Appendix 1 to
Annex A
HB(A)/CM/6/3
Dated 5 January 2004

THE SOLDIER's LOAD : HISTORICAL DATA.

A. Introduction.

1. Official concern, study and recognition that the imposition of excessive manpack loads on infantry soldiers carries penalties in terms of personal combat efficiency as well as long-term health date back in the British Army to the late 1860s.

2. The following information has been collated from a range of official medical and equipment-development studies as well as after-battle reports and unit accounts. It also includes details of where official policy as to loads / categorisation of types of equipment have been made and included within doctrine.

B. Quantative Assessments.

3. The material mentioned above is however very short on detailed quantitative reporting as to the impact in actual terms of soldiers disabled/unfit for duty as a result of excessive loads / long marches / arduous terrain/climatic conditions.

C. Historical Data.

4. The question of the impact of the soldier's personal equipment on health was first raised in March 1864 by the Deputy Inspector General and Professor of Military Medicine at the Army Medical School at the Netley military hospital, during a lecture at the Royal United Service Institute (RUSI) in which he summarised the results of trials that he and his colleagues had conducted to examine the effects of the existing accoutrements (now more commonly termed Personal Load Carrying Equipment [PLCE]) on the soldier's respiration. With the assistance of the Commanding Officers of the Depot Battalion at Chatham, several 'trials' had been conducted and two reports summarising their findings submitted to General Sir Henry Eyre, the General Officer Commanding (GOC) at Chatham. The doctors believed that their trials and previous observations indicated that the existing accoutrements were:

> "Highly injurious to the health of infantry soldiers and have a large share in producing many affections of the lungs and heart common among them."(RUSI Journal 3/1864)

5. Maclean explained that his team of four physicians had agreed on four general principles to govern the design of accoutrements for the infantryman. These all dealt rather with the equipments design than the total weight carried: at this time it was some **60 lbs**, including clothing worn and 3 day's rations.

6.While the need to reduce 'total' weight was less clearly emphasised, this is the first clear sign of an understanding of the need to evaluate, as scientifically as possible, the impact of load carriage and the fact that any change to existing in-service patterns of PLCE would have cost impacts was appreciated but it was suggested, the expense had to be set against the financial burden imposed on the Army as a result of defects in the existing pattern which led to the discharge on medical grounds of significant numbers of soldiers.

7. In May that year the Secretary of State for War appointed a committee to:

> 'consider how far the large amount of lung and heart disorders prevailing among soldiers of less than two years service is attributable to the present system of drill and accoutrements...and the best pattern of accoutrements and knapsacks best adapted to obviate the evils complained of.' (Eqpt Cttee; 1st Rpt; pub HMSO 1865).

8. The fact that the total load carried was of relevance, was reflected in reports from Service Observers of the recent 'Prusso-Danish' (1864) ' and 'Austro-Prussian' (1866) conflicts, all of which commented on a clear need to reduce the infantryman's total load. A significant impetus in this line of thinking was the recent introduction of breech-loading rifles which it was felt would increase the infantryman's rate of fire in turn e, making the carriage on the man of greater quantities of ammunition important.

9. Reflecting this last point, in producing its preferred PLCE design in 1869, which did not dramatically reduce the overall weight but carried it more efficiently, the Committee's agreed that more ammunition should now be carried by the man – an increase from the current 60 rounds to 90 – but that this should only take place immediately before an action; the extra rounds going into the 'Valise' or pack.

10. A suggestion made frequently at that time that use be made of light carts to carry the men's packs; was rejected because of the impossible demands this would add to the transport organisation and because it increased the danger of the troops becoming separated from their 'necessaries'. The Committee did however seek to reduce the load by suggesting that the spare pair of trousers and the spare pair of boots, both currently carried in the pack, be omitted and that light canvas shoes be substituted for the latter.

11. Subsequently further discussion of the 'necessary' load and the best design of PLCE – inventors in effect continually approaching the War Office with 'improved' designs, saw further Committees which deliberated from 1880-1882. They did draw on recent operational experience through a questionnaire on the subject by means of a questionnaire on the subject of equipment, the total load carried and related matters, which they sent to some forty officers who had served in the recent war in Zululand.

12. The main difference in the Committee's final pattern which 'Modified' the existing design was that the Valise was larger, to carry both the greatcoat, previously worn outside, and also all the other small items in the man's possession so that when changing station, the Valise could be used as a general kit bag carried in unit transport. In addition the ammunition pouches could now hold a total of 100 rounds.

13. The Committee's work also gave further thought to the question of the soldier's overall load. Their recommendation for the omission of the spare trousers and shirt, spare boots (to be replaced by light canvas shoes) meant that even with the extra 30 rounds of ammunition, there was a saving of some 6½ lbs; the total load carried reducing to **52 lbs. 4oz. (23.75 kg).**

14. Apart from consideration and trails of different patterns of PLCE, a greater understanding of the importance of fitness and training emerged. One senior officer commented on the need to train the troops for marching long distances and preparing them for Active Service

> 'Since I took up this Command, I have endeavoured to impress on all ranks the necessity of practice in parading and marching [on training] in Marching Order...If troops do not march in Marching Order their performance is no test' (Report on Army Manouvres1895).

15. Further work on realistic training and the medical aspects of load carriage was was undertaken in 1895 by Brigade-Surgeonof the Army Medical Department who organised practical trials of six days continuous marching by a groups of infantry based in Ireland. This led him to suggest that the soldier's total equipment load could be lightened by adopting modified designs of boots and clothing. He said:

> 'It is a well known fact that a few pounds make a difference to a horse in even a short race and the present kit could in a way I have suggested be lightened by about 2½ lbs which would be a considerable difference to a man, especially as most of it would be taken off his feet...if the Royal Munster Fusiliers had had some kit such as this...they could have exceeded the distance they have just done. . . '

16. Similar work was underway elsewhere. In Germany the authorities were conducting experiments in conjunction with the medical community. A series of supervised marches were carried out by a number of subjects carrying different weights over varying distances. The Germans' conclusions were that a weight in excess of 68 lbs (31 kg) was too great to be carried under any circumstances while up to 59 lbs (27 kg) could be carried some 25-28 Kms in cool weather without adverse effects and some 48 lbs (22 kg) could comfortably be carried a similar distance in almost any weather conditions. These figures were fairly widely reported across Europe and seem to have been accepted as the latest medical advice.

17. During the operations against the Boers in South Africa in 1899-1902, the British troops were frequently called on to make long moves across country to pursue of a highly mobile and elusive enemy. Although maximum use was made of the limited railway network as well as locally procured animal-drawn transport, inevitably the infantry had often to move on foot relying for considerable periods on what they could themselves carry.

18. Under the acid test of war the PLCE was found wanting. The War Office acted fairly speedily and sought in the light of the recent operational experience to establish how much kit really needed to be carried on the man and the opinions of COs who had served in South Africa were n canvassed. These almost unanimously agreed that a drastic reduction in the total load could be achieved as the following two comments illustrate.

'It is, I think, most important that something should be done to reduce the weight carried by the soldier. It is too much to expect him to fight well if he is worn out and done up by long marches and the heavy weight he carries. It is difficult to say what effect this overloading of the men on long marches had in increasing the number of prisoners taken by the enemy, men carrying nearly 60 lbs. and marching enormous distances, and often with very little inside them, may get so done up that they, at the time, do not care what happens to them, all the heart is taken out of them. I think, therefore, great efforts should be made notwithstanding the cost of as light material and metal and possible, and that much of what is now carried on the man should be carried on pack mules, one or two should be allowed for each section, canvas shoes, tins of grease, emergency rations, waterproof sheets and possibly even haversacks might be at times so carried.'

'As regards the kit a man should actually carry, my opinions are entirely derived from regimental experience as a company officer in three campaigns in India, and as a Commanding Officer in this campaign. I am strongly of opinion that the less weight we put on our men's backs the better results we shall get, and for two reasons:-

1. I believe that, other things being equal in actual battle, the lighter equipped of two combatants, and the least encumbered by extraneous articles, will win the day; he is at any rate the best adapted to take cover or to get rapidly across an exposed zone.

2. I do not consider our men are naturally good marchers; British troops have never had that reputation, but with strict marching discipline they can be taught to march well, and the lighter they are equipped the easier it is to teach them. I have frequently heard the argument adduced that foreign soldiers carry "so much" therefore we must train our men to carry a like amount. I do not believe that many of the overloaded soldiers could fight a modern battle without throwing away a portion of their equipment.'
(War Office: Extracts from Reports of COs of Units in S. Africa 18991901).

19. These views found favour with the Army's then Commander-in-Chief, Field Marshal Roberts who had led the troops in S.Africa for the most intense part of the British successful operations which led to the formal Boer forces' surrender.

'It is not possible to fight under the altered conditions of war if they have to carry anything except their rifle, ammunition and possibly at times a greatcoat or waterproof cape'.(Report of Cttee on clothing for Soldier in Pace &War; War Office 1902).

20. After considerable discussion in the War Office it was agreed that the soldiers load should be reduced with only the greatcoat with spare socks, shirt and cap in its pockets and rifle ammunition, water and basic ration being carried on the man. With an ammunition level of 110 rounds, this gave a total load of some **50.43 lbs** which compared favourably with that of other nations' infantry: France, 54.69 lbs; Germany 58.97 lbs, Austria 62.19lbs and the USA, 55.43 lbs.

21. Just as a new PCE design reflecting the recent experience was issued, the Advisory Board for Army Medical Services suggested that the effects of food, training and clothing on the health of the soldier should be considered, and a committee was established in 1906 to look into these aspects and the system of the physical training of recruits. Among other issues – although the total load was not covered in detail - the subsequent Committee considered that

> 'It is recognized that fatigue or distress during marching diminishes the fighting capacity of the soldier, even apart from any subsequent impairment of his physique; a soldier directly after a trying march is unable to shoot well, for there is constantly seen under such conditions a trembling movement of the hands which cannot readily be controlled.' (Rpt of Physiological Effects of Marching; Cttee on Physiological Effects of Food, Training & Clothing on the Soldier; issued 1908).

22. In order that reliable data could be obtained, particularly on the 'physiology of marching' the Committee organised a series of practical trials using both Regular soldiers and volunteers from the Physiological Laboratory of Guy's Hospital, as well as some Committee members. Their report noted the soldier did not receive sufficient progressive training in route marching and digging entrenchments. They recommended that one march per week should be carried out as a regular part of training with the distance and weight carried being progressively increased. Subsequent steps included the creation of lead weights to provide one battalion's worth of weights equal to the Active Service ammunition load for use on exercises.

23. Although an improved PLCE design was introduced in 1908, the re-introduction of a man-carried entrenching tool meant that the soldier in 1914 carried in **Fighting Order 49lbs 2oz, in Marching Order 57lbs 2½oz** (both equipments with 150 rounds of ammunition).

24. When the 'Great European War' as it was first known broke out in August 1914 all the infantry of the Regular Army had been issued with their '08 Equipment. The early weeks of the War involved the Regulars (and recalled regular reservists) hard marching especially , during the 'Retreat from Mons'. Several contemporary accounts record that full marching order was soon found to be too heavy.

25. At a meeting of War Office Directors in November the same year, it was reported that although all men in the Expeditionary Force now had their greatcoats, there had been great difficulty in making them carry these and their packs and that some packs were still being carried on the first line transport, while 15,000 greatcoats had been lost in the retreat from Le Cateau.(War Office Directors 50th Mtg, 8.11.14.)

26. A major factor in the load carriage problems experienced during these operations was the fitness of the troops themselves. A large proportion of the British Expeditionary Force (BEF) were reservists, in some units it was at least 50% of the ORs and their fitness was naturally less high than that of their colleagues.

27. As the war progressed the introduction or wider distribution of new weapons to meet unexpected battlefield demands: eg hand grenades, usually carried in addition to the existing weapons, added to the soldier's load. This upward trend in the total load was exacerbated by the issue of specialised clothing eg: leather or fur jerkins/coats to cope with more static warfare in harsh weather conditions; the conditions themselves added to the load as the clothing and equipment absorbed water/became coated with mud. Finally there were new protective items such as the steel helmet and the Anti-Gas Respirator.

28. Equally, or more significant were the difficulties of re-supply in an advance. This led to many commanders to seek to insure against problems by issuing the assaulting troops with even greater quantities of combat supplies. Higher Command sought to curb CO's and Formation Commanders' desire to over-insure through instructions against over-loading: without however much success. As early as the autumn of 1916 notes detailing the problems of the soldier's load in the initial attacks of the Somme offensive were circulated to the forces in France. These stated that it was important to lighten the man's load as much as possible and that extra items for consolidation of captured positions - wire, pickets, ammunition etc. - should <u>not</u> be carried by the first three waves of the assault troops.

29. Finally an added problem – though far more difficult to quantify -was the effects of physical and mental fatigue of the troops following duty in the trenches or after a long approach march.

30. In terms of weight of load carried, this has been, and still is on occasion, the subject of debate. The British Official History estimates that the total load (clothing, equipment, weapon etc) of the troops assaulting in the July 1916 Somme offensive carried in Battle Order some 66 lbs. Estimates by other participants for the total load carried at various times range up to 80lbs for the period 1917-18, rising to 112-114 lbs as the weight of the greatcoat alone could increase by 20 lbs when wet through.

31. Contemporary Army instructions for the Somme operations stated that the troops could not move faster than 50 yards at the 'slow double' and 20 yards at the 'charge' if they were to be fit for fighting at the end.

32. Post-War 'Lessons' reports/studies further recorded the opinion of participants that the load increased significantly and was excessive, adversely affecting the soldier's ability to fulfil his assigned tasks.

'From 1915 onwards the soldier entered the battle carrying every conceivable article of offence and defence...this impossible and cumbrous load hampered his movements and undermined his stamina.'(Committee on Lessons of the Great War; War Office, 1932/33).

'The enormous load carried by the infantry soldier in the Great War deprived him of his fighting ability and made him into a beast of burden only able to close with the enemy when put there by the fire of other arms.'(*ibid*)

At Gallipoli '. .Well conceived operations to turn the Turkish flank...were hampered by a variety of causes...a powerful contributory factor was the heavy load carried by the troops...The enterprise failed mainly owing to the troops being beaten by fatigue long before they reached the summit of the hills...The idea [of this overloading] being that having reached the objective the soldier should be self-supporting until rearward services of some kind could be organised. It resulted usually in the men failing to carry out the first stage of the programme, viz even reaching their objectives, or in their throwing away most of their impediments, which led to the very shortage of ammunition etc. which it was desired to avoid.'(*ibid*).

33. After the end of active hostilities the subject of suitable mobilisation equipment was addressed. The first report of the War Office Committee noted that:

'A review of the articles of equipment carried into action during the later stages of the war raises once more the question of the weight which the individual soldier should be called upon to carry' (Committee on Mobilisation Equipments & War Reserves).

34. The aim was to identify those items essential at all times for the man, and those additional items which should be issued when going into action. The former to be kept to a minimum and that the latter not issued until the last possible moment. Subsequent research convinced the War office that:
made them: :

> 'that in the end economy will result from the adoption of this principle, as it should eliminate much of the loss of equipment due to ordinary casualties before troops come into contact with the enemy, and to the unauthorized discarding of equipment for which no immediate necessity is apparent [to the bearer]'.(*ibid*)

35. A series of trials then followed which resulted in a general consensus that a Steel Helmet & A/Gas Respirator – adding some 6lb – were essential. One sub-committee included Professor G E Cathcart (late Major RAMC) who was a member of the Army Hygiene Committee and Inspector of Physical Training and its noted that evidence from trials undertaken in France during the war pointed to a weight of about 55lbs as being an acceptable load for open warfare and they recommended a maximum of 55-58 lbs. This required the omission of the greatcoat and entrenching tool and the reduction to90 rounds (from 150) of the ammunition routinely carried.

36. Of significance in these discussions was the input from the General Staff's representative on the Hygiene Committee - Colonel J F C Fuller, the Deputy Director of Staff Duties (DDASD) at the War Office – later to become a leading military theoretician. He pointed out, based on his own service experience u that during the war the infantry could not march anything like the distances achieved in pre-war training, however these peace-time marches had not been made carrying the full Active Service weight. He also noted that in WW1 before battle the men inevitably

got little sleep or rest with all the preparations and even when these were complete, the stress of the impending action compounded these debilitating effects. He had considered that with the fighting load at some 72 lbs – the figure he had calculated as true for the Battle of Cambrai in 1917 - with this 'excessive' weight and the other factors already mentioned, the physical capacity of the infantry was limited to a move of about 10,000 yards - some 7 miles (9.2 kms). In support of this he stated that at the Battle of Amiens in August 1918 the troops were exhausted after an advance of 13,000 yards and this included the reserves, not just the assault units.

37. Of significance is the comment by the Committee that:

> 'the secret to be discovered is not what a healthy man can possibly carry under normal peace conditions, but what is the economic load for him to carry under war conditions that will leave the soldier sufficiently fresh for action' ( ).

38. Work by Professor Cathcart, at the Committee's request determined the 'maximum load to be carried by the soldier should not exceed 30% of his body weight', giving they felt an average of 40 lbs. This figure was estimated as being acceptable for a march of some 20 miles (32.5 kms) on main roads under European climatic conditions.

39. When the Army Council considered these recommendations , the difficulties in reaching this low figure were noted, the Deputy Chief of the Imperial General Staff (DCIGS), said that he believed that it was clear from history that it was impossible to achieve such a low total weight:

> 'the essential weight to be carried by the foot soldier is more or less constant between 50 and 60 lbs. and that experience has shown us that the soldier has been able to carry it throughout arduous campaigns'( ).

The Master-General of the Ordnance (MGO) felt that

> 'the ultimate conclusions of the Army Hygiene Committee....should not be allowed to exercise too much influence...there are of course many practical aspects of the problem which cannot be ignored and the decision must necessarily be a compromise.'( ).

40. The in response Committee stressed that the problem was to:

> 'reinstate an equilibrium between equipment and mobility. If the soldier fails to reach, on account of his heavy equipment, the critical point at the critical time, he is useless. If he reaches the point too exhausted to fight he is almost as useless'.(ibid)

41. In its work the Hygiene Committee now had the historical study produced by Major N V Lothian MC RAMC on 'The Load Carried by the Soldier'(Army Ghygiene Advisory Committee Report No 1 published 1932). This suggested that armies in the past had all suffered very severely from straggling and other forms of 'manpower inefficiency' largely because of excessive loads and inefficient methods of carriage. (see extracts at Appendix 1).

42. Subsequent medical research based on measurements and taken statements from the 'guinea-pigs' - two RAMC officers - carrying out the test marches in the gymnasium at Aldershot showed that even under these relatively favourable conditions - an even, predictable surface and no extraneous debilitating factors such as poor rations, adverse weather or other tiring tasks - the maximum efficient load was found to be 40% of the man's body weight. Reflecting what they as Medical officers considered were the likely conditions of Active Service, the realistic figure was therefore suggested as 33% of body weight.

43. These findings, considered to have both confirmed their own initial medical opinions and the results of earlier studies in the previous century, were reflected in Professor Cathcart's chapter on 'Energy Expenditure' in one of the volume of the British Official History of the War dealing with the Medical Services

> 'Under normal conditions the strain on the physique of the men was very severe in the march up to the trenches even although the troops had been adequately rested in "rest billets", but the evils were aggravated when the man, already fatigued both physically and mentally by duty in the trenches, were called upon to carry an excessive load for many miles frequently under adverse conditions as regards both road and weather, and with the atmosphere probably so saturated that the heat-regulating mechanism of the body was tried to the uttermost. Little or nothing could be done to lighten the load during the course of the war. It is, however, a problem the solution of which must be faced'.
> (British Official History of the War; Medical Services; pub)

44. However only in 1930 was there renewed attention at the War Office in the subject when with interest in increasing the overall mobility of all arms, the new CIGS, General Milne, established a committee to consider the best organisation for the infantry elements of an Expeditionary Force . CIGS said after initial reports that he hoped

> 'that it may be possible to arrive at some satisfactory dress and equipment in time to try it out in the summer. <u>To my mind I think the weight carried should not exceed 40 lbs., if possible it should be less</u>'.
> (Committee on Dress & Equipment of the Soldier)

45. The resultant design saw a total weight of **51.5lbs.** of which 2.5lbs could be 'dropped off' to allow for additional ammunition. The provision however of motorised infantry unit transport with a 'platoon' vehicle , this suggesting the end to any great extent of a requirement to use Marching Order.

46. However in the subsequent World War 1939-45 the need for the infantry to maintain an adequate long distance marching ability was soon reaffirmed and at frequent intervals units were exhorted by the War Office to carry out practice marches of about 12 miles, this being apparently the maximum distance it was considered troops would have to cover before the transport could join them.

47. During the War the soldier's battle load increased slightly with both an entrenching tool and the frequent carriage (as in WW1) of a full sized digging implement, partially offset by the introduction of lighter anti-gas equipment and a smaller bayonet: some 1½ lbs in all were added to the load.

48. WW2 brought into particular focus the needs of men earmarked for Mountain Warfare, as well as for Commandos and Paratroops, all of whom had a need for man-packing capability over considerable distances of their crew served infantry weapons, such as mortars and machine guns, as well as their heavy and bulky ammunition.

49. Detailed and practical investigations were undertaken by the Army assisted by research bodies set up by the Ministry of Supply (the most important of these was the Army Operational Research Group [AORG]; which in spite of its title, was actually under Ministry of Supply control, with scientists and operational analysis specialists working closely with military staff. Help was also received from the Medical Research Council & its subordinate Military Personnel Research Council.

50. In study of the practical effects of the carriage of loads of differing weights, it was found that loads of up to 25 lbs did not affect performance except to reduce the man's speed, and could therefore be considered as a comfortable 'fighting' load. Loads of above 50 lbs reduced performance in an 'increasingly steep curve' and 50 lbs was generally accepted as the preferred load limit for operations requiring manpacking over long distances or for long periods.

51. The subsequent experiences of British Special Forces - SBS, SAS and Raiding Support Regiment - particularly in the Aegean islands and Greece confirmed these views. Even for these specially trained troops, the usual load in the rucksack was some 55 lbs.; indeed one of their reports suggested that if the men were to be 100% operationally fit at the end, some 25-35% of the man's weight was the maximum load for long or strenuous marches (No 1 SBS War Diary 1944).

52. In the immediate post-war period, reflecting on wartime experience there were several years of study of 'optimum' loads etc. While some clung to the long-established ideal load as 30-35% of bodyweight figure, usually therefore some 40lbs, , others noted that he figure of one-third of the body weight for the load in excess of clothing was misleading and that the figure should be ½ body weight including clothing and personal equipment. Weights actually carried in various theatres were cited. Some in excess of 100 lbs had been carried successfully by specialist mountaineer troops after long training; in the tropics, 32nd Infantry Brigade had carried total loads of between 85 and 95 lbs during an advance of some 215 miles in 40 days with an average daily advance of 5 miles a day, but one maximum effort of 36 miles in two days including a 2,000 foot climb - apparently the troops were still in a fit condition when they finished. Therefore the evidence from operations showed that heavier loads could be carried for short distances or after special training and by

very fit, acclimatised troops, but there was general agreement that impetus to the drive to reduce military loads was essential .(Directorate of Tactical Investigation Battle Studies 1945)

53. Research was complicated by the publication of an article on the Soldier's Load by an American Army officer, S.L.A.Marshall in the US Army's Journal in which he suggested that a total of no more than 40 lbs. was attainable for the man's fighting order and should be the maximum load; [this was later to be expanded into his work 'The Soldier's Load & the Mobility of a Nation']. The School of Infantry responded by pointing out that various items considered by the British infantry to be essential had been omitted from Marshall's total load and these accounted for the difference of some 19 lbs. The disputed items included entrenching tools, ground sheet/cape and mess tins and a reduction in ammunition (only 50 rounds). The War Office, while accepting the range of views that existed, set its physiological requirements, as **46 lbs for Fighting Order and 63 lbs for Marching Order**

54. Interestingly the Combined Operations Pamphlet in 1951 on the 'Employment and Training of Commandos' for Land Operations in its appendix on 'Man Loads' reaffirmed the view that one-third of body weight was the ideal. While accepting that far heavier loads could be carried with training and proper equipment, it was stressed that such loads were for marching/porterage only and <u>not</u> for troops expected to engage in fighting :

> 'mobile, active aggressive fighting on foot is not physically possible to heavily loaded men. Apart from physical factors, fear, fatigue are all the same in their moral effect on an advance. It is therefore important not to confuse loads which can satisfactorily be carried on the march with loads which can be taken into battle' .(Employment & Trg of Commandos; 1951).

55. Efforts to design an improved PLCE ran on for several years but the total weights in Combat and Marching Order remained around the **'practical' level of 48lbs for Combat Order & 65 lbs for marching order.**

56. Attempts by users to enlarge the carrying capacity of the 1958 Pattern equipment to give 'flexibility' as to load, were firmly rejected. Their size had been <u>intentionally</u> limited in an attempt to control the degree of overloading to which it was accepted the soldier would be subjected by commanders.

58. The Borneo 'Confrontation' operations 1964-66 with long-range jungle patrolling tasks saw loads for the rifleman rise to some 80lbs and a study by the Army Personnel Research Establishment (APRE) showed that the 'basic' Fighting Order for UK based troops was **59 lb rising to 63 lb** if the NBC Respirator was carried.

59. Reflecting these problems the e Defence White Paper for 1965 said:

> 'As to the equipment of the fighting soldier, it is recognised that he should carry no more than a 55 lb load, and it is planned to provide lighter yet robust equipment'. (SDE 1965, Cmnd 2592),

60. A special Steering Group for a new infantry PLCE was established. The Infantry Committee in 1965 reported a study for it by the Army Work Study organisation which noted that:

> 'The current fighting load of the infantryman has reached a level in excess of his ability to operate at maximum battle efficiency. . . the temptation to carry extra items for insurance must be resisted'

61. At the 1973 Infantry Conference, the Director of Infantry told Commanding Officers of infantry units that they must use their judgement as what was not to be carried since to attempt to carry the present complete fighting scale (ranging between **70-100 lbs**) would simply defeat the soldier. This was reflected in doctrine:

> 'It must be the aim of all commanders to take every opportunity to lighten the load carried by their men. Experience has shown that a tired man is not only less alert and less observant but he succumbs to fear more readily.. . Therefore platoon commanders should constantly ensure that their men only carry their fighting load plus absolute essentials. Other items of the load should be readily available but not man-packed. Platoon commanders must get away from the tendency to carry everything that might be needed under every eventuality. General Scharnhorst wrote:"The Infantryman should carry an axe in case he may have to break down a door". Such an outlook is the start of overloading. Aim at carrying the essential items only'. (Infantry Training Pamphlet No 45 Pt.3; The Infantry Platoon, 1977 edition).

62. Little had changed by the time of the Falklands operations of 1982. There in particular because it was exclusively a 'foot-soldiers war', the problem of loads was highlighted. This was exacerbated as enemy action destroyed 4/5ths of the Medium Helicopter Lift so that troops had to carry more of their kit – extra clothing – etc.

63. Loads were well into the **70-80lbs** range with Support Weapon personnel, man-packing these items with even more: 42 RM Cdo experience was that a soldier with personal kit & man-packing a 81mm Mortar tube had **136 lbs**; a soldier with a MILAN Firing Post had **146 lbs**.

64. However the subsequent House of Commons Defence Committee investigations heard from Service witnesses that many men had in fact taken far more kit than they needed because they were under the impression that conditions would be worse than they turned out to be. Even after the FI operations, trials conducted by RM COs showed that some Marines would have still take more kit than they could sensibly carry. It must be noted that how far these excessive loads were actually carried in the Falklands is debatable. 45 Cdo RM which set out to 'Yomp' from San Carlos to Douglas settlement with full marching order, covered 13 miles+ of rough terrain at a cost of some 15 men with sprained ankles etc., and then decided to cache their Rucksacks and move on in their lighter Fighting Order.

65. One aspect which it was hoped would help was the decision to adopt a basic weapon both lighter itself and with lighter ammunition in 5.56mm rather than 7.62mm calibre. However, although the SA80 with its sight - the SUSAT - was significantly more accurate a weapon, the reality was that the amount of ammunition carried

simply increased. The suggested load for the SA 80 was 330 rounds - 6 x 30 round magazines and a further 150 rounds in a bandolier compared with the current total of 5 x 20 7.62mm magazines plus a 50 round bandolier or belt for the MG.

66. During the development and trials of the new PLCE, a far more flexible and suitable design than any predecessor, the Infantry Directorate emphasised the need to constantly check what load needed to be carried, accepting that this was inevitably a compromise between the carriage of 'enough' ammunition, personal protection against battle risks, weather etc plus essential food and water. The aim was an infantryman agile and mobile enough in the assault with enough stamina to change position quickly and bring effective fire down on the enemy. In Combat and Marching Order he should retain enough stamina to keep going all day, if necessary, at a reasonable pace. Although fitness would play excessive loads carried combat penalties. Reflecting the constant concern over having 'enough' ammunition, the need to carry full scales of ammunition and to practice realistic ammunition resupply/ redistribution during training was also stressed. Overloaded soldiers would quickly become exhausted & the mission put at risk.

67. However the weight levels gradually climbed, notably 'Assault Order'.. Recommended as **16Kgs (35 lbs)** [including NBC IPE] **by 1988 it was 20.76 Kg.** (Inf Trg Pamphlet 45 Pt.3. , Inf Pln; 1988 edition).

68. Recent UK combat experience has been limited in terms of sustained non-mechanised infantry intensive combat operations. The Gulf 1990-91 was almost exclusively conducted by armoured infantry. However reports from Op JACANA 2002 confirm that the operations required the carriage of very heavy loads, especially by signallers and weapons crews: weights exceeded 120lbs (3 Cdo Bde Lessons Identified).

69. Finally to reflect fairly recent US experience, a US Army study of the Grenada 1983 operations based on interviews with men from the seven battalions involved, including the 'elite' Ranger and Airborne' elements, found that in many instances the soldiers were still going to combat grossly overloaded. One US Ranger said:

> 'Most people jumped [para assault] with excessive loads. . . . I jumped with an M60 MG, my rifle and my .45 pistol. I also had about 1,000 rounds of 7.62mm ammunition and some frags [grenades]'. (Lt. R Thomas 2/75th US Army Rangers).

Another said :

> 'We attacked to secure the airhead. We were like slow moving turtles. My rucksack weighed 120 lbs. I would get up and rush for 10 yards, throw myself down and couldn't get up. I'd rest for 10-15 minutes, struggle to get up, go 10 more yards and collapse. After a few rushes I was physically unable to move, and I'm in great shape. Finally after I got to the assembly area, I shucked my rucksack and was able to fight, but I was totally drained'.
>
> 'I thought the rucksacks we were tacking had too much in them. . . They were a little too heavy. It proved out once we got down there. . There were all those guys sitting on the roadside with IV tubes in them. There's no way the guys could do it. We got most of those heat casualties walking up that one hill'.

Reflecting in particular this last case, the several units involved in that phase of an approach march with little or no combat, saw in one day 29 soldiers from one battalion incapacitated by heat/fatigue with another battalion treating 48 heat casualties at its RAP.'*Grenada Overloading'*; US Army's '*Infantry*' Journal Jan-Feb 1987.

70. The US Army's '*Infantry*' Journal for May-Jun 1992 again addresses the Soldier's Load, in particular that of the non-mechanised infantryman. Reiterating the long-standing views of US military historian & Ops Analyst SLA Marshall and others, it suggests that the 'rules of thumb' are the distance marched in 6 hours decreases by one mile for every 10lbs carried above 40lbs. The time of an assault course [round] increases by 15% for 10lbs carried above 40lbs'.

71. It then describes how in DESERT STORM in 1991, 'The battalions that entered the Euphrates River Valley had learned a valuable lesson of their earlier training attack. . Although their fighting and approach march loads were still as heavy, they knew better how to manage them. When units arrived at their landing zones, the battalions secured their rucksacks (approach march load) with a minimal guard force while the rest occupied their positions. As soon as practicable, soldiers went back, a few at a time, to retrieve the rucksacks'

72. Summary. The historical overview shows a general consensus as to the ideal and the realistic loads as well as some information on the seemingly inevitable excessive loads that emerge in combat.

73. Unfortunately while the overall impact of such excessive loads is well attested, quantifiable data on how many individuals per unit were unfit for subsequent action/activity at any time as a result of overloading is harder to pin down.
