



1992  
No. 5  
Oct.

# Newsletter

## Contents:

**Analysis, Design and Evaluation of Man-Machine Systems**  
IFAC/IFIP/IFORS/IEA Symposium  
Netherlands

**New Working Groups**

**News from NMOs**

**Control Engineering Practice**  
New IFAC Journal

**Forthcoming Events**

**Papers from the Next Issue of Automatica**

**Safety, Security and Reliability**  
IFAC/IFIP Conference, Norway

**Who is Who in IFAC**

## Analysis, Design and Evaluation of Man-Machine Systems

### 5th IFAC/IFIP/IFORS/IEA Symposium

The Hague, The Netherlands, 9-11 June, 1992

This Symposium was held in The Hague, as a joint activity of the Delft University of Technology and the Royal Netherlands Institute of Engineers. About 135 participants from 19 countries attended the symposium.

All in all 53 technical papers were presented. They were grouped in five categories:

1. Manual and Supervisory Control
2. Human Performance - Human Reliability - Mental Load Models
3. Human - Machine Interfaces
4. Knowledge Engineering, Expert Systems and Decision Support Systems
5. Task Allocation, Work Design and Training Procedures

Furthermore, 4 survey papers were presented, covering the following topics:

- Teleoperation, Telerobotics and Telepresence: A Progress Report
- Task Allocation Problems and Discrete Event Systems
- Theoretical Problems in Man-Machine Systems and Experimental Validation
- Human Reliability in Process Control During Malfunctioning. A Survey of the Nuclear Industry with a Case Study of Man-Machine System Development.

In addition, two round table discussions were held at the end of the Symposium. The following topics were discussed:

- Do we need man in the man-machine system? If so, why and what for?
- User-interface design: Technology-led or user-driven?

The move from manual control towards supervisory control continued. Roughly speaking about a quarter of the presentations discussed Manual Control Theory and Applications, whereas more than half of the presentations was more or less related to Supervisory Control; applications of AI-concepts have become almost common in this area. It was remarkable that only 10 % of the presentations dealt with task allocation problems, because just this topic covers the important underlying question "What is the functional purpose of the man-machine interface, or, which tasks should be performed?" Also the training of human operators did not get the attention it would deserve.

One additional comment should be made. The more the Man-Machine System discipline moves towards plant-wide control, the more the field becomes multi-disciplinary. Not only

control engineering, informatics, mathematics and signal and image processing deliver important tools for the modeling and design of Man-Machine Systems. Since an optimal controller requires a model of the plant to be controlled, an optimal human-machine interface requires a model of human functioning and actions. What is thus needed is a contribution from cognitive engineering disciplines. This development raises an important aspect. Nowadays, the IFAC/IFIP/IFORS/IEA Symposium is mainly sponsored by engineering disciplines. Would it not be attractive to build a bridge with the cognitive psychological societies in order to radiate to the outside world that the Man-Machine Systems discipline requires a multi-disciplinary approach indeed?

During the organization of the Symposium, the IPC decided to award the young scientist who gave the best presentation with a prize. This award of Dfl 1.000,— was set up in order to stimulate young people to put more efforts in their presentation at international symposia. The IPC selected three contributions, namely those of J.F.T. Bos, H.J. Massimino and T. Sawaragi, as the best. The final winner was H.J. Massimino with the paper: Sensory Substitution for the Force Feedback in Teleoperation

Finally, the venue of the next symposium was announced. It will be held at the MIT, Cambridge, MA, USA (Symposium chairman Prof. T. Sheridan).

Prof. Hank G. Stassen  
IPC Chairman

**This Newsletter may be reproduced in whole or in part. We encourage reprinting in national and local automatic control periodicals. Acknowledgement to IFAC would be appreciated.**



## New Working Groups

### Working Group on Air Traffic Control Automation of the TC on AEROSPACE

The objective of this Working Group is to

1. Provide an overview of the state-of-the-art and technological improvements of the management and control of air traffic
2. Promote theory and application of automatic control to air traffic management
3. Address global issues for transitioning from current manual operations to an automated air traffic control (ATC) system using satellite-based communication, navigation, and surveillance (CNS) systems
4. Make recommendations to the civil aviation community based on Working Group activities.

Specific areas of interest include ATC applications of:

- Digital communication and satellite data link
- Global Navigation Satellite Systems (GNSS)
- Automatic Dependent Surveillance (ADS)
- Flight management and guidance systems
- Artificial intelligence and expert systems
- Human factors techniques

The Working Group solicits individuals from academia, industry and national/international organizations involved in air traffic control automation research. The group expects to conduct technical meetings on specialized topics in ATC automation, participate in symposia and world congresses, and initiate an informal electronic newsletter for exchange of ideas on related subjects. A workshop dedicated to Air Transportation Systems is under consideration for 1995. For further information, please contact

Dr. Satish C. Mohleji  
Center for Advanced Aviation System  
Development  
The MITRE Corporation  
7525 Colshire Drive, McLean, VA 22102, USA  
Tel: (703)883-6030  
Fax: (703)883-1330  
e-mail: smohleji@mitre.org

### Working Group on Modelling for Manufacturing Management and Control (M<sup>3</sup>C) of the TC on Manufacturing Technology

#### 1. Scope

The Working Group M<sup>3</sup>C aims to analyze, compare and classify formal models, both descriptive and prescriptive of CIM systems, and to specify requirements for new models oriented either to manufacturing process simulation, or to production planning and control, or to process planning.

Activity of the Working Group M<sup>3</sup>C members will be devoted to organizing workshops with the specific aim of planning first a special issue of an international journal surveying CIM models (main features and applications), then a compact handbook of CIM models (specification and potential best utilizations)

#### 2. Motivations

Complexity in managing CIM systems has greatly increased owing to augmented sophistication of both the manufacturing processes and the IT tools for process management and control.

Evolution of complex CIM systems towards increasing integration and intelligence has often evidenced inadequacy of some models in their use either for process planning or for production management.

Despite challenges of heuristic approaches, planning and control strategies only based on experience revealed to be unreliable. On the other hand, strategies based on hard mathematical formulations often appeared to be difficult to implement.

Both situations, especially noticed in the industrial frame, require meaningful models, founded on both mathematical and K-B representation tools which are easy to use and characterized by clear specifications and requirements for usage.

Organization of a CIM model classification that is sufficiently wide to allow industrial use appears to be a challenging motivation of the Working Group M<sup>3</sup>C, together with the recognition of the most promising research lines in CIM modelling.

#### 3. Objectives

The general mission of the Working Group M<sup>3</sup>C is to increase the effectiveness of the research in CIM modelling and to promote the applications of its results in the industrial world. To this end, the Working Group M<sup>3</sup>C will stimulate the cooperation and the exchange of scientific information among its members and in the MANTECH Committee, through the organization of working group meetings, workshops and the publication of activity reports and papers in journals and books.

Since the Working Group members come from several countries in the world, the main objective will be to analyze, compare and classify the different approaches for developing descriptive and prescriptive models of CIM systems, and to translate the industrial experience which the members have made or known, into requirements for the development of new models oriented to manufacturing process simulation, production management and to process planning.

The main practical result of the activity of the Working Group M<sup>3</sup>C should be the assessment of a classification of models of CIM systems, either existing or under development, such as to specify main characters, purposes, potential utilizations, known applications for each model, in such a way as to make available to industrial end users a kind of handbook with clear suggestions for the use of CIM models.

## News from NMOs

### Change of name of Polish National Member Organization

The Polish NMO of IFAC, i.e. the Polski Komitet Pomiarów, Automatyki i Robotyki has recently changed its name to:

**Polskie Stowarzyszenie Pomiarów,  
Automatyki i Robotyki POLSPAR**  
(Polish Society for Measurement, Automatic  
Control and Robotics).

POLSPAR is headed by Professor Jan Bek of the Warsaw University of Technology, who was elected to the position of President last March.

POLSPAR consists of three committees, namely on:

- Measurement
- Automatic Control
- Robotics.

Among them, the Committee on Automatic Control is, of course, the most involved in IFAC activities. This Committee is headed by Professor Józef Lisowski of Wyższa Szkoła Morska, Gdynia.

### Transfer of membership of the Bulgarian NMO

At the Council Meeting in May, the transfer of IFAC membership from the „National Council of Automation“ to the

### Union of Automation and Informatics

was approved. Professor Emil Bozhanov was elected Chairman of the Union for Automation and Informatics. The new address of the Bulgarian NMO therefore is:

Prof. Emil Bozhanov  
Chairman, Union for Automation & Informatics  
Rakovski Street 108  
POB 431  
BG-1000 Sofia  
Bulgaria

#### Impressum:

Medieninhaber und Herausgeber:  
International Federation of Automatic Control (IFAC),  
Zürich  
Schlossplatz 12, A-2361 Laxenburg, Austria

Verlagsort und Redaktion:  
Dipl. Ing. Dr. Gusztáv Hencsey  
Schlossplatz 12, A-2361 Laxenburg

Hersteller:  
Artur Schefczik & Sohn  
August-Reuss-Gasse, A-1130 Wien

Editor: Gusztáv Hencsey

Layout: Ernestine Rudas

published bimonthly

### Editor's Note

In Newsletter Issue 4/92 of August 1992, page 2, article on the "New Publications Program, the abbreviation of the new IFAC Journal "Control Engineering Practice is given as 'CEP'. Please note that this abbreviation should read 'CEngP'.





# FORTHCOMING EVENTS

1992  
No. 5  
Oct.

Title	1993	Place	Deadline	Further Information
IFAC Workshop Production Control in Process Industry	March 29-31	Düsseldorf Germany	-	VDI/VDE-GMA, PCPI 93 POB 101139, Graf Recke Str. 84 D-4000 Düsseldorf 1, Germany
IEEE/IPJS/SICE/IFAC Symp. Autonomous Decentralized Systems-ISADS	March 30 April 1	Kawasaki Japan	-	Dr. K. Mori, ISADS Secretary Systems Development Lab. Hitachi Ltd, 1099 Ohzenji, Asao Kawasaki 215, Japan
IMACS/IFAC Conference Mathematical and Intelligent Models for System Simulation	April 12-16	Brussels Belgium	15 Oct. 1992	MIM-S '93 Lab. d'Automatique, C.P. 165 U.L.B., av. F.D. Roosevelt 50 B-1050 Brussels, Belgium
IFAC Workshop Intelligent Autonomous Vehicles	April 18-21	Southampton UK	-	Prof. C.J. Harris, Dept. of Aero&Astro. Highfield, Univ. of Southampton Southampton SO9 5NH, UK
1993 American Control Conference in cooperation with IFAC	June 2-4	San Francisco USA	-	Prof. A. Haddad, AACC Secretariat Dept. of EECS, Northwestern Univ. 2145 Sheridan Road, Evanston, IL60208-3118, USA
IMACS/IFAC Workshop Qualitative Reasoning & Decision Technologies	June 15-18	Barcelona Spain	-	Prof. M. Singh, UMIST Computation Dept., Sackville Street Manchester, M60 1QD, UK
1993 European Control Conference in cooperation with IFAC ECCA'93	June 28 July 1	Groningen Netherlands	1 Oct. 1992	ECC '93 Secretariat, c/o J.W.Nieuwenhuis Faculty of Economics, POB 800 NL-9700 AV Groningen, Netherlands
IFIP/IFAC Conference System Modelling and Optimization	July 5-9	Compiègne France	-	Prof. J. Henry, c/o INRIA B.P. 105 F-78153 Compiègne Cedex, France
<b>IFAC WORLD CONGRESS</b>	<b>JULY 19-23</b>	<b>SYDNEY AUSTRALIA</b>	-	<b>IFAC Congress Secretariat '93 Dept. of El. &amp; Computer Engg. Univ. of Newcastle, University Drive Callaghan, NSW 2308, Australia</b>
IFAC/IFIP/IFORS/IEEE/ACM/AAAI Workshop AI in Economics and Management	August 25-27	Portland, OR USA	-	Prof. Kuan-Pin Lim, Dept. of EC Portland State University, POB 751 Portland, OR 97292, USA
Title	1994	Place	Deadline	Further Information
IFAC Symposium Fault Detection, Supervision and Safety for Industrial Processes	June 13-16	Espoo Finland	-	Prof. B. Wahlström, Techn. Res. Centre/VTT, Otakaari 7B SF-02150 Espoo, Finland
1994 American Control Conference in cooperation with IFAC	June 29 July 1	Baltimore, MD USA	-	Prof. A. Haddad, AACC Secretariat Dept. of EECS, Northwestern Univ. 2145 Sheridan Road Evanston, IL 60208-3118, USA
IFAC/IFORS Symposium (10th) Identification & System Parameter Estimation SYSID '94	July 4-6	Copenhagen Denmark	Sept. 1993	SYSID '94 Secretariat Danish Automation Society, Bygn. 343 Danish Technical University DK-2800 Lyngby, Denmark
IFAC Symposium Advances in Control Education	August 1-2	Tokyo Japan	1 Sept. 1992	Prof. K. Furuta Tokyo Institute of Technology, Dept. of Control Engg. 2-12-1 Oh-Okayama Meguroku Tokyo 152, Japan
IFAC Symposium Robot Control - SYROCO	Sept.	Italy	-	Prof. S. Nicosia, DIE - 2 Univ. Roma Via Raimondi, I-00173 Rome, Italy
IFAC Symposium Robust Control Design	Sept. 14-16	Rio de Janeiro Brazil	-	Prof. P.M.G. Ferreira, R. Marques de Sao Vicente, 293 (PUC-RIO) 22451 Rio de Janeiro, Brazil

\* not yet known  
- past



## Technical Communiques IFAC Report

A Contemplative Stance on the Automation of the Mining, Mineral and Metal Processing Industry (MMM)  
(G. Sommer)

## Book Reviews

Knowledge-Based Systems for Industrial Control, Edited by J. McGhee, M.J. Grimble and P. Mowforth  
(H.B. Verbruggen)

Jump Linear Systems in Automatic Control, by M. Mariton  
(J.H. van Schuppen)

Control of Machines with Friction, by Brian Armstrong-Hélouvy  
(R.W. Daniel)

Self-Tuning Systems, Control and Signal Processing, by P.E. Wellstead and M.B. Zarrop  
(S. Shin)

Temporal Logic for Real-Time Systems, by J.S. Ostroff  
(L. Motus)

## Safety, Security, Reliability

### SAFECOMP '91

#### IFAC/IFIP Conference

Trondheim, Norway

30 Oct. - 1 Nov., 1991

SAFECOMP '91 was arranged in Trondheim, Norway, by the Norwegian Society of Automatic Control. It was sponsored by IFAC and co-sponsored by IFIP and SRE, among others. The International Program Committee counted 30 persons from 13 countries. The Conference was chaired by Johan F. Lindeberg, SINTEF DELAB.

73 participants from 12 European countries attended the Conference. 26 of them came from Norway.

The participants rated the Conference as well above average. The administration, facilities and service got high scores, but the judgement of the presentations showed great variance. The papers themselves got significant higher and more consistent scores.

SAFECOMP '91 covered timing aspects, applications, hardware, assessment, specification and development, verification and validation, and models. It also featured a session and a panel discussion on security as a means to reliability and safety.

One main conclusion is: The field is making slow and steady progress, but the complexity of the safety-related systems is also increasing, so the gap between what is wanted or required and what is feasible still seems to be there.

SAFECOMP is an annual international conference on safety, security and reliability of computer based systems. It is initiated by EWICS TC7.

The next SAFECOMP will be held 28-30 October, 1992 in Zurich, chaired by Dr. H. Frey, ABB Transportation Systems.

## WHO IS WHO IN IFAC



Prof. F. Butera  
Chairman, TC on Social Effects

Federico Butera (born in Milan in 1940) is presently full professor of Sociology and Organization at the University of Rome 'La Sapienza' and also President of RSO (Research on Organization and Systems), Milano.

Professor Butera has developed a parallel career both as designer of complex organizations and as scholar and teacher in the field of social sciences related to technological and organizational development.

As a designer, he worked first for 12 years at Olivetti Ivrea, where he was Director of the Organization Studies Department. In 1975 he founded and has directed until now RSO, a leading group of research institutes, consultancy and management training firms.

In this context he has contributed to some of the innovative socio-technical designs in Europe under consideration of the Quality of Working Life: For example, the 'assembly island' at Olivetti, the 'semi-autonomous work groups' in the steel industry, the 'automated plant under human control' at Dalmine, the 'process organization' at ANIC, Mondadori, the 'skill based manufacturing systems' at CPC and CERESTAR, the 'process operator work organization' in a variety of plants and offices, the 'new company professions' in R&D Honeywell, the 'client-oriented front-office systems' in many service organizations, the 'network enterprise' at COOP and Systems & Management Group, etc.

As a scholar, he taught at the University of Torino, Politecnico di Milano, UCLA. He has conducted several international research projects (among others for ILO Geneva, EEC - 'European Foundation for the Improvement of Living and Working Conditions', ESPRIT-CNR, Rome) and has contributed to a great number of scientific international conferences.

He has been consultant to ILO and EEC, Member of the Executive Committee of the 'International Council for the Quality of Working Life' for its entire duration for more than a decade, and Chairman of the IFAC Technical Committee on Social Effects of Automation since 1990.

Prof. Butera is member of the Scientific Board of AIF (Italian Association of Management Education), of AISL (Italian Association of Work Organizations), and he is chairman of the Scientific Steering Committee of ASMIT (Advanced School of Management of Innovation and Technology), Tecnopolis, Bari. He is on the board of reviewers of Studi Organizzativi, Sociologia del Lavoro, QWL, Journal Human Futures, European Business Review, L'Impresa, and Etica degli Affari.

He has written more than 70 scientific articles, published in Italian and international reviews, and has authored 15 books, many of which have been translated into other languages.

## Papers From the Next Issue - November 92

### Survey Paper

Neural Networks for Control Systems: A Survey  
(K.J. Hunt, D. Sbarbaro, R. Zbikowski, P.J. Gawthrop)

### Papers

Optimal Control Drug Scheduling in Cancer Chemotherapy  
(R.B. Martin)

On the Computation of Reference Signal Constraints for Guaranteed Tracking Performance  
(T.J. Graettinger, B.H. Krogh)

Global Boundedness of Discrete-Time Adaptive Control Just Using Estimator Projection  
(C. Wen, D.J. Hill)

Pole Assignment for Linear Time-Invariant Systems by Periodic Memoryless Output Feedback  
(D. Aeyels, J.L. Willems)

Extreme Point Results for Robust Stability of Interval Plants: Beyond First Order Compensators  
(B.R. Barmish, H.I. Kang)

### Brief Papers

Artificial Neural Networks in Process Estimation and Control  
(M.J. Willis, G.A. Montague, D. Di Massimo, M.T. Tham, A.J. Morris)

Partial State Reference Model Adaptive Control of Multivariable Systems  
(M. M'Saad, G. Sanchez)

Design and Implementation of Petri Net Based Supervisor for a Flexible Manufacturing System  
(F. DiCesare, M-C. Zhou)

A Modified Variable Structure Controller  
(K-K. Shyu, Y-W. Tsai, C-F. Yung)

An Iterative Learning Control Theory for a Class of Nonlinear Dynamic Systems  
(T-Y. Kuc, J.S. Lee)

Robust Eigenvalue Assignment for Generalized Systems  
(V.L. Syrmos, F.L. Lewis)

Stable Redesign of Predictive Control  
(E. Mosca, J. Zhang)

Recursive Solution of Generalized Predictive Control and its Equivalence to Receding Horizon Tracking Control  
(W.H. Kwon, H. Choi, D.G. Byun, S. Noh)

A Multiple Controller Structure and Design Strategy with Stability Analysis  
(W. Yan, J.B. Moore)

Universal Fuzzy Controllers  
(J.J. Buckley)

Complete Decomposition Algorithm for Nonconvex Separable Optimization Problems and Applications  
(S-Y. Lin)

Dynamic Boundary Control of the Timoshenko Beam  
(Ö. Morgül)

A Multirate Controller Design of Linear Periodic Time Delay Systems  
(N-Z. Yen, Y-C. Wu)

Induced Norms for Sampled-Data Systems  
(N. Sivashankar, P.P. Khargonekar)



Call for Papers

NEW JOURNAL FROM IFAC

# Control Engineering Practice

Editor-in-Chief: **M. G. RODD**,

The Institute for Industrial Information Technology Ltd, The Innovation Centre,  
Singleton Park, Swansea SA2 8PP, UK

*Control Engineering Practice* strives to meet the needs of industrial practitioners and industrially related academics and researchers. It publishes papers which illustrate the direct application of control theory and its supporting tools in all possible areas of automation. As a result, *Control Engineering Practice* only contains papers which can be considered to have made significant contributions to the application of control techniques. Strictly theoretical papers will find a more appropriate home in *Control Engineering Practice's* sister publication, *Automatica*. *Control Engineering Practice* papers therefore tend to be shorter and, in most cases, similar in content and style to conference publications. Papers which adopt the recommended camera-ready form will be published more quickly.

In addition to purely technical applications papers, *Control Engineering Practice* carries material covering topics linked to the application of automation, including social effects, cultural aspects, project planning and system design, and economic and management issues.

Papers for publication in *Control Engineering Practice* should be of one of the following kinds:

- Full papers, on the application of control technologies and tools to industrial problems.
- Short communications reporting new research relevant to industrial control.
- Technical notes, reporting new tools or techniques, of practical use.

Papers will be rigorously but sympathetically refereed and published quickly. To avoid delays in refereeing and publication, authors should prepare their scripts in accordance with the Instructions for Authors, a copy of which may be obtained from the Editor-in-Chief.

- A key feature of *Control Engineering Practice* is its recognition of the importance of papers from major conferences, workshops and symposia; it therefore aims to publish, after minimal further review, the most significant applied papers presented at IFAC events.

Another unique feature of *Control Engineering Practice* is the publication of the abstracts of all papers accepted for IFAC events, thereby providing readers with direct access to papers not otherwise published in either *Control Engineering Practice* or *Automatica*, but available in the published preprints, which will be held and sold by Pergamon Press.

In addition, *Control Engineering Practice* contains an extensive Conference Calendar of all IFAC and related events, and a regular column of book reviews.

Papers for publication should be sent to the Editor-in-Chief,  
Prof. M.G. Rodd, at the address above.

— Send for a free sample copy —



**PERGAMON PRESS**

A member of the Elsevier Science Publishing Group Oxford • New York • Seoul • Tokyo

## SCOPE

The scope of *Control Engineering Practice* matches the activities of IFAC, including applications in:

Aerospace  
Marine systems  
Communication systems  
Biomedical engineering  
Pulp & paper processing  
Environmental engineering  
Scientific instrumentation  
Transportation and vehicles  
Power plants and other utilities  
Mining, mineral & metal processing  
Chemical & biotechnical process control  
Manufacturing technology and production engineering

The journal covers all applicable technologies including:

Robotics  
Identification  
Signal processing  
Project management  
Autonomous vehicles  
Computer networking  
Modelling & simulation  
Human-computer systems  
Components and instruments  
Adaptive and robust control  
Electromechanical components  
Model-based control techniques  
Fault detection and diagnostics  
Software engineering techniques  
Hydraulic & pneumatic components  
Real-time and distributed computing  
Intelligent components and instruments  
Architectures and algorithms for control  
Computer-aided systems analysis and design  
Software design, verification, safety, etc.  
Artificial intelligence techniques, including fuzzy control, neural networks and genetic algorithms



## Editorial Board

Dr Serge Boverie, Siemens Automotive SA, Toulouse, France

Professor Pieter Eykhoff, University of Technology, Eindhoven, The Netherlands

Dr David G. Hulbert, Mintek, South Africa

Professor Rolf Isermann, Technische Hochschule, Darmstadt, Germany

Mr Kensuke Kawai, Toshiba Corporation, Tokyo, Japan

Professor Peer Martin Larsen, Technical University of Denmark, Lyngby,

Denmark

Dr Michael K. Masten, Texas Instruments, Plano, TX, USA

Professor Julian Morris, University of Newcastle-upon-Tyne, UK

Dr Banavar Sridhar, NASA Ames Research Center, Moffett Field, CA, USA

Dr Gregory J. Suski, Lawrence Livermore Laboratories, Livermore, CA, USA

(00123)

### Subscription Information

1993: Volume 1 (6 issues)

Annual subscription (1993):

£220.00/US\$418.00\*

IFAC affiliates rate:

£45.00/\$86.00\*

ISSN: 0967-0661

## ORDER FORM / INSTRUCTIONS FOR AUTHORS REQUEST FORM

Please enter my subscription to:

**Control Engineering Practice** (00123)

One Year (1993) £220.00 / US\$418.00\*  Free Sample Copy

IFAC affiliate rate (one year, 1993) £45.00/\$86.00\*

Please send me instructions for authors for **Control Engineering Practice**

Name \_\_\_\_\_

Position \_\_\_\_\_ Organization \_\_\_\_\_

Address \_\_\_\_\_

Post/Zip Code \_\_\_\_\_

### Payment details

Please bill me Total value \_\_\_\_\_

Cheque/money order/UNESCO coupon made payable to  
Pergamon Press Ltd enclosed

### Payment by credit card

I wish to pay by credit card

Visa/MasterCard/American Express/Diners Club (delete as appropriate).

Issuing Bank (MasterCard only) \_\_\_\_\_

Card No. \_\_\_\_\_ Expiry Date \_\_\_\_\_

Signed \_\_\_\_\_ Date \_\_\_\_\_

JOURNALS: Prices include postage and insurance.

\*Sterling price quoted is definitive and applies worldwide. US dollar price quoted is for convenience only and is subject to exchange rate fluctuation.

SAVE 25% ON JOURNAL BACK ISSUES.

Subscribers ordering a current subscription may order back issues at a 25% discount.

Contact Pergamon for prices.

## PERGAMON OFFICES

Where to send your  
order and requests

USE THE TELEPHONE  
OR FAX FOR FASTER  
SERVICE

### North America:

Pergamon Press Inc.  
660 White Plains Road  
Tarrytown

NY 10591-5153

USA

Telephone: 914-524-9200

Fax: 914-333-2444

### UK & all other countries:

Pergamon Press Ltd  
Headington Hill Hall

Oxford

OX3 0BW

UK

Telephone: +44 0865 743479/  
743781

Fax: +44 0865 743952