On Her Majesty's Service

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MUSEUM.

~~ON TOP OF SHELVING, FIRST BAY LEFT HAND SIDE,~~

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PROFILE

Newspaper of the Royal Ordnance Factories

JANUARY 1984 No.40

This colourful, eye-catching float publicised the products of the Royal Ordnance Factories in the Lord Mayor's Show in November.

It was mounted by ROF Chorley in association with 55 Ordnance Company (V), Territorial Army Unit, pictured are the soldiers who showed off the float in the procession. They are: Major Norman Bonney, Sgt David McDougald, Staff Sgt Martin Rablega, WO2 Ken Morns, L-Cpl Colin Smith, and Pte Darren Marley.

Unfortunately industrial action by BBC Outside Broadcast crews prevented the Show from being televised as usual, but many thousands of spectators, including a substantial proportion of overseas visitors, witnessed the event.

● Another picture, back page.

BILL POINTS WAY TO ROF's FUTURE

Ordnance Factories and Military Services

A

BILL

To make provision for the transfer to a company or companies of certain property, rights and liabilities to which Her Majesty or a Minister of the Crown is entitled or subject and which are attributable to the operations of the Royal Ordnance Factories; to make provision for the transfer of property, rights and liabilities between such companies or from them to the Secretary of State or Her Majesty; to make provision about the finances of such companies and about investment in them and their subsidiaries; to make provision for the extinguishment of certain liabilities concerning the Royal Ordnance Factories; to make provision for the payment out of money provided by Parliament of certain sums required by the Secretary of State in relation to International Military Services Limited; and for connected purposes.

Presented by Mr. Secretary Heseltine
supported by
Mr. Chancellor of the Exchequer,
Mr. Secretary Tebbit, Mr. John Moore, and
Mr Geoffrey Pattie

Ordered, by The House of Commons,
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Holding company and four subsidiaries to be the new structure

THE Ordnance Factories and Military Services Bill introduced by the Government to Parliament on Monday December 19 represents an important first step in changing our status.

The purpose of the Bill is to enable the ROF Trading Fund to be wound up and certain property, rights and liabilities to be transferred to a new company. The company will operate in a fully commercial environment under the Companies Act, although initially it will be wholly owned by the Government. The introduction thereafter of private capital, and when and how this can be achieved best, will be decided later.

by Fred Clarke
Chairman ROFs

ROFs' present and proven manufacturing capability is being enhanced not only by the creation of our own sales organisation but also by our having research and development in the propellant and explosives areas. It is planned that operations of PERME Westcott and PERME Waltham Abbey (South Site) will be transferred to us with effect from April 1 this year.

Proposals for this transfer are now being finalised and a consultative document about the transfer of research and development facilities and staff has been issued. About 900 people will be affected. They will include industrial workers, scientists, support staff, engineers and others. They will be a very important new resource and I know they will make a valuable contribution to our future. I look forward to meeting as many as possible of them as individuals and welcoming them to the ROFs. We need their skills and expertise and I hope they will soon feel at home with us.

Explanation of the Bill and full text of the Consultative Document on transfer to ROFs of R&D facilities and staff — page 3

Debate of the Bill in Parliament begins with its second reading on Monday January 16. Subject to further Parliamentary debate and approval and the subsequent enactment of the Bill, it is planned that the ROFs will be incorporated in October 1984 as a holding company with four subsidiary companies — Small Arms, Ammunition, Weapons and Fighting Vehicles, and Rocket Motors. We have not yet finalised all the details of this structure although it is of course a priority task which is well in hand. What is clear is that it will allow us to build upon the many individual strengths we now have without losing the advantages that we have as a flexible and diverse group.

● TO PAGE 3

INSIDE:

Smoke system chosen

The Ministry of Defence has accepted the Royal Ordnance Factories' submission for full development of a new Visual and Infra Red Screening Smoke.

After competitive tendering, including exhaustive comparative trials against products offered by a number of firms, the ROFs solution has been chosen as the most suitable system for turreted armoured fighting vehicles.

First Aiders achieve new standards of examination

SINCE the new criteria for First Aid examinations were introduced last year, ROF personnel have gone all out to shape up to the standards required.

Glascoed reports that following the programme of First Aid at Work Courses organised by Eric Ingham — Fire Officer, there are now 88 employees trained to competent standard. At a gathering in the main canteen recently, the original Glascoed First Aiders, among them several competition team members and trainers, received their new style certificates from Factory Director Gerry Glover, who congratulated everyone on the results obtained.

The men's team who were successful in a First Aid competition at ROF Chorley came away with the Worden Shield, they were also joint winners with Radway Green in the Wren-Helmore Shield.

At Chorley an additional 37 students have passed the new examinations, bringing the total there to 75. This latest batch all achieved more than 70 per cent in three written papers and three practical skill tests.

Yet more successes have been reported from ROF Nottingham, where the entire 1982 apprentice intake have passed with flying colours. In addition a special refresher course was held for six existing First Aiders with the result that they renewed their certificates with a 100 per cent pass rate.

RSAF Enfield also boasts a good record with 15 members of the workforce having recently earned their First Aid at Work certificates.

Ability to administer First Aid is of immense value as the need for this knowledge and expertise could arise suddenly any time. Whether at work, at home, or travelling, a First Aider's skills could make all the difference — an injured person's survival could well depend on them.

If you have not already done so why not take up First Aid training? Wouldn't it be good to know that if you were the only person present at the scene of any kind of accident you could cope, and possibly be responsible for saving a life?

Have a word with your First Aid representative where you work. He or she will be able to give you details of the training arrangements and how to enrol.

Above: Glascoed's First Aid Men's Team proudly pose with the shield they won in a competition at Chorley. They are (left to right): B. Watkins, G. Parrott, R. Preston, G. Sayce, Factory Director and A. Felton. Below: The factory's original First Aiders, who received their new certificates from Factory Director, Gerry Glover

Chorley's latest batch of successful "students" pose with Mr T. Jebb (Assistant Director), Dr Colin McNamara (Factory Medical Officer) and Mr Stan Taylor (Chief Training Officer)

Among those at ROF Nottingham who passed their First Aid examinations with flying colours were the 1982 intake of apprentices. Successful "students" line up here for a commemorative photograph

Director of RSAF Enfield, Mr Stan Carroll, poses (front row, centre) with some of the factory's successful First Aiders plus the training and examining team

Success for accountant Paul

Paul Shires, an EO in Financial Accounts at ROF Leeds, has scored a resounding success in the Institute of Cost and Management Accountants examination. He received his certificate from Mr. J. Burnup (right), President of the Institute's West Yorkshire branch. The year 1983 will be one to remember for Paul, as his other happy event was the birth of his daughter Victoria. Congratulations, Paul, on both counts!

Army raises three new brigade headquarters

Two new brigade headquarters have been raised by the Army — 143 Infantry Brigade HQ at Shrewsbury and 160 Infantry Brigade HQ at Brecon. Effective date of their establishment was January 1, and a third, 43 Infantry Brigade HQ, is to be formed at Exeter on April 1.

The establishment of these headquarters is designed to improve the supervision of peacetime training of the currently unbrigaded units in the Wales, Western and South Western Army Districts. It constitutes the final phase in the provision of one-star headquarters for United Kingdom Land Forces, begun two years ago, to enhance the effectiveness of the command structure.

Aid for Dr. Barnardos

In response to a BBC Breakfast Television appeal for donations to Dr. Barnados, an informal collection at R.O.F. Nottingham raised £70. Vandals had destroyed all toys at the Belfast Warehouse which were destined for all Children's Homes.

PROFILE

JANUARY 1984

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Proposals announced for PERME transfer

A consultative document detailing proposals for the transfer of R&D facilities and staff of PERME to the ROF organisation has been issued and the following is the complete text of the document.

Following the announcement by the Secretary of State in 1982 of the Government's decision that the Royal Ordnance Factories should operate in a more commercial environment under the Companies Acts, the Consultative Document issued in October 1982 indicated that relevant facilities and staff at certain R&D establishments would be transferred to the ROF organisation before the change to Companies Acts status and that separate proposals would be made for these transfers. In May 1983 the Trade Union Sides were informed that as part of these proposals it was intended to examine the possibility of transferring to the ROF organisation the rocket motor activities of the Propellants, Explosives and Rocket Motor Establishment (PERME) and the Rocket Motor Executive (RME).

It is not intended to transfer blocks of staff or facilities from the Royal Armament Research and Development Establishment (RARDE) or the Military Vehicles and Engineering Establishment (MVEE); however, opportunities for individual transfers would continue as at present. Instead, the ROFs will subcontract R&D work in their product areas to the Controller R&D Establishments, Research and Nuclear (CERN) Establishments as necessary; in the longer term the ROFs will develop their own capability. The intention is to transfer the responsibility for this work in the ROF product areas to the ROFS who will be funded directly. This document therefore outlines the proposals for the transfer to the ROFs of staff and facilities at PERME and the RME.

Transfer Proposals: To enable the ROFs to assume wider responsibility for rocket motor activities and for applied research and development in the propellants and explosives areas, the ROFs will take over the Westcott site and the Waltham Abbey South Site on a permanent basis. (Waltham Abbey, North Site being retained by CERN.)

Broadly the proposals are —

PERME Westcott, including staff from the Rocket Motor Executive which will be disbanded, to be transferred to the ROFs. About 530 staff to be transferred to the ROFs with the balance of about 20 remaining with CERN (and in due course moving to a CERN site).

PERME Waltham Abbey. The South Site together with about 375 staff to be transferred to the ROFs. The North Site with about 170 staff to be retained by CERN.

The process of identifying the posts it is proposed to transfer is very largely complete. Because of the skills and experience required and to maintain continuity with ongoing projects, it will be necessary to nominate staff for transfer. Members of the staff who would be transferred under these proposals will be notified individually and the Trade Union Sides informed.

Future management structure: An appropriate line management structure will be established and further details of the new organisation and its senior management will be notified to the Trade Union Sides as soon as possible.

Timing: It is intended that the transfer of facilities and staff be completed by 1 April 1984.

Future of the Land Systems Research Establishments: After these transfers, CERN would retain the essential minimum capability for those tasks which must be performed within Government within the propellants, explosives and rocket motors areas including the supervision of extramural research contracts and the provision of advice on safety. It is intended that the staffs of RARDE, MVEE and those remaining in PERME will be combined into a land systems research establishment under a single Director, with Headquarters at Fort Halstead and with staff and facilities at Chobham and Waltham Abbey (North). The future organisation and staffing of the establishment will be the subject of separate consultation with the Trade Union Sides.

Personnel implications for transferred staff: Proposals on some of the personnel issues for staff who are transferred are at Annex C. This should be read in conjunction with paragraphs 9-25 of the Consultative Document issued in October 1982, the MOD response to comments made by the MOD CCSU in May 1983, and with the Consultative Document on Superannuation and Related arrangements for the ROFs which was issued in November 1983.

Conclusions: The acquisition of the Waltham Abbey South Site and Westcott will provide the ROFs with sites and facilities on which to expand their capabilities and the transfer of experienced staff will strengthen their capability in important product areas. In particular, considerable management improvements can be expected to arise from the placing of responsibility for design, development and production of rocket motors within the same organisation. For those transferring the opportunities for creative work will be no less challenging than in their present employment.

The arrangements described in this document are intended to achieve a transfer with the minimum of disruption to current projects and to provide as smooth a transition as possible for the staff who will be affected.

POSITION OF ANCILLARY GROUPS

CISCO: Restaurant and catering facilities at the PERME sites are currently provided by CISCO. The future catering arrangements for the ROF personnel at these sites will be a question for discussion between the ROF management; and CISCO.

Ministry of Defence Police: MOD police are currently stationed at the PERME sites. After incorporation it will not be appropriate for MOD police to continue to provide the security arrangements for those sites under ROF administration and the management of the new company is considering how it wishes the required services to be provided. The effect on the future employment of MOD police currently stationed at these sites will be the subject of consultation with the Defence Police Federation.

Medical staff: The Director of Civilian Medical Services (PE) provides a full occupational health service in the R&D establishments at present. The ROF management is considering how best to provide this service after incorporation and there will be discussions with the Trade Union Sides about this and the implications for existing medical and nursing staff.

Personnel implications for transferred R&D staff: It is proposed that all staff in the PERME and RME establishments who are employed on work which is transferred to the ROFs will be transferred in their existing grades. Transfer into the ROF organisation will be regarded as a normal posting within the MOD and staff transferred will continue to be MOD Civil Servants until the ROFs are incorporated under the Companies Acts following the necessary legislation.

While it is intended that all staff serving with the ROFs at incorporation should have their employment automatically transferred to the new Company structure, it is proposed that some time before Vesting Day all staff affected will be able to register if they do not wish to transfer and the MOD will use its best endeavours to place them accordingly. It must be emphasised however that the ability to redeploy staff is subject to the requirements of the Company and the availability of vacancies in the MOD and the rest of the Civil Service. Much will depend on the categories of staff involved and it would be unrealistic to give any general assurance that individual wishes can be met.

In the period up to Vesting Day staff transferred to the ROFs from PERME and RME will, in common with all ROF staff, continue to be eligible for MOD promotion reviews and postings under the normal rules.

The terms and conditions which are established for all staff serving with the ROFs on incorporation will apply equally to staff who are transferred into the ROFs.

Personnel Management: It is proposed that the personnel management responsibility for transferred staff who are managed under local delegated authority should be transferred direct to the ROFs. The MOD CM divisions will retain the responsibility for those who are managed centrally until the progressive transfer of further personnel management responsibilities from the MOD to the ROF organisation as a whole.

Whitley arrangements: It is proposed that PERME and RME staff who are transferred into the ROF organisation will, like existing ROF staff, from the date of transfer until Vesting Day come under the aegis of the ROF Whitley Committee (for Non-Industrials) or the Central Production Committee (for Industrials) for matters that affect the organisation as a whole. However, those matters relating to the terms and conditions of staff on incorporation will be appropriate for discussion within the MOD Whitley Council for non-industrials and the MOD JIWC for industrials.

ROF management will wish to discuss with the Trade Unions the establishment of suitable joint consultative arrangements at the ROF sites at Westcott and Waltham Abbey.

Pointing way to the future . . .

● FROM PAGE 1

The question of the terms of transfer has naturally been foremost in many minds and I am conscious of how important these matters are. We are making progress.

As you have seen in the consultative document which was reproduced in the last issue of PROFILE, you will have a choice to make about which pension arrangement best suits you in the light of your personal circumstances, previous service, age and so on. At this stage it all may seem a bit complicated but there will be more explantory material to come and trained staff who will be available to help. I hope that by all these means you will end up choosing a pension plan which suits you — that is certainly our aim. Meanwhile the first task is to work out the remaining details in consultation with the trade unions and our pensions experts.

The Transfer of Undertakings (Protection of Employment) Regulations 1981 protect the remaining conditions of service apart from certain minor matters and that must be a step forward in clarifying the personal issues.

Job security is one area which is of major concern to us all, and job prospects will be related to the order books whether we are in the public or private sector. A key factor therefore in our future success will be that we make the most of our new status and commercial environment to expand the market for our products, particularly overseas.

The uncertainties under which we have all laboured for so long are beginning to clear and we can proceed together during 1984 in laying the foundations of our new company and making it a success.

EXPLANATION OF THE BILL

TO THOSE of us who are not normally accustomed to Parliamentary Bills and the language in which they are constructed they are somewhat complex documents which do not make easy reading. However, the Ordnance Factories and Military Services Bill contains an invaluable explanatory introduction which summmarises the key points of the document.

Having established that the Bill's purpose is to enable the Royal Ordnance Factories to be constituted as "a company or companies under the Companies Acts" the summary goes on to explain that it gives the Secretary of State for Defence powers to transfer to one or more companies wholly owned by the Crown any property, rights and liabilities used in connection with ROF's operations.

Such transfers are to be made by means of one or more schemes defining the property etc. to be transferred. Securities in the form of shares or debentures may be issued in consideration of any transfer.

The Bill also enables the RAF Trading Fund to be wound up so that a new financial structure can be created for the company. Provision is made for the payment of compensation to any third party who is affected adversely by the transfer.

Clause 1 of the Bill gives statutory force to the schemes which may be made by the Secretary of State for transferring property, rights and liabilities, but no scheme may be made without consulting any transferor or transferee company nor without Treasury consent. Such schemes may be made only in respect of wholly owned companies.

This clause also makes provision for establishment of reserve funds thus allowing the most suitable capital structure to be made for the company (or companies).

Transfers may be made from the Secretary of State to any company, between two or more companies, or from companies to the Secretary of State. The property etc which may be transferred from the Crown are defined in the Bill as those which are (or have been certified as being) attributable to the operations of the ROAs. Subsequent transfers of property between companies, or back to the Crown, may include property outside the extent of this clause.

Any transfer of property etc will be binding on third parties, and tranferees will be bound to honour all agreements and transactions made prior to the transfer.

Clause 5 enables the Treasury, or the Secretary of State (with Treasury consent) to acquire securities, or rights to subscribe for securities, in companies or their subsidiaries at any time during and after the period of sole ownership by the Crown. Disposal of such securities or rights similarly requires Treasury consent. Proceeds from any disposal, as well as any dividends or other receipts, will be paid into the Consolidated Fund.

In the next clause power is given to the Secretary of State to appoint nominees to receive or hold the securities issued under Clause 1 or to acquire or hold securities or rights under Clause 5. These nominees may then deal in the securities etc under direction of the Secretary of State and subject to Treasure approval.

Once the company has ceased to be wholly owned by the Crown the Secretary of State will be required to set an investment limit for Government shareholding. This limit will be expressed as a proportion of the voting rights held and while it will be possible to reduce the limit by a further order, it cannot be increased.

Clause 8 fulfils the Secretary of State's legal obligations to existing creditors. It requires him to discharge any outstanding liabilities transferred to a company (or companies) which have been incurred before the transfer date should the new company (or companies) be wound up (except on amalgamation or reconstruction).

According to Clause 9 trustees will be able to invest in the company (or companies) despite the Trustee Investments Act of 1961 which requires a company to have paid a dividend in each of the five years preceding the investment. As the company will probably have not been trading commercially for five years before privatisation this clause enables the company to be deemed to have paid dividends for the required period.

If there is any outstanding debt to the National Loans Fund from the ROF trading fund then under the terms of Clause 10 it can be extinguished.

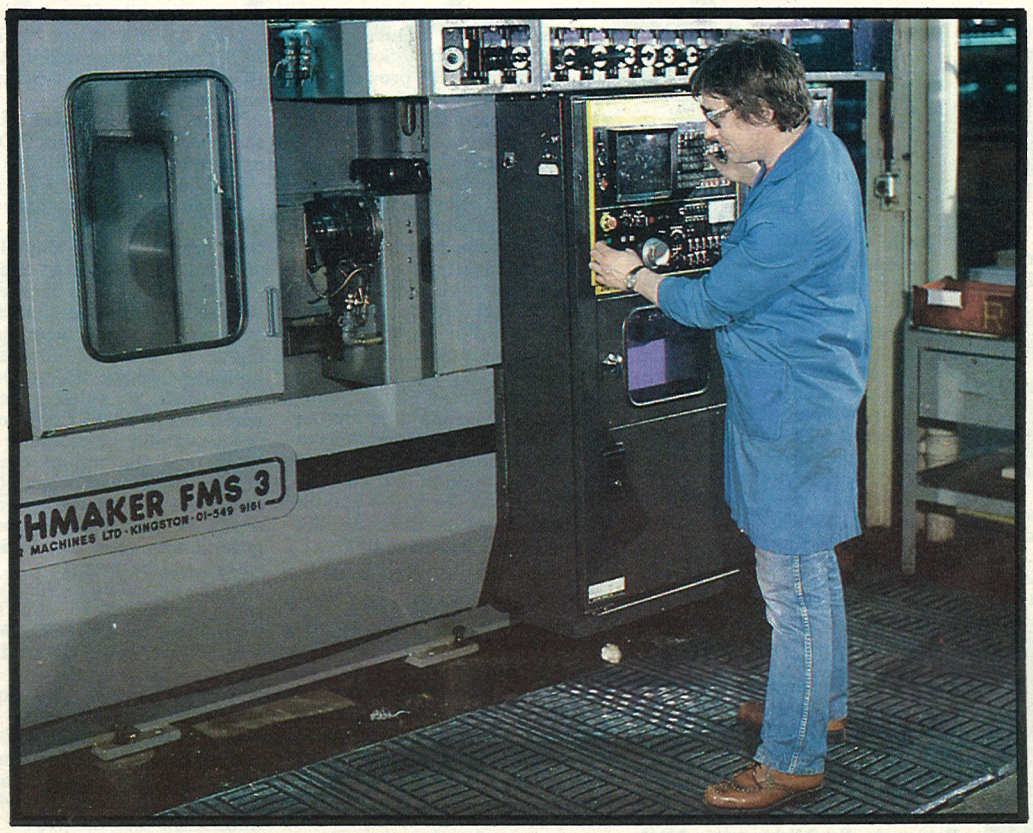
Obviously ROF's transition to Companies Act status will involve changes in its financial relationship with the Ministry of Defence but these are unlikely to have a major effect on central government expenditure. The Bill provides for payments to be made out of money provided by Parliament to meet various liabilities.

The summary includes a paragraph on pensions and explains that when ROF employees transfer from the Principal Civil Service Pension Scheme to the new company schemes, payments will be made to the new pension funds sufficient to meet existing pension liabilities in respect of their periods of employment as civil servants. These transfer values could amount to £250 million.

The final paragraph in the explanatory section points out that while the 18,500 or so ROF employees will cease to be civil servants they will still count as public sector employees and consequently the Bill will have minimal immediate effect on public sector manpower. When private capital has been introduced, however, the ROF workforce will cease to be classified as employed in the public sector.

● For those who wish to examine the Ordnance Factories and Military Services Bill itself, it is published by Her Majesty's Stationery Office at £2.70. It can be ordered direct from HMSO or through any good bookshop.

FOCUS ON ENFIELD AND THE G



WHILE modern technology may appear to have displaced traditional crafts in some industries, there is ample proof at the Royal Small Arms Factory, Enfield, that individual human skills can flourish hand-in-hand with computer controlled production. Indeed, they are complementary to each other in a field where no machine can be a substitute for a true eye and a skilled pair of hands.

Traditional s modern tech combine to a classic we

An excellent example of this subtle blend of craftsmanship and space-age technology is the production of the General Purpose Machine Gun which has been manufactured at Enfield for some 20 years.

This weapon originated as the FN MAG, designed by Fabrique Nationale of Belgium and initially built here under licence. When that licence agreement expired it evolved quite separately as a wholly British designed and built gun from 1964 to become available in four basic configurations to meet British Army requirements. The GPMG family, therefore, is as familiar a sight throughout our Armed Forces as was the Bren in its own heyday.

All the components for the body of the gun are fashioned by CNC (computer numerical control) machines. Each of these features a carousel which carries either 20 or 30 tools, each of which is selected and deployed automatically to perform a particular machining function, as directed by the computer program. Introduction of this equipment streamlined GPMG manufacture because one CNC machining stage will perform 15 or more conventional operations. This investment in modern technology has resulted in two major advantages: product improvement and reduction in floor area. The latter is an important benefit in that it creates the much needed capacity for new products, particularly the new Enfield Weapon System.

Laser technology is also employed at Enfield for cutting the outline shapes of the machine gun body side panels which are then further machined on CNC plant. The very latest introduction to GPMG manufacture has been an FMS machine (Flexible Manufacturing System). This is a next generation to CNC and incorporates the latest state of the art in computerisation.

Featuring a 30-tool carousel it provides the option to increase this number as required and forms a basis on which to build in future by adding further equipment and installing extra FMS plant all linked to provide a sequential operation. For the present Enfield is proving and evaluating this plant and assessing its potential while it is employed to make the top cover for the GPMG.

In addition to making extra floor area available, improving manufacturing methods and ensuring greatly enhanced consistency of product, computerised plant has raised skill levels and introduced a further dimension — that o computer programming.

It is interesting to note tha personnel have thrown them selves wholeheartedly into th computer aspect of thei work, even to the extent o studying the subject at adul education classes in thei spare time. In many cases i has provided a leisure tim hobby interest with indi viduals entering the field o home computers.

As far as the gun body i concerned each is an individ ual piece of equipment — lik fingerprints, no two are abso lutely identical. It is here a the building stages tha craftmanship and experienc really come into their own for instance, the block fron has to be hand-planed t minute measurements to en sure an absolutely precise fi when it is located between th side components of the bod shell.

While hand rivetting ha been replaced mainly by spi rivetting this operation sti requires hand operation Instead of hammering th rivet home the operator uses machine which spins it into it location. The workpiece i secured in a clamp which i manoeuvred into positio under the rivetter by riding o a cushion of air. When it i precisely located the air i

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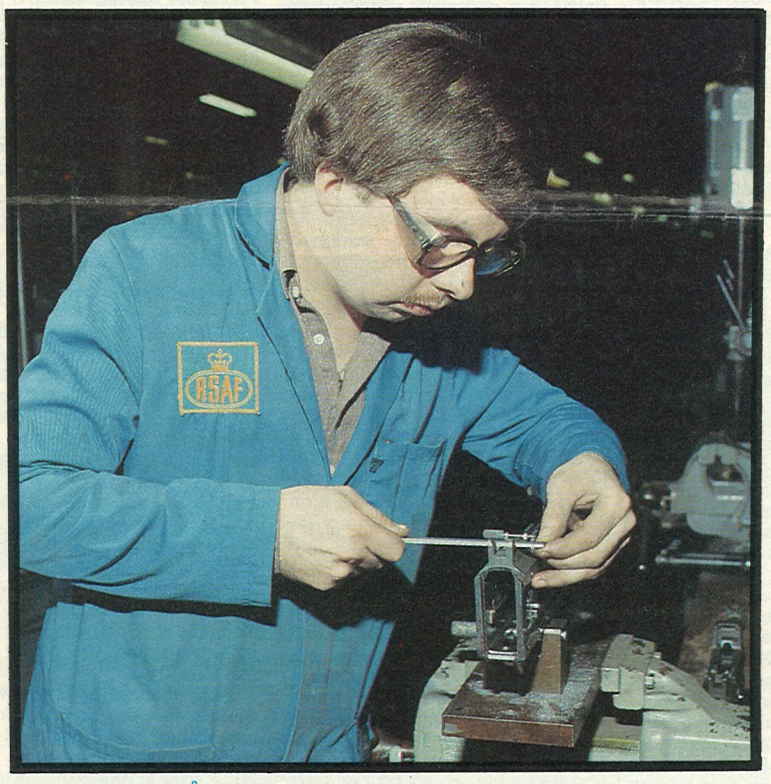
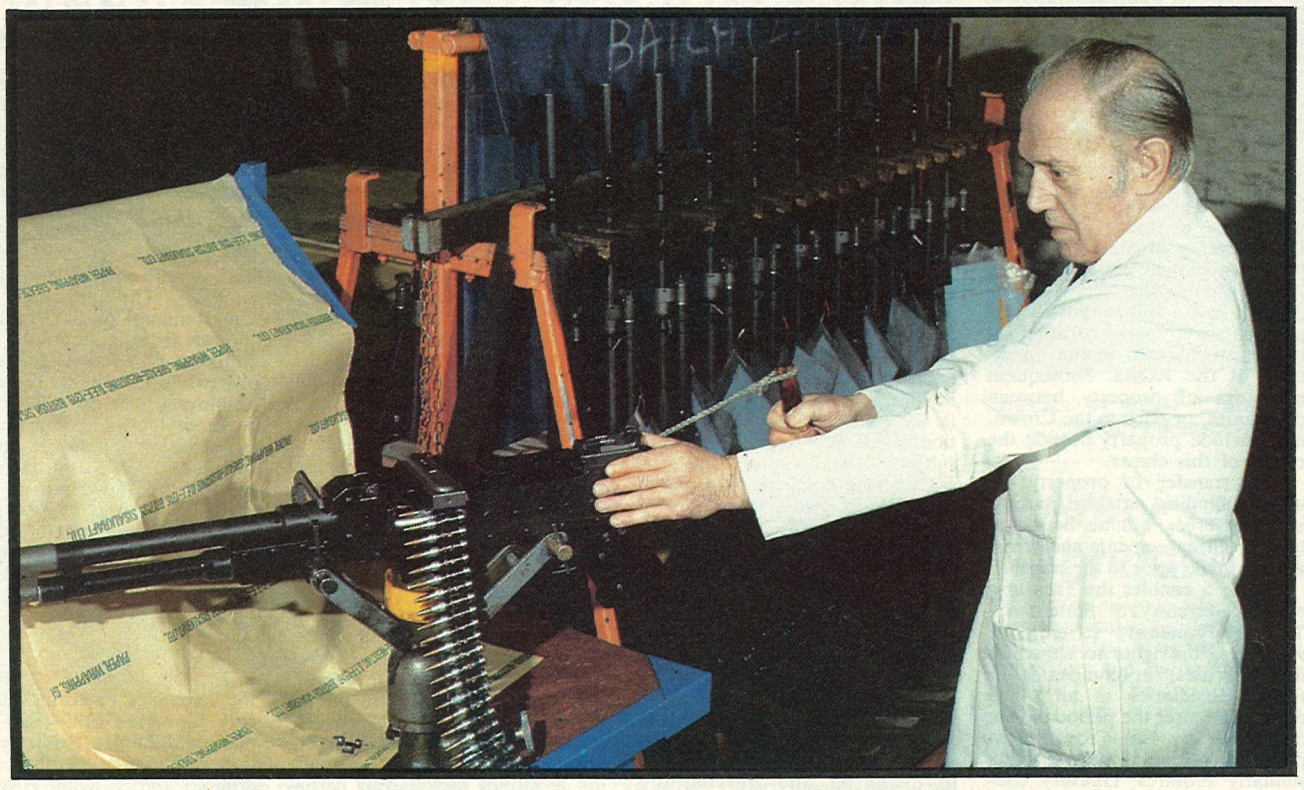


Above: Alan Edwards, a CNC setter, programs the FMS3 machine — Enfield's latest introduction in the field of computerised technology

Left: Kevin Stock files by hand the sight steps on the GPMG

Below: In the assembly section an assistant foreman conducts a belt lift test to ensure the gun will function accurately while lifting a four-foot belt of ammunition



NERAL PURPOSE MACHINE GUN

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ut off so that the heavy mp can move no further d the rivetting operation n be carried out. The achine makes this a less enuous task than hammer- g and the result is a beauti- lly finished rivet head, but it ll calls for skill and a good e.

Yet another example of afsmanship thriving in an ge of automation is the shioning of the steps on the ck sight. These flats, which e essential to the accurate nctioning of the sight djustment, are individually ed by hand.

Gun barrels are produced om cylindrical billets which e machine hammered to eir final shape. Hammering so produces the rifling hose grooves and lands are ansferred from the shaped rface of a mandrel which is serted into the bore.

It is in the assembly com- lex that the body ncorporating gas tube), bar- l and other components are nally brought together to oduce the completed gun, ut this is by no means the nd of the manufacturing quence. Tests now have to e carried out in what is a ntinuation of the strict spection and quality control rocedures that have followed e weapon's progress through its production stages.

Once assembled each gun is hand functioned on the bench to ensure that it operates correctly. It must be able to pull up a four-foot hanging belt of ammunition (drill rounds) and "fire" each round. To test this the operator cocks the weapon; the round should pass into the breech and the belt clip should eject. He then pulls the trigger and cocks the gun again — this time the round should eject downwards and a fresh round pass into the breech. By manually repeating this procedure the operator is simulating in slow time the functions the gun will perform when actually firing a burst.

Next stage in testing is comprehensive proof firing of live ammunition on Enfield's extensive ranges and every single weapon has to pass this critical examination before it is released from the factory for delivery to the customer. This firing stage, of course, tests accuracy as well as correct operation and reliability of the mechanism and speed, and it is an operation to which ROF Radway Green makes an essential contribution as manufacturer of the ammunition used.

Speed varies, of course, across the GPMG family. Rate of fire of the L7 infantry version should meet the 700 to 900 plus rounds per minute specification while the L8 derivative for use in armoured fighting vehicles should achieve a rate between 625 and 750 rounds per minute. The L43 is a ranging gun produced for the Scorpion and mounted co-axially with the 76mm main armament; its rate of fire is the same as that of the L8.

The L37 variant is a dual-purpose weapon which can be mounted in AFVs, scout cars and armoured personnel carriers. Deployed in this role it carries the L8 barrel and sub-assemblies. It can also be changed rapidly to perform the ground role by substituting the L7 infantry weapon barrel, bipod and butt.

GPMG has a 7.62mm calibre and is gas operated. The gas tube (below and parallel to the barrel) contains a piston operated by the gases produced by the propellant combustion. Upon activation the piston sends the breech block backwards to enable the spent cartridge case to be ejected and a fresh round to be loaded. Those weapons which are mounted in armoured vehicles feature a sealed gas tube so that the gun can exhaust safely into the atmosphere outside the vehicle and safeguard crew members from toxic fumes.

By means of a regulator at the forward end ot the gas tube speed can be adjusted and this is an essential capability in the "quick-change" redeployment between the two roles of the L37 and when changing between L7 and L8 configurations.

An additional capability is provided for the L7 with a sustained fire kit. It incorporates a special tripod with all round traverse, elevation and depression and quick release lock control for any position. The sighting system features optical aids which can be set up at the extremes of a desired arc of fire. By recording the readings taken from these points the arc can be predetermined for subsequent accurate acquisition at night or in poor visibility such as fog.

This kit enables infantry to set up a GPMG at a desired location to command a given field of fire and achieve denial of territory to the enemy.

Above: Familiar environment for the GPMG as two soldiers prepare to fire it in a field demonstration. Below: This "skeleton" GPMG has key sections of body, barrel and gas tube cut away to show clearly the internal components

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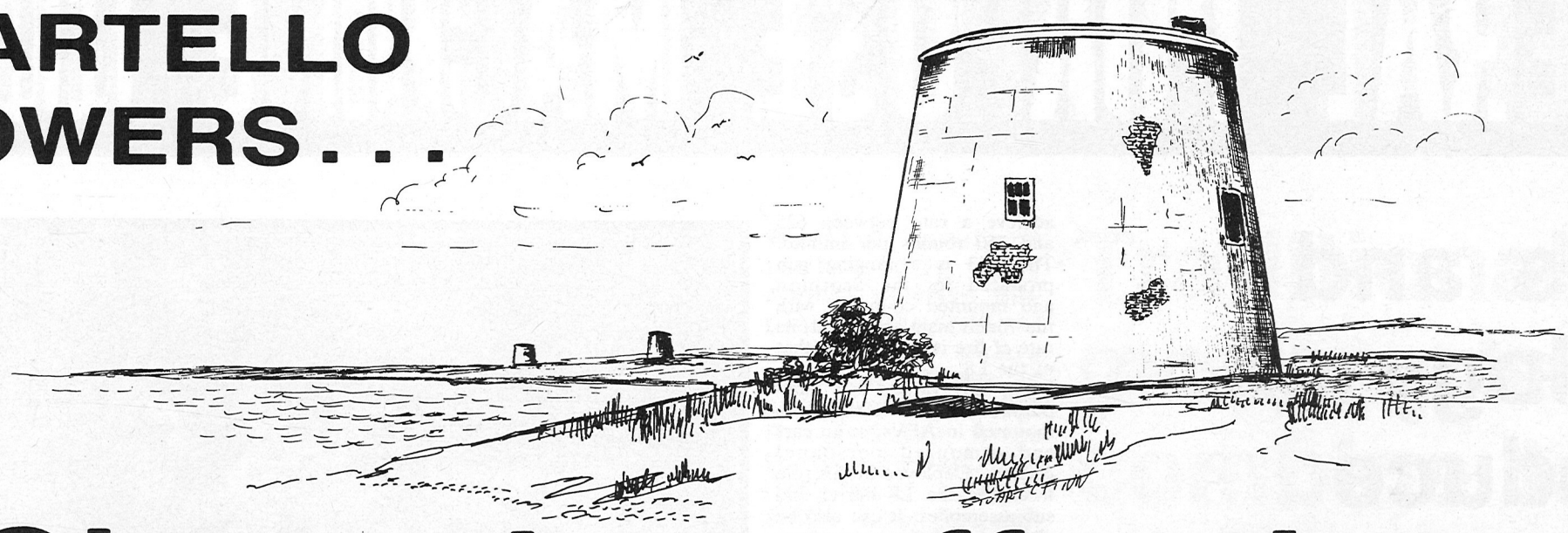
Left: The General Purpose Machine Gun is tested on the ranges, secured in the special Enfield-designed stand. Ian Raffill prepares the gun for firing

Right: Ian Raffill fires the same weapon, this time mounted on versatile tripod which is also a feature of the sustained fire kit — another Enfield design

MARTELLO TOWERS...



Cheap but effective defences that kept Napoleon at bay

ALTHOUGH Britain has not been invaded since 1066 there have been several periods during our history in which these islands have faced very serious threats or possibilities of invasion. In many cases substantial fortification works were put in hand to defend our shores against enemy onslaught and some excellent examples of these defences still survive today, from the cloverleaf pattern castles of Henry VIII to the reinforced concrete bunkers and gun emplacements of the Second World War.

by Stuart C. Finn

Along the Channel coast there are rich hunting grounds for the military archaeologist, with the additional bonus of, in certain areas, fortifications of the last war standing alongside the defences of the Napoleonic period.

Of the various types of fortification erected during the wars with France the one that has had probably the greatest effect on the landscape is the Martello tower. A chain of these towers was built along the coast between Beachy Head (Sussex) and Dover with another chain along the Essex and Suffolk shore.

Invasion fever was running high as the 19th Century approached and it was in 1796 that plans were being prepared for defence of Britain against landings by Napoleon's forces. A strong recommendation was made for coastal fortification and the weakest point of Britain was identified as the low lying Romney Marsh area of Kent.

This extensive level area of loosely triangular shape, with Dungeness at the seaward apex, was once sea. It was reclaimed by nature, with some help from man (notably the Romans) over several centuries. The fact that it had no natural obstacles such as the cliffs further along the coast and because it stands only 20 miles or so from the nearest point on the French shore made it particularly vulnerable to enemy landings.

Eventually there emerged a proposal that a line of fairly cheap coastal forts be built between Rye in Sussex and Hythe in Kent along the Romney Marsh shoreline and spaced at 600 yard intervals. At the same time it was planned to cut a canal further inland to join these two towns.

The design of fort that was adopted was the Martello tower — a structure resembling an upturned flower pot and standing 34 feet high and having a 50-foot diameter at the base, tapering to 40 feet at the top. In fact the towers are elliptical rather than circular in plan and therefore on the east-west axis have a 46-foot diameter at the base and 36 feet at the top. Additional protection was provided by a 20-foot deep dry moat whose sides were designed to make climbing almost impossible.

Mounted on the roof of each tower was a 24-pounder cannon supported on pivoting beams which gave it traverse capability through 360 degrees.

Ironically the Martello concept came originally from the French island of Corsica and the British adopted the design having seen proof of its ability to withstand seige and mete out formidable destructive firepower.

Early in 1794 Britain had sent a Naval squadron to support the Corsican Assembly who fervently wished to remain independent of Metropolitan France. However, on arrival the squadron found that a Republican element were well ensconced in a Martello type fort which commanded a field of fire over the safe anchorage they sought to use.

Two ships of the line, the 74-gun Fortitude and the 32-gun Juno bombarded the fort to no avail. A combined sea and land attack was launched but no impression was made on the tower and eventually both ships had to withdraw out of range, the Fortitude being on fire. A battery of four 18-pounders was landed and these continued to bombard the tower at a range of 150 yards for two whole days. It was not until they fired hot shot that any impression was made — in fact the roof was part timber and only after this was ablaze did the 33 men holding the fort surrender.

These 33 had held the tower with two 18-pounders and one six-pounder against 1,400 men, two men o' war and a battery of four 18-pounders — an impressive feat indeed.

The word Martello first appeared in drawings and reports submitted to the Admiralty by Lord Hood. Quite how the name came to be used is not clear, however, there was a similar tower at Cape Mortella guarding the Genoan penal colony hence this type of fort in the Mediterranean was given the name Mortella. Adoption of the name Martello could therefore have been the result of a spelling mistake arising from the sailors' mispronunciation of Mortella.

While examining the defensive requirements in Kent the planners also foresaw the likelihood of landings on the low-lying shoreline of Essex and Suffolk and so, of the 103 towers which were built, 29 were sited north of Shoeburyness to form a chain running up to Aldeburgh, Suffolk. In addition to the Martello towers on the Romney Marsh two redoubts were built and the famous Royal Military Canal was also cut.

Total cost of the system was less than £500,000 which, although a large sum in the early 19th Century, was modest in comparison with the total cost of the war with France. A key factor in cost-saving was the use of locally-made bricks from the Kent brickfields, notably in the north of the county near the rivers Medway and Thames. These were transported to site by barges. Half a million bricks went into the construction of each tower.

Operating costs of the forts were also low as each had as its full complement — an NCO and 24 men. This establishment was considered quite sufficient to operate the gun and withstand a lengthy seige.

Each tower had only three floors — ground, one at 20 feet from the base, and the roof on which was mounted its single 24-pounder armament, weighing 2½ tons. The ground floor contained only the magazine, while the middle floor was divided into quarters for the NCO and men, messing facilities, quartermaster stores and an armoury for the muskets. The entry door to the tower was also at this level (on the landward side) and was reached from outside by a ladder fixed to the wall. This was an additional precaution to deny access to the enemy.

Running up through the centre of the tower was a brick column which provided the support for the gun mount pivot on the roof. Access to the gun level was via a stairway in the thickest part of the wall. In fact wall thickness varied around the ellipse and from top of bottom with a maximum of 13 feet and a minimum of five feet.

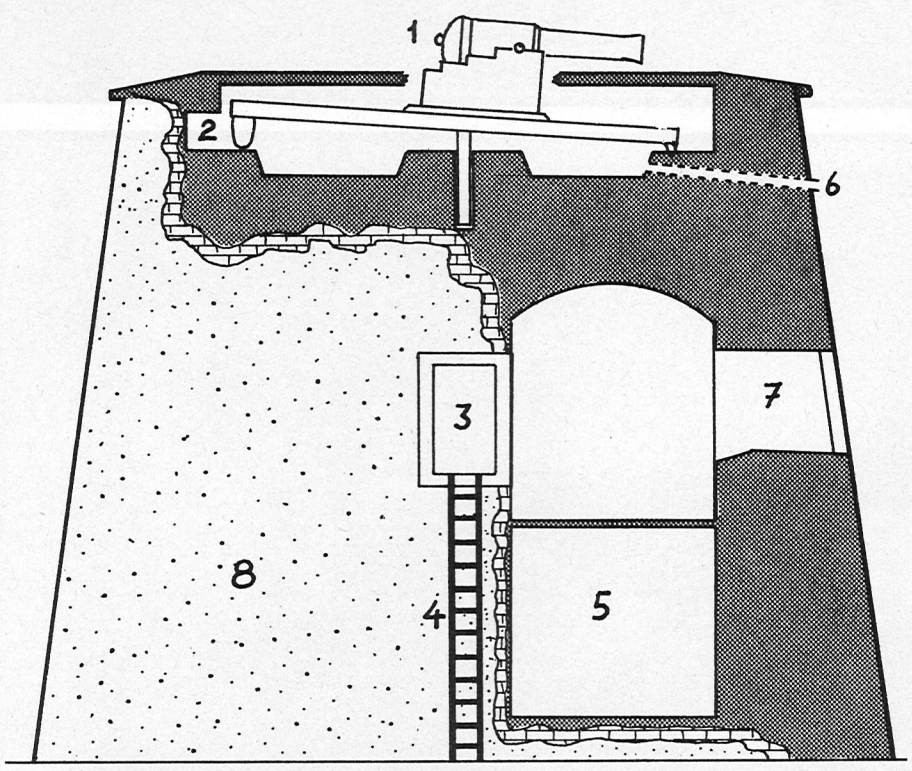
The gun was mounted on 26-foot beams which were attached to the central pivot and set to give the gun an angle of ten degrees below the horizontal. The outer ends of the beams travelled on a circular iron track.

Martello towers had immense strength. Their curved design and the upward taper would serve to deflect any shot which found its mark. Brickwork was bounded with stand and lime mortar which was harder even than the bricks. The exterior surface of each tower was rendered with cement stucco to give it a smooth finish and enhance its deflective capabilities.

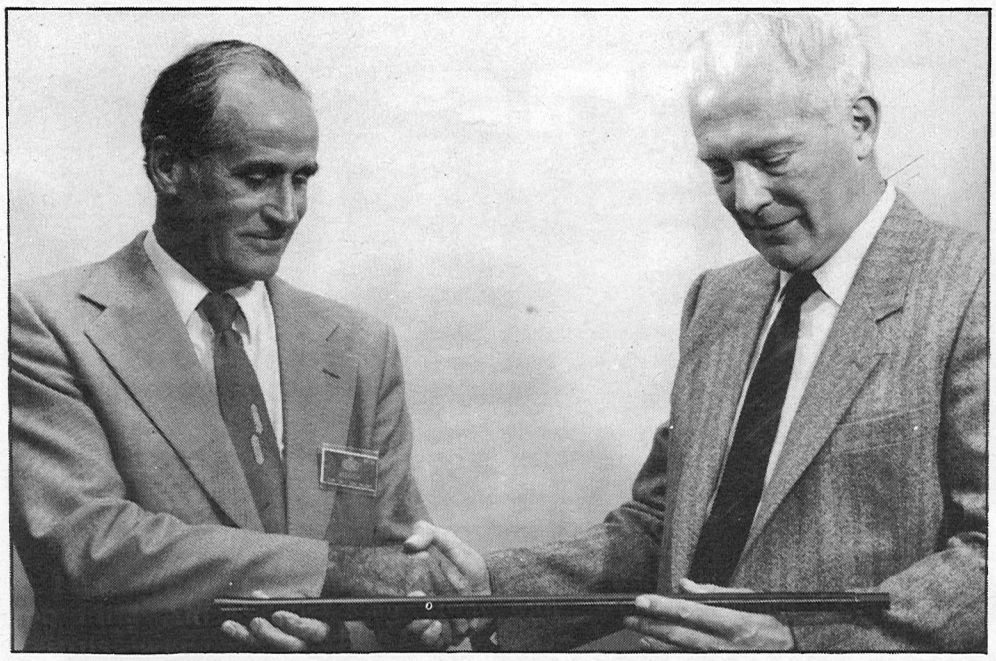
While some of these towers no longer exist and a number are in a sorry state of ruin there are several which have survived well the ravages of time. Certain examples have been preserved and more than one have been converted into very comfortable dwellings.

Among the preserved towers one at Dymchurch is open to the public with a very modest admission fee. This one is in the care of the Department of the Environment.

The towers remained in War Department ownership long after hostilities with Napoleonic France had ceased and it was not until 1906 that the department decided to sell most of them. However, some of these relics from an earlier war were pressed into service during the Second World War. Of course, they were no longer suitable for their original purpose as shoreline batteries but they provided ideal facilities for coastal artillery observation posts and some were used by the Royal Observer Corps.



Cross-section through a Martello tower showing: 1 — the 24-pounder gun; 2 — shot stowage locker; 3 — door; 4 — ladder (sole access); 5 — magazine which included 24 pound shot (100 rounds), grape shot, 80 hand grenades, 380 flannel cartridges and 10 cwt of black powder; 6 — drain from roof; 7 — window at accommodation level; 8 — cement stucco rendering over brickwork.



Arthur Clarke, Gunsmith and Distributor for the new Enfield barrels, and John Barber, RSAF Production Manager, examine a Long Range Barrel

New rifle barrels are bang on target with marksmen

NEW long range rifle barrels manufactured at RSAF Enfield became available to the general public in time for their successful design to be proved in the 1983 National Rifle Association's Annual Meeting.

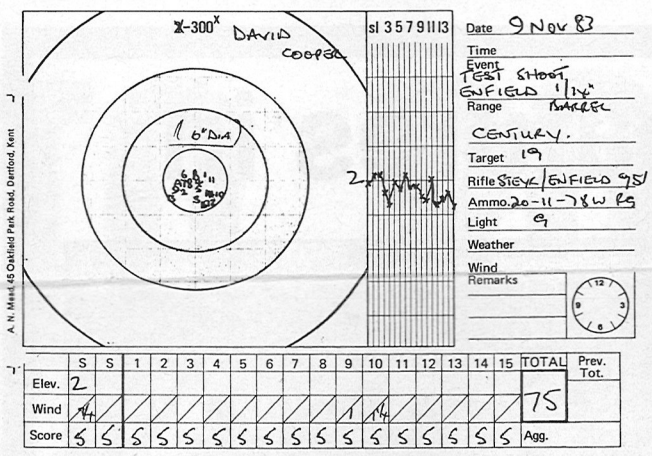
Using the new 1 in 12 inch twist 7.62mm barrel a number of competitors achieved excellent results. Alain Marion of Canada took the Queen's Pirze and fellow countryman Bob Pitcairn tied for first place in both the Corporation 1000 Yards Match and the Long Range Aggregate.

The barrel has been produced specially for long range shooting at 900 to 1000 yards in a Number 4 rifle action. Although telescopic sights are permitted in Match Rifle competitions, Target Rifle contests such as the Queen's Prize carry a stipulation that only open sights may be used.

Following the public debut of the long range barrel Enfield produced a short range 1 in 14 inch twist barrel which is now also available to the public. Another successful product, it has been tested extensively at 300, 500 and 600 yards ranges using the famous Radway Green "Green Spot" ammunition.

The short range barrel has been put through its paces by one of the country's expert shots, Major the Reverend David Cooper, Padre of the 2nd Battalion, the Parachute Regiment. His face became familiar in homes throughout the UK following television coverage of the church service he conducted immediately after the taking of Port Stanley.

Firing the STEYR / Enfield 95 rifle, fitted with the Enfield Short Range Barrel, Major Cooper scored a remarkable 17 consecutive bulls. His target is reproduced on the right.



DOUBLE HONOUR FOR A HUSBAND AND WIFE

IT WAS a unique double celebration for a husband and wife when they made a return visit to ROF Blackburn recently. John and Florence Crake were each presented with the Imperial Service Medal by Factory Director David Walton.

Florence began work at Blackburn in 1942 and had been engaged in a wide variety of jobs by the time she left the factory as a chargehand in 1982. John started work there ten years later and was employed as a setter mechanical, although he spent a short period as a PTOIV in 1976 while on temporary promotion. He also left Blackburn in 1982.

At the same award ceremony Thomas Nightingale also received the ISM for his service as a setter mechanical between 1951 and 1982.

John and Florence Crake proudly show their Imperial Service Medals

Factory Director at Blackburn, David Walton, presents the ISM to Thomas Nightingale

MODELSCENE

YOU cannot please all the people all the time, as kit manufacturers are only too well aware. If a company produces an aircraft kit with a particular array of weaponry then there are bound to be modelmakers who would prefer to have a different set of missiles in order to build that aircraft and finish it in the markings of an alternative air force. Manufacturers cannot provide everything if they are going to keep prices realistic.

The dedicated modeller should have no problem — all he has to do is scratchbuild the missiles of his choice or raid his spares box to convert bombs, missiles and external fuel tanks discarded from previous kits. However, there are modellers who, although sufficiently well skilled to do this, have no inclination to embark on such a project. Their reasons may be varied but most often it will be because they lack the time.

Now two Japanese companies have come to the rescue by producing sets of weapons in kit form. Hasegawa have released four such packages to cover bombs and rocket launchers, guided bombs and gun pods, air-to-air missiles, and air-to-ground missiles. All are of American built equipment and in 1/72 scale.

In every case the components are beautifully moulded and include essential detail, together with appropriate markings provided by superb decal sheets.

Similarly the LS Company have produced two sets of weapons and ECM (electronic counter measure) pods, all in 1/144th scale. Here again superb mouldings and markings are a distinctive feature of these representations of US equipment.

Although certain items can be adapted for incorporation on models of RAF aircraft, we eagerly await the time when both companies turn their attention to British weaponry. These kits certainly fill a gap and their appearance will be welcomed by all modellers. Next we shall need a similar operation in 1/48 and 1/32 scales.

Hasegawa are noted for their fine, clean mouldings, and a recent addition to their range is a 1/72 scale version of the Mirage F-1C. There is plenty of good detail, even to the extent of the pilot's access ladder should you wish to make up the kit in a flight line situation.

The markings provided are also interesting in that each roundel is provided as three separate decals — blue, red and the yellow surround. Naturally the white ring between red and blue is featured on each as the background. Obvious order in which to apply these is: yellow, red and then blue. This decal application is certainly one in which the Microscale system should be employed. This system incorporates the use of two liquids, Microsol and Microset, which shrink the decal into place to create a realistic flat appearance and get rid of the "silvering" effect normally created by a decal's clear carrier film.

Equally renowned for excellent mouldings are the Italian ESCI kits (you pronounce it Eshie). Worthy of attention is a recent release in 1/72 scale of the McDonnell Douglas F-4C/J Phantom. It provides a choice between a US Marines version and one in Spanish Air Force markings with full decals provided for both. The decals also provide detailed cockpit instrumentation and side console representation — no mean feat in this scale.

This continues the theme set by the detail which has been incorporated in the fine mouldings and manufacturers deserve top marks for having produced engraved panel lines. ESCI have been following this principle for some time but some other kits on the market have panel lines raised so that the modeller has the frustrating task of sanding them down and then lightly scribing them to achieve the realistic engraved effect.

Still on the subject of ESCI kits we come down to earth with a recent release in 1/24 scale of a Land-Rover 109, equipped as a vehicle of the 1st Battalion the Parachute Regiment. It is laid out as a left-hand-drive model to represent the battalion's service in Germany.

Detail is admirable throughout the kit which even provides engine and transmission components and a first-class representation of the suspension. Tyres are provided as separate mouldings in a softer rubberised plastic.

As the vehicle grows during assembly it begins to take on its military appearance at stage 9 of the construction sequences. This is where radio communications equipment is built, followed by the assembly of a rather nice representation of the General Purpose Machine Gun and special mounting.

The box art portrays rolled up camouflage netting complete with artificial foliage along the sides of the vehicle. However, the mouldings for this are smooth and give the impression of rolled up canvas. To achieve realism one must either use this as a foundation upon which to build simulated leaves, or discard it altogether and make up the material from scratch. I favour the latter method for which mutton cloth is such a useful material. Having rolled and folded the cloth to your satisfaction soak it with diluted white (PVA) glue and sprinkle over it that imitation foliage that model railway enthusiasts find invaluable.

Loosely rolled, camouflaged canvas is also featured on the bonnet and a moulding is provided for this. Alternatively it could be fashioned from a strip cut from an old handkerchief, or it would be permissible to make up some more camouflage netting for this item.

Altogether a great kit and one which certainly provides enjoyable modelmaking and equally satisfying finishing work.

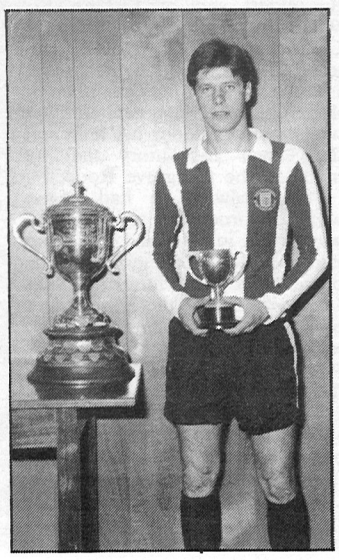
Soccer dream comes true

During the 13 years that Steve Martin spent at the Blackburn Orphanage Home it was his task to clean and polish the Orphanage Cup in preparation for the annual charity soccer competition in which many local industries vie for the honours.

As he worked hard at making the coveted trophy gleam he had plenty of time to dream of one day being a member of the team that would proudly carry it home.

Now that dream has come true because Steve, now a mechanical examiner at ROF Blackburn, played a vital role in the factory team's 3—0 defeat of Mullards in this year's final played at Ewood Park.

As a reward for his efforts both on the field and in the years when he looked after the cup Steve was made captain for the victory celebrations on the evening of the match.



Lord Mayor's Show first for Chorley

ROF Chorley represented the Royal Ordnance Factories by entering this eye-catching Float in the Lord Mayor's Show.

The factory collaborated in the design and manufacture with 55 Ordnance Company (V), a TAVR Unit based in West London, and the float earned the award for the best military exhibit in the Lord Mayor's procession.

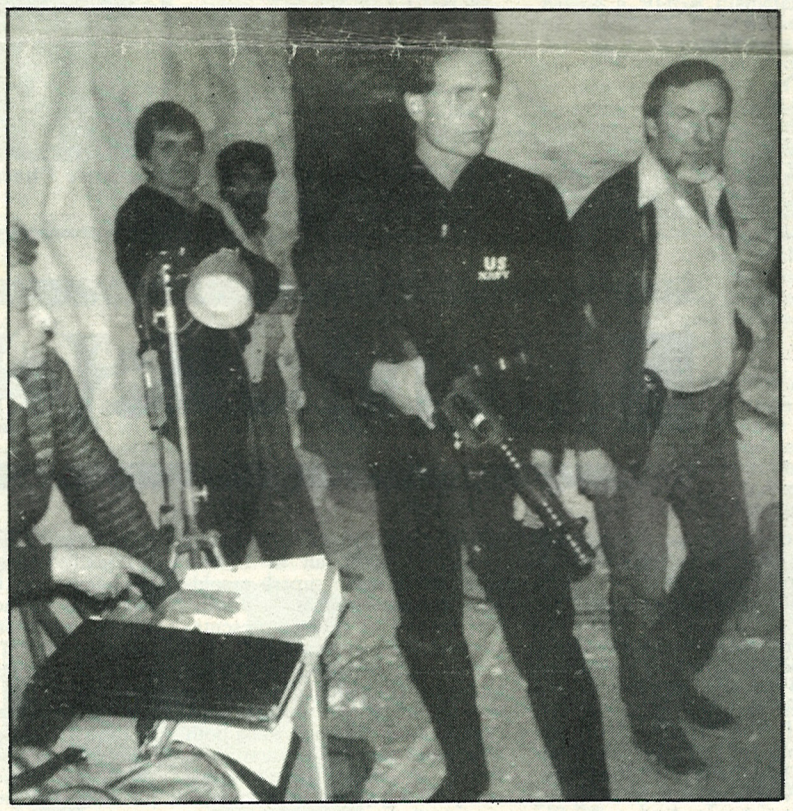
ARWEN features in latest Bond movie

THE latest weapon to be introduced to the 007 armoury is ARWEN-37, the Enfield-manufactured riot control system, and it features in the latest James Bond move "Never Say Never Again."

This production, which sees Sean Connery's return to the role of Bond, was filmed at the EMI studios at Borehamwood as well as on location. ARWEN stars in the later stages of the story during an action-packed combat sequence in an underwater cavern.

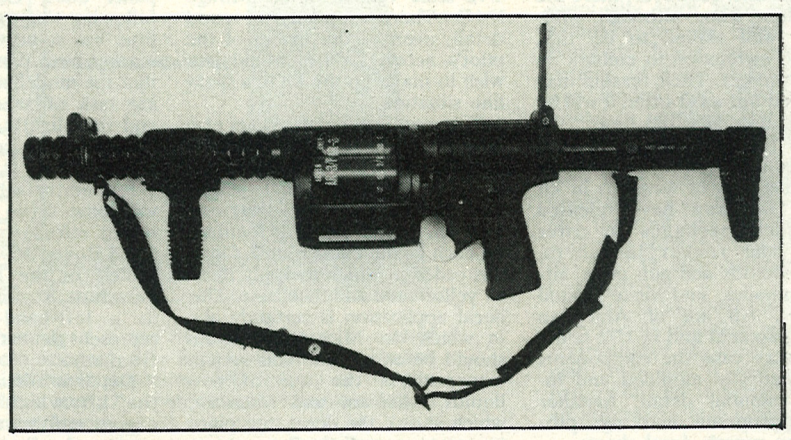
United States Navy divers are confronted by agents of the international criminal organisation SPECTRE and James Bond's colleague Felix Leiter (played this time by Bernie Casey) saves the day when he uses ARWEN to fire a volley of special "dazzle flares" to blind SPECTRE into submission and help Bond save the Western World from imminent doom.

Incidentally, PROFILE is reliably informed that the Director of RSAF Enfield has dismissed rumours that all future ARWENs manufactured there will carry the serial number 007!



Bernie Casey as Felix Leiter, James Bond's American coleague, holds an ARWEN-37 as he prepares for action in another "take" during filming of "Never Say Never Again."

Below: A close-up of the weapon loaded with AR-3/P rounds.



A tribute to the pioneers

A LINK with certain milestones in Britain's industrial history is maintained by the ROF Centre for Management Studies through the names of three of its four lecture rooms.

CMS was first formed at what was then ROF Swynnerton in Staffordshire in 1948. This association with the Potteries is marked by the Wedgwood Room outside the door of which is displayed a fine example of the style of ware created by Josiah Wedgwood.

Wedgwood, a member of the fifth generation of a family of potters, set up his own business in 1759 and soon earned respect and reputation. Within six years he had received his first order from Royalty. It was in 1774 that he produced his first Jasper — the ware with raised white classical figures and a style which, with most people today is synonymous with his name.

Besides his achievement as a potter he was also a scientist and humanitarian keenly interested in slave emancipation. He was also largely responsible for the building of the Bridgwater Canal between the Mersey and the Trent.

The Congreve Room was named after Sir William Congreve and is linked with the Centre's move to the Royal Arsenal, Woolwich in 1958. Congreve was the eldest son of Lt-Gen Sir William Congreve, Colonel Commandant of the Royal Artillery, Comptroller of the Royal Laboratory and Superintendent of the Military Machines. It was while serving under his father at the Royal Laboratory that he invented the Congreve Rocket.

At Woolwich he had begun work on producing an improved war rocket in 1800 and five years later was able to demonstrate its possibilities. The following year 18 small ships of the British fleet bombarded Boulogne with 200 rockets and an Army rocket team was formed and actually deployed the weapon in the Battle of Leipzig in 1813 with the resulting surrender of five French battalions. Rockets were also fired against the Danish fleet at Copenhagen in 1807.

Congreve's rockets were made from sheet iron tubes with cast or wrought iron interchangeable warheads. There were even special warheads which exploded at altitude releasing parachute flares.

The third room marks an important historical event which has local connections. CMS moved to its present location at Chorley in 1967 hence the naming of the Arkwright Room, for its was at this town that Sir Richard Arkwright suffered the loss of his mill, burned by those who opposed automation. Their hostility towards machines followed Arkwright's invention of the spinning frame.

Arkwright was born at Preston in 1732 of humble parentage. After an early apprenticeship as a barber he set up in business as a dyer in the wig-making trade. When this business declined he turned his attention to mechanical inventions as applied to the cotton industry and eventually produced the spinning frame which was also known as the water frame or throstle. In this piece of machinery cotton was spun by a revolutionary roller process.

After the burning of his Chorley mill he settled at Cromford in Derbyshire where he set up four factories. He died in 1792 having made an important contribution to the industrial revolution and one which has earned him the description of the first successful industrialist.

Outside the Arkwright Room is displayed a fine model of his water frame which was made and presented by the Sir Richard Arkwright Company Ltd., of Oswaldtwistle.

Firepower

In our December issue report on the firepower demonstration at Lulworth it was incorrectly stated that the RARDEN APDS round could punch through any armoured vehicle at ranges up to 2,000 metres.

It should have read, of course: ". . . any APC (armoured personnel carrier) at ranges up to 2,000 metres."

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