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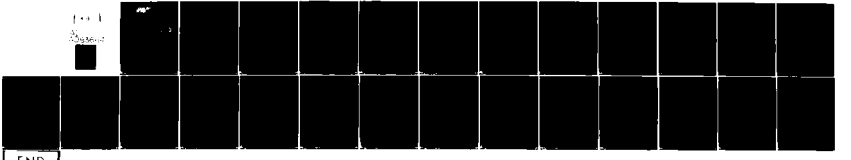

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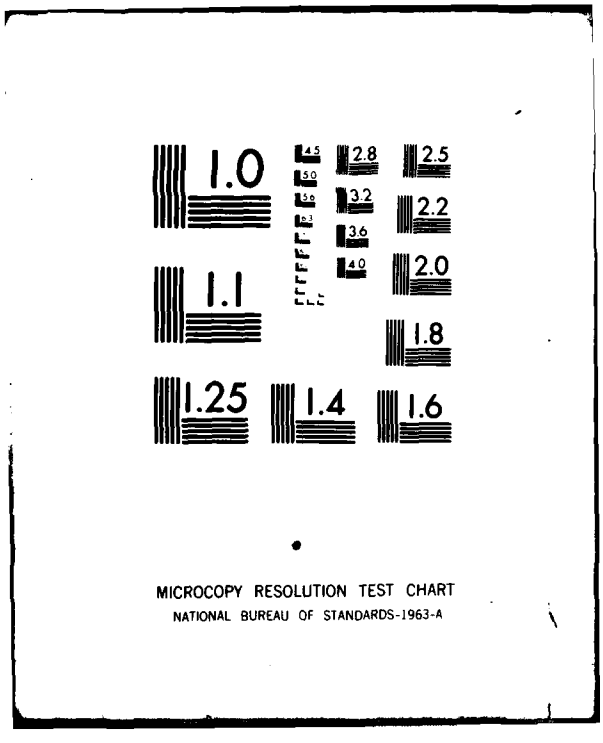
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SWEDISH DEFENCE RESEARCH ABSTRACTS 78/79-3

by

Research Institute for National Defence, Stockholm

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EDITOR'S SUMMARY

The Swedish Research Institute for National Defence issues a quarterly list of unclassified Reports published by the Institute. The titles of these Reports and informative abstracts have been translated in English. This volume is the third issue of 1978/79. Further volumes will be translated in due course. The main topics covered are: Protection - atomic, biological, chemical; ammunition and weapons; conduct of war, information and commands; vehicles and spacecraft; reliability and logistics; human factors; associated studies and their solutions; positive methods for limitation and control of armaments; psychology reports.

EDITOR'S NOTE

The Reports are in Swedish unless some other language is indicated (usually English). When requesting Reports it should be appreciated that an English version will not normally be available, and that the prices of the original Swedish documents have not been indicated in this Translation. Reports may be obtained from:

FOA P Rapportredaktion, 104 50 Stockholm 80, Sweden

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A PROTECTION - ATOMIC

A3 Effects of nuclear explosions, and protective measures

(157) FOA Report C 30140-A3
Experimental determination of transients in a coil
Torbjörn Karlsson and Sven Persson May 1978

The voltage induced in a single-layered coil from an external field can be determined by the laws of induction. This is usually based on the approximate assumption that the change of flow is equal in each turn of the coil, with the result that the calculated induced voltage is proportional to the number of turns. Any such approximation is generally invalid for EMP fields, since the voltage contribution by the individual turns is not coherent, but each one adds up to yield a voltage of lower amplitude and longer duration than that obtained from the approximate induction formula. The voltage in a coil induced by a transient field has been measured and is here described. The voltages between individual turns of a coil were displayed on an oscilloscope and photographed so as to facilitate comparison between the curves.

D AMMUNITION AND WEAPON TECHNOLOGY

D1 Technology of explosives

(158) FOA Report A 20031-D1
Methods for testing rocket propellants. II Composite propellants
Anders Schwartz February 1979

Methods for the testing of propellants have been devised for application to investigating the ageing of composite propellants in rocket engines. The object of this is to enable the same method to be used each time in the event of repeated investigations. The report describes the testing of the following properties: density, hardness, heat of explosion, adhesion of insulation, rate of combustion, tensile strength, thermal properties, linear expansion and the glass temperature transition.

(159) FOA Report C 20297-D1
Long-term storage tests of propellant. IV Measurements in 1977
Jan Hansson and Ingemar Ohlsson March 1979

A fresh analysis has been carried out on propellants after long storage. The experiments were begun in 1971, using about thirty relatively old propellants. Their content of stabiliser and coefficient of viscosity were re-measured. The propellants do not appear to have undergone any appreciable changes during the storage period under review. Some suggestions concerning methods are put forward.

(160) FOA Report C 20299-D1
Combustion properties of high-fuel HTPB propellants using ammonium perchlorate (AP) as the oxidising agent
Torsten Liljegren and Bert Anderson March 1979

Some high-fuel HTPB propellants, intended for use in hybrid engines, were prepared and their combustion properties were investigated by combustion-testing in a rocket engine. By using combustion catalysts and finely-divided perchlorate, the content of perchlorate can be reduced to 30% while continuing to obtain stable combustion. The results are presented in the form of rate-of-combustion curves for propellants containing 30-60% of AP. The effects were examined of different catalysts and the grain size of the perchlorate. The rate of combustion as a function of temperature was investigated for a propellant with 40% of AP. The temperature dependence was greater than for normal rocket propellants.

D2 Gunnery technology and associated ballistics

(161) FOA Report C 20298-D2
Measurements of stability and the cone of fire for projectiles with cylindrical portions of different length. MALFOM 4.4831, Stage 3
Sven Nordström and Nils-Bertil Nilsson (FMV) March 1979

Stage 3 of the MALFOM 4.4831 programme covered tests of five different types of 7.5 cm projectile, in which the lengths of their cylindrical portion (the body length) were different. Their stability at four velocities was measured at the Nordbana of FMV-A:AP in Karlsborg. Measurements of scatter in long-range firing were carried out both at Karlsborg and at the OrlB S range at Torhamns Udde. The report discusses the projectiles under test, the test results and accuracy of measurement. Some of the results are compared with measurements from other investigations.

The static stability factor S_0 is strongly dependent on body length with values from 3.1 for the shortest type to a maximum of 1.2 for the longest. One pattern of the latter was dynamically unstable, otherwise all the measuring points lay within the limits of static and dynamic stability. The great reduction in velocity with low S_0 and large amplitude of yaw was found to involve some non-linear effects which were difficult to evaluate.

In test firing for scatter no statistical differences were determined for scatter among the various types, since all the types were compared with one another. A certain correlation can be observed between the static stability factor and longitudinal scatter. Measurements both of range and air drag indicate that any variation of body length has no discernible effect on air drag.

D6 Protection from exploding warheads

(162) FOA Report C 20288-D6(A3)
HSLAB - an interactive program for one-dimensional heat flow problems
Leif Abrahamsson (Uppsala University) and others (in English)
January 1979

HSLAB is an interactive computer program for processing unsteady temperature conditions in one dimension of a multi-laminar disc when subjected to heat. The program is employed through the terminal of a DEC-10 at the Stockholm Computer Centre. The program is user-oriented and easy to manage. Even users having little experience of computer calculation will be able to use *HSLAB* to solve problems in heat transport.

The program will accommodate temperature-dependent material parameters, flexible conditions in the vicinity such as a given temperature or a given heat transport at the surface as a function of time. The numerical solution is based on difference approximations using Crank-Nicholson as the standard method. The output of results is obtained either graphically or in tabular form. Two simplified models included in the program enable one to calculate the temperature in a room subjected to external heat (eg a shelter) or the temperature in a burning room.

(163) FOA Report C 20293-D6
Air temperatures in a shelter affected by fire - some experiments with ventilation and internal heat sources
Bengt Hägglund and others March 1979

The investigation yielded experimental data concerning the effect of ventilation and various internal heat sources on the air temperature in a shelter when affected by fire, by means of 12 experiments using different combinations of combustion effect, ventilation, dry and moist internal heat sources and what are termed human simulators (Mannequins).

The results are presented as processed measurements with summarised comments on them. Two distinct results were that the increase of air temperature in the tests could be reduced by 10-30% by ventilation, and that the rise in temperature was from 5-25% lower with moist than with dry heat sources.

These results are not of general validity, being mainly intended to test various mathematical models for calculating air temperatures in shelters.

(164) FOA Report C 20294-D6(A3)
Study visit on fire research in the USA and Canada, October-November 1978
Bengt Hägglund and Vilhelm Sjölin March 1979

The report covers a number of fire research projects at the National Research Council of Canada, National Fire Protection Association, Factory Mutual

Research Corporation, National Bureau of Standards, John Hopkins University, SRI International, Ryland Research Inc and Mission Research Corporation.

Additional information concerns investigations by the National Fire Prevention and Control Administration and the International Association of Fire Chiefs. The investigations concern both interdisciplinary research programmes and subjects of industrial safety in the fire authorities.

Finally a brief description is given of seminars and lectures given by the visitors in Canada and the USA, with a discussion in general terms of some special projects.

D8 System studies

(165) FOA Report C 20286-D8
Methods and software for the analysis of activity trees
Stefan Arnborg and Staffan Rydbeck January 1979

The report describes a notation for defining activity trees, especially suited for the calculation of effects, and software for analysing activity trees. A *SIMULA* program reads plain-text descriptions of the activity tree, verifies that the tree satisfies certain rules and converts them to a form of representation which can be used for rapidly calculating the probability of a selected activity. *FORTRAN* programs which use this representation are also described.

A feature of activity trees in the model representation of effects includes the fact that an activity is often defined as having occurred if at least k out of n enumerated activities have occurred, and that it is required to obtain a distribution function of how many out of a number of enumerated activities have occurred.

(166) FOA Report C 20287-D8
A method of analytical treatment for the time-dependent parameters in the model of artillery effects
Göran Sten January 1979

The studies being pursued by FOA on the effects of artillery fire require calculations of the effects for a large number of combat situations. In order to meet this large requirement for calculations a number of versions of an artillery effects model (*AVM*) have been produced.

In its original form *AVM* was a Monte Carlo (MC) model, embodying few elements of analytical secondary models, which among other things necessitated considerable machine time.

The report describes a method for processing analytically the time-dependent parameters of the *AVM*. The method requires the effect on non-stationary targets to be calculated from that on targets stationary in time.

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(167) FOA Report C 20292-D8
On the complexity of multivariable query evaluation (in English)
Stefan Arnborg March 1979

Research has been in progress in FOA Section 043 (computer science and applied mathematics and control theory) since 1975 into the technique of databases, with the object of investigating the possibilities of designing a general back-up system for technical and scientific data processing, based on modern theories and methods of data storage and retrieval.

The present report describes the search algorithms for certain types of database search, termed multi-variable queries. These algorithms are effective for a limited class of query. The limits have proved to be necessary if what are known as NP-difficult problems of calculation are to be avoided, ie there are grounds for assuming that queries which do not meet the limits are in principle untreatable. The problem of answering a multi-variable query is converted to a search problem for hyper-graphs, and graphic search methods are applied to the problem as thus transformed. The report emphasises the analysis of upper limits to the asymptotic cost of evaluation, although some heuristic methods of reducing evaluation costs are informally discussed.

E CONDUCT OF WAR - INFORMATION AND COMMAND TECHNIQUE

E1 Reconnaissance, target location and fire control

(168) FOA Report B 30028-E1
An iterative algorithm for angle detection on digital curves
Roger L.T. Cederberg (in English)

The report describes a method for detecting angles and bends on digital curves. The algorithm is iterative and operates in parallel throughout the curve. This will permit very rapid observations using a machine with parallel-operating processors.

Edited version of a lecture at the 4th International Joint Conference on Pattern Recognition, Kyoto, Japan, 7-10 November 1978. FOA Reprints 1978/79:17.

(169) FOA Report B 30029-E1
Machine interpretation of a hand-drawn circuit diagram
R.L.T. Cederberg

Computer Aided Design (CAD) in the electronics industry has become an increasingly common element in the development, production and testing of electronic products. This involves a growing need for the simple and efficient input of circuit diagrams, which has given rise to a wide variety of digitizers and graphic terminals. The author presents an alternative input system based on input from a TV camera and interpretation of the diagram by image-processing

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methods. An automatic input station can be used both for new creations and for modifying and updating of the CAD database.

A circuit diagram consists of graphic symbols and text. The hand-drawn circuit should naturally be drawn to certain rules, and it is important for these rules to conform largely to current standards. A feature of this system is that only horizontal and vertical lines are used and that all components are drawn as rectangles.

The diagram is interpreted in two phases having different resolutions. First to be processed is the graphic part at low resolution, and then the graphic information controls the search and detection of the text at higher resolution.

Edited version of lecture to the International Conference on Computer-Aided Design and Manufacture of Electronic Components, Circuits and Systems, University of Sussex, 3-5 July 1978. FOA Reprints 1978/79:20.

(170) FOA Report C 30108-E1
Digitizing and handling of analogue-registered MSS data (in English)
S.I. Åkersten and others October 1978

The report describes the digitizing and handling of image data from an analogue recording multi-spectral sweep photometer (MSS). The technique of data collection is briefly described together with the techniques and problems associated with digitization and subsequent formatting of data. In addition to an account of work already completed, some preliminary information of future processing is also given, which will be important for a more developed system of computer-assisted evaluation of multi-spectral remote sensing data. This work forms part of the MSS-75 project, which is one of the projects in an investigation of possible applications of airborne MSS techniques being conducted for the National Delegation on Space Activities.

This project is being conducted partly at the behest of the National Delegation on Space Activities.

(171) FOA Report C 30146-E1
Program library for handling and processing of remotely sensed multi-spectral data - second revised edition (in English)
S. Ingvar Åkersten and Lars-Erik Gustafsson September 1978

A brief user's guide is presented on a system of computer programs for the handling, processing and analysis of multi-spectral image data. The system has been developed at FOA and implemented on an IBM 370/165 at the Stockholm computer centre. The program is used in batch processing with a specially sorted pack of punched cards for each tasked application. Examples are provided of some typical combinations of the stages of image generation and identification as to type, proceeding from digital data edited by the system.

LI 2053

(172) FOA Report C 30153-E1
The recording and display of infra-sound signals using a microprocessor
F. Malmström and H. Nygren December 1978

The present report discusses the use of a microprocessor in an apparatus to determine the direction of infra-sound sources, and describes the instrumental configuration designed to afford suitable facilities for recording and monitoring.

Previous experiments in this field were contained in FOA Report C 30088-E1 of December 1976.

The report contains a description of the new apparatus and an account of the programming of the microprocessor.

For further details on the method of evaluating infra-sound signals, attention is drawn to the above-quoted report.

(173) FOA Report C 30159-E1
Annual report 1978
Department of image-processing, FOA 355, 331 and 562

The report provides a descriptive review of activities in the field of image-processing during the calendar year 1978.

E2 Communications

(174) FOA Report C 30157-E2, E1
Measurements of rainfall intensity. Instrumentation and data processing (in English)
Sture Wickerts and Sten Granath January 1979

Measurements of rainfall intensity at high resolutions in time and space have not occurred to any large extent in Sweden. A serious need for such measurements exists in many fields of application. In connection with the propagation of radio waves at frequencies above a few GHz the effect of raindrops is of importance both in planning new systems and in operational use. At these high frequencies raindrops cause attenuation by diffusion and absorption, and also give rise to radar echoes. These effects increase with increasing frequency.

A system has been constructed at FOA for the measurement and collection of information on the intensity of precipitation. The measurements began in June 1977 and are intended to continue to at least 1980. The first part of the report describes the equipment and the system for collecting data. The second part covers the data processing, from collection through verification and correction to its assembly in a database giving the intensity of precipitation minute by minute from all the instruments in the area surveyed. The second part also describes some of the statistical calculations performed on the information acquired from the above-mentioned database.

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E3 Guidance, navigation and target identification

(175) FOA Report C 20296-E3
Omega measurements at Stockholm
Bertil Landkvist March 1979

The report briefly describes some newly designed measuring apparatus for automatically recording and evaluating positions given by Omega and Decca Navigator in latitude and longitude. The positional error of Omega is also evaluated, using either the Decca or some known fixed position as a reference. The apparatus has been tested both on FOA premises in Stockholm (89 Linnegatan) between January-March 1978 and on board ship in a limited test among the southern offshore islands of Stockholm. The results of these measurements are briefly reported and commented upon. The measuring equipment is mainly intended for Omega, though it can be equally well used for navigation by Decca, without any special need for the Decca charts, eg among the islands or onshore. For the present no account is being taken of corrections incorporated on the Decca charts, which anyway are of minor importance for Omega, whose normal positional error clearly exceeds that of the Decca Navigator.

E4 Countermeasures, including signal interception and technical intelligence

(176) FOA Report A 30017-E4
The JONAS-77 system: The Ag 60 display terminal
Sture Högosta June 1978

The JONAS comprises two Ag 60 display terminals, one in the central unit and one in headquarters.

This report supplements the inadequate technical description available on the Ag 60.

(177) FOA Report C 20290-E4
Earthquake in Southern Germany on 3 September 1978
Ola Dahlmann and Ingvar Hansson February 1979

On 3 September 1978 Baden-Wurttemberg was shaken by the strongest earthquake in Southern Germany since World War II. No fatalities were caused, though 19 persons were injured, a large number were shocked and about 400 had to be evacuated. Material damage was estimated at some tens of million DM.

The present report begins with a description of seismological measurements of the earthquake, stating parameters of the source, the probable cause of the quake and the historical seismicity of the locality. This is followed by an account of an on-the-spot inspection with a description and discussion of the resultant damage.

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(178) FOA Report C 20295-E4
Swedish earthquakes and acceleration probabilities (in English)
Ragnar Slunga March 1979

A method is described for determining the probability of ground accelerations. A lack of instrumental measurements necessitates the use of macro-seismic observations. Theoretical calculations of wave propagation are employed to derive the relationship between the intensity of an earthquake, the depth of the epicentre, the distance and maximum acceleration. Taken in conjunction with earthquake statistics, these relationships provide a model for the calculation of probabilities. A probability of 10^{-5} per year yields ground accelerations of 5-20% g for sites of immediate interest for nuclear power installations. Applying the wave propagation model to the earthquake of 1904 we obtain an acceleration at the epicentre of 5-15% g. The model which we have produced, based on macro-seismic observations, is in good agreement with the available instrumental measurements at long range.

E5 Technical reliability

(179) FOA Report C 30152-E5
Test of 2000 Ah primary lithium thoinyl chloride cells, made by GTE Sylvania, USA (in English)
Barbro Hallgren November 1978

Two lithium thoinyl chloride cells of 2000 Ah were tested at FOA as a requirement for FMV-M.

Both cells were discharged at 8 A to a final voltage of 3.0 V/cell.

Testing of the cells proceeded smoothly and the results broadly agreed with expectations. During discharge the cells yielded 97-98% of their rated capacity.

It should be indicated however that the pressure increase in the cells while discharging was greater than that predicted.

Since this cell system is a new one and the components inside them, which were not hermetically sealed, were poisonous and corrosive, the cells had to be handled by qualified personnel.

H HUMAN ENVIRONMENT

H5 Emergency treatment, rehabilitation, preventive medicine

(180) The effects on the metabolic rate and nutrition of patients with severe burns following treatment with infra-red heat (in English)
G. Arturson and others

A patient suffering from extensive burns undergoes a prolonged and serious heat loss owing to increased radiation, convection and evaporation. His

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ability to control his skin temperature is limited, and the function of the injured skin as a moisture barrier is impaired. The increased heat loss can be compensated by supplying energy from outside by means of infra-red heat, thereby obviating an otherwise unavoidable loss of weight by the patient. Plenty of energy can be supplied to the patient by infra-red heat while maintaining the ambient air temperature at an acceptable level having regard to the patient's air passages and the working environment of the nursing staff. This method is cheap and simple, and consequently suitable for treatment in emergency situations.

Offprint from Burns (1978), 5, pp 164-168; FOA Reprints 1978/79:21.

(181) FOA Report B 54011-H5
Variations of metabolic rate in burned patients as a result of the injury and the care (in English)
U. Danielsson and others

The metabolic rate in a person suffering from extensive burns is extremely high for a number of weeks following the accident. If it is possible to eliminate the mental and physical disturbances caused both by the injury and its treatment, while the patient is being nursed in an environment in which he can obtain thermal comfort, his metabolic rate will decrease and his daily calorie requirement can be appreciably reduced.

Offprint from Burns (1978), 5, pp 169-173; FOA Reprints 1978/79:22.

H6 Individual and group efficiency

(182) FOA Report B 57008-H6
Relationship between lactate accumulation, LDH activity, LDH isozyme and fibre type distribution in human skeletal muscle (in English)
Per Tesch and others

Lactic acid concentration and activity of the enzyme LDH and its isozyme distribution were determined in the two principal types of human muscle fibre. The analysis was made from sections of muscle (biopsies) taken after about 30 seconds of intensive dynamic work. The lactic acid concentration, total LDH activity and muscle-specific LDH activity exhibited higher mean values in fast (FT) than in slow (ST) muscle fibres. Positive correlations were also found both between the individual percentage of FT fibres and the lactic acid concentration in the muscle, and also between the accumulation of lactic acid and total LDH activity and muscle-specific LDH activity. Results show that the fast-contracting muscles (muscle fibres) have a greater ability to form lactic acid as compared with slowly-contracting muscle (fibres).

Offprint from Acta Physiol. Scand. (1978), 103, pp 40-46;
FOA Reprints 1978/79:23.

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(183) FOA Report B 57009-H6
Isometric strength performance and muscle fibre type distribution in man (in English)
Per Tesch and Jan Karlsson

The maximum isometric single-leg strength (MIS) was determined for 31 moderately to fully trained persons whose distribution of muscle fibre type varied widely (21-79% fast (FT) muscle fibre) in the femoral muscle (vastus lateralis). A positive linear correlation was found to exist between MIS and the relative distribution of FT fibres ($p < 0.001$). This seems to imply that not only the mass of muscle involved but also its quality determines the amount of isometric strength which can be developed.

Offprint from Acta Physiol. Scand. (1978), 103, pp 47-51;
FOA Reprints 1978/79:24.

(184) FOA Report B 57010-H6
Muscle fatigue and its relation to lactate accumulation and LDH activity in man (in English)
Per Tesch and others

The concentration of lactic acid in various types of muscle fibre was determined in biopsy material from human femoral muscle after maximum dynamic exertion of the leg. The exertion was applied on two occasions, of respective durations of 30 and 60 seconds. The composition of individual muscle fibres, the activity of LDH (the lactic acid enzyme lactate dehydrogenase) and the isozyme distribution of LDH were also determined. As with previous studies, muscular endurance was related to the proportion of slow-twitch fibres in the muscles employed. After 30 seconds' exertion the accumulation of lactic acid was highest in the fast twitch fibres, while some levelling-out between both types had occurred after a further 30 seconds. The difference of activity of lactic acid LDH and specimens of LDH isozyme between the two types of fibre were correlated with muscle fatigue. It can be assumed on good grounds that an intracellular accumulation of lactic acid or changes in pH, principally in the fast fibres, can be associated to a large extent with limited muscular functioning.

Offprints from Acta Physiol. Scand. (1978), 103, pp 413-420;
FOA Reprints 1978/79:25.

M INTERDISCIPLINARY STUDIES AND INVESTIGATIONS

M2 Environment and social studies

(185) **FOA Reprint C 10110-M2**
Great Britain, the USA and West European security
Nils Andrén **February 1979**

This report on the development of British security policy and roles on the international stage is based on the 'special relationships' which have been developed for various reasons between Great Britain and the USA. One principal theme in this presentation is the manner in which these relations have been affected as a result of the transformation of Great Britain from a world power to what is mainly a European NATO power. The bulk of the report consists of a historical review of British relations with the USA and Western Europe and factors which have governed them. It concludes with an outline of future British prospects and their consequences for Britain's role as a European power and for the historical 'special relationships'.

This study forms part of the West Project.

(186) FOA Report C 10111-M2
French thinking on security policy and strategy
Hans Sjöberg March 1979

The present report is an account and discussion of the official strategic doctrine in France under the Fifth Republic. It proceeds historically from the main themes of the doctrine under the Presidency of de Gaulle through refinements of it during Pompidou's period as President to the revisions which have been discernible since Giscard d'Estaing acceded to the Presidency. In conclusion the attitude of the major Leftist parties to the subject of nuclear weapons is briefly dealt with. The report can usefully be read in conjunction with the author's report "Some principal features of French foreign policy", FOA Report C 10106-M2, November 1978.

This study forms part of the West Project.

(187) FOA Report C 10114-M2
Congress and foreign policy
Göran Rystad February 1979

The central role played by the USA since World War II has naturally aroused intense interest in the process by which American foreign policy is determined. This applies not least to the elusive though significant role played by Congress in this process. The difficulties lie partly in the American political system with its separation of powers, where the potential opportunities of Congress to exert influence are exploited to a different extent during different periods.

'War powers' and 'treaty powers' occupy the centre of the institutional conflict between the President and Congress. The problem of 'information' and 'consultation' here again occupies a central place, ie questions as to when, how and in what manner Congress is to collaborate in the process of foreign policy.

The subjects on which this presentation concentrates are the following: How has this development progressed? What role does Congress play today in the foreign policy process, what instruments of power does it wield, how does it use them and to what effect? Has a balance in the institutional conflict been stabilised? What are the probable developments in the next few years?

Developments towards the 'Imperial Presidency' which were begun by World War II culminated under Lyndon Johnson and Richard Nixon. The Vietnam war led to a reaction on the part of Congress, an attempt at self-assertion with the object of advancing the positions of Congress power in foreign policy. The experiment was productive, being symbolised among other things by the Case-Zablock Act of 1972 and the War Powers Act of 1973, whilst the decisive step towards the increased influence of Congress was facilitated by the weakening of Presidential power brought about by Watergate.

Some swing back in favour of Presidential power is probable, though not involving a return to the power situation at the start of the 1970s, provided that no serious foreign policy crisis arises. There is some reason to expect that in the next few years Congress will retain the influence it has now achieved, particularly by exercising the power of the purse.

This study forms part of the West Project.

(188) FOA Report C 10121-M2
The Nordic balance and Swedish security (in English)
Nils Andrén November 1978

1 The Nordic balance : An overview

This version of the report was delivered at a Conference held on 14 June 1978 arranged by Georgetown University, Washington DC.

The Nordic countries reacted in various ways to the division of Europe by the Cold War. The general result of the choice of role by the different countries has been a political pattern which is considered to have contributed towards reducing serious confrontations between the two power blocks on their 'Northern flank'. This has come about although the importance of the region has increased, both militarily because of the expansion of the Soviet Navy and the nuclear strategy of the superpowers, and economically owing to the resources of the sea and in particular the growing importance of oil. The global, European and Nordic conditions for the political security pattern in the North - often termed the Nordic balance - and some possible effects of future changes are discussed.

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2 Is Sweden moving towards a New Security Policy?

This article was published in Swedish in 'Fredens Spiral' (The Spiral of Peace) by the Central Council of the Swedish Church in October 1978. It deals principally with the importance of defence in the context of the traditions and objectives of Swedish security policy, and with some possible reactions in security policies as a consequence of cuts in Swedish defence.

(189) FOA Report C 10124-M2
The bread supply system under disturbed conditions
Margareta Persson and Petter Wulff January 1979

We have chosen not to call this report 'the vulnerability of bread supplies'. One reason is that we think that the idea of vulnerability is beginning to lose its precision through being used in an increasing number of senses. In addition it would seem like condemning the bread supply system out of hand, to discuss it under this heading. It is obvious that the conclusion that 'bread supplies are vulnerable' has been drawn straight from the title. Our impression of the bread supply system is rather that extremely great possibilities exist for providing supplies even under conditions of disruption (war and blockade). But in that event the responsible authorities should be prepared to adopt different channels of supply from peacetime.

(190) FOA Report C 10125-M2
The Soviet economy - some trends and assessments
Vilhelm Rappe February 1979

The growth rate in the Soviet economy has in recent years exhibited some clear tendencies to flagging. Western commentators have also often prophesied for it a still gloomier future.

This report begins with economic developments hitherto and the factors which govern them. In this context various plans and forecasts for the future Soviet economy are outlined and compared. The author feels certain that growth is now running into a number of restrictions both in the form of an increasing lack of resources including manpower and energy, and in the lack of efficiency. However nothing exists necessarily to compel the Soviet economy to stagnate. On a timescale of 15-20 years it is felt safest to assume that the Soviet Union will continue to be an economic power to reckon with.

M3 Predictive planning

(191) FOA Report C 10077-M3(E5)
Algorithm needed in a natural language understanding system (in English)
Jacob Palme February 1979

The author of this report maintains that a computerised system for understanding natural languages should incorporate a large number of rules as to

how various words and combinations of words should be interpreted. A central problem in constructing some such system will then be the language in which these rules are to be input into the computer. In order to aid any future designers of systems which understand natural language, the author enumerates a choice of such rules which form part of an existing system for question-answering. Anyone designing a new system should be able to test his rule-formulating language by testing the extent to which correspondences with the rules described in the present report can be formulated in the new rule language.

(192) FOA Report C 10078-M3(E5)
Postlude to a question-answering project (in English)
Jacob Palme February 1979

Between 1967 and 1973 the author was working on a research project to develop a computerised system to be capable of accepting facts and answering questions expressed in natural language. This report, written after the project had been concluded, attempts to summarise some experiences of how one ought to set about writing such a system. These experiences may be of use to someone setting up a new project for developing systems capable of understanding natural language.

(193) FOA Report C 10117-M3
Long-term developments in wages and prices in Defence - some forecasts and conclusions
Per Forslund and others February 1979

Defence planning is conducted on a basis of fixed prices and frameworks. However inflation will most probably mean modifying both planned costs and appropriation estimates when the plans are implemented. Besides the fact that the general price level will change in the future, the prices of various resources used for defence purposes will also shift with respect to one another. For purposes of long-range Defence planning this means that the evolution of prices can vary among different future patterns of Defence organisation (usually termed Defence structures).

This report compares the costs of implementing the Defence structures studied in Phase 1 of the long-range planning, having regard to the assumed evolution of prices.

The economic feasibility of the various structures is also assessed with respect to the outcome of the price control system now in force.

Professor Sten Wandel has contributed some valuable ideas to this report.

(194) FOA Report C 10122-M3(E5, H9)
The importance of computers for the vulnerability of society and the individual
Jacob Palme March 1979

This report is not intended mainly to discuss the actual technical aspects of vulnerability of the computer equipment itself. These are presented only in summary. The purpose rather is to discuss the effect of computers on society and the individual's way of life and how they affect the present time, and how they may be expected to affect the vulnerability of society, and of organisations and individuals from now to the year 2000.

We can expect a rapid trend towards cheaper computers and the wider use of them. This development towards a society increasingly dominated by computers will impose some major changes to our way of life. These changes possess both positive and negative aspects of vulnerability.

On the positive side among other things, computers can be designed so as to help individuals to avoid serious mistakes, while new communications facilities using computers may counteract the concentration of activities under one roof in one spot, and increase the opportunities for decentralisation and regionalisation of activities.

The negative side includes a dependence on imported technical equipment, the dangers or rigidity and lack of flexibility, and the risk of computers being misused for the undesirable exercise of power.

These risks can be substantially reduced by a consciousness of the problem and an active will to invest sufficient resources to counteract the problems of vulnerability.

(195) FOA Report C 10123-M3(E5, H9)
Teleconference-based management information systems (in English)
Jacob Palme March 1979

The conventional computer-backed systems frequently entail rigidity and impaired facilities for individuals and organisations to adapt themselves to new requirements in new situations. This report suggests a method for designing a computer-backed system as an extension of the principle of the teleconference system. The term 'teleconference' is expanded to that of 'activity', which may be a teleconference, a person, computer program, circularised enquiry, collection of travel bills, a collection of entries in a database system or the like. Each activity consists of communications or notes, both of which may contain normal text and information structured in type-defined fields. This method of designing a computer system may afford greater flexibility and adaptability to new requirements and environments.

(196) FOA Report C 10128(E5, H9)
A human-computer interface for non-computer specialists (in English)
Jacob Palme March 1979

The KOM teleconference system was designed to be simple to use both by new beginners and by users with computer experience. A number of questions as to how the man-machine interface should be devised are considered in close detail. These questions are not unique to the teleconference system, but arise in many other cases when developing man-machine interfaces for users without computer experience.

This report discusses the conventions of notation, menu formats, user commands, ancillary facilities and previously-input user commands.

M4 Systems and program planning

(197) FOA Report C 10126-M4
Liquidity planning in defence - the theory of the FPE system and its application in practice
Peter Gavatin and Ulla Törnqvist February 1979

This report contains the result of a series of interviews intended to demonstrate how the principles of the FPE system are put into practice as regards liquidity planning in Defence organisations.

The report is presented in very general terms and concentrates on questions of theory. It deals with liquidity planning in the short and medium term in main production area 1: activities at command and unit level, and in general terms in main production area 2: procurement of materials. It concludes with a discussion of opportunities for improving liquidity planning.

M6 Miscellaneous investigations and surveys

(198) FOA Report C 20289-M6
Design of a user dialogue in the *DAPU* interactive computer system
Lars-Åke Larsson February 1979

DAPU is a system of computer back-up in planning, budgeting and performance monitoring for the various branches of the Swedish Defence organisation. The system is terminal-based so that each unit possesses a computer terminal which can be coupled to a central computer by telephone. The system has been designed to be easy to learn and to use. The inexperienced user can use the system so that he chooses alternative functions in succession from 'menus' which are displayed to him. The more experienced user can go directly to the functions which he wants by giving a command to the system. If a user answers a question from the computer by a ?-symbol, he will always receive a detailed explanation of the question. The system is programmed in *SIMULA* on a DEC-10 system at the

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Stockholm Computer Centre (QZ) and has been converted for operational runs on a Univac system at the Defence Computer Centre at Karlstad.

The object of the report is not to supply a complete description of the *DAPU* system, but to demonstrate some examples of how systems can be made better and made in a better way than that traditionally employed.

T CERTAIN MEASURES FOR LIMITATION AND CONTROL OF ARMAMENTS

T1 Seismological multiple stations

(199) FOA Report B 20023-T1
Depth determination by use of teleseismic P-arrivals (in English)
Ragnar Slunga

A common problem in the monitoring of seismic events is that of depth determination when only long-range observations, ie teleseismic P-arrivals, are available. Only the first arrival time is at present being reported from the observing stations. To determine the depth from these data requires a very good knowledge of wave propagation times as a function of depth and distance. A model of propagation times is presented here for teleseismic depth-determination of events within a limited area. The following two assumptions are adopted. The Earth's crust and upper mantle in the source region are assumed to be laterally homogeneous, and propagation times as a function of distance from the region to each of the stations are assumed to be well described by a second-order polynomial. This model is applied to earthquakes in Japan. Most of these lie at depths between 30 and 80 km. We then obtained time residuals with a standard deviation for a single observation of 0.6 seconds, which is clearly less than the values usually obtained of 0.8-1.0 seconds for global models. The rms error in depth when the events are localised by this model was about 15 km for earthquakes having m_b over 5.

Offprint from Geophys. J. Roy. Astr. Soc. (1975), 42, pp 737-746;
FOA Reprints 1978/79:18.

X MISCELLANEOUS (In-house projects etc)

(200) **FOA Report C 20291-X7 (H9)**
Dialogue with a computer for text editing and database manipulation with practical terminal exercises for a DEC-10, with a short summary of the elements of data-processing technique
Per Thernquist **February 1979**

This report is based on the contents of a course on data-processing technique arranged in 1978 for the staff of FOA 2 Administration. It is intended to be further used for a similar course in the FOA training program in Spring 1979 for FOA staff.

The report begins with a brief survey of the elements of data-processing technique, including computer construction, various channels and components for input and output, and the use of flow charts and programs.

The QZ computers IBM 370 and DEC-10 are briefly described with a selection of programming systems which are run on them. A brief account is given of the various elements in a dialogue with a computer in general, and with DEC-10 in particular.

The SOS text-editing system is discussed. For manipulations with complete lines it covers adding, exchange, erasure, transfer and print-out. The search for strings of symbols is also dealt with, and it concludes with some practical exercises on the terminal.

The 1022 database system is discussed. Programs are described for constructing and updating databases. Search, sorting and print-out of entries are described, with the use of order files. It concludes with some practical exercises on the terminal.

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