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OBJECTIVES AND MEMBERSHIP

Objectives
The Company's objects are interdisciplinary research and the development of improved computational methods in planning and transport enabling the results of research to be put to practical use as quickly as possible. Planning and transport is intended to cover urban and regional planning, road location and design, transportation planning, public transport analysis and associated model building and data management techniques.

These objectives are pursued through the complementary activities of education, research and contract work:

EDUCATION: Seminars, symposia, courses, advice.

RESEARCH: Research and the development of new methods and programs often in conjunction with academic institutions.

CONTRACT WORK: Programming, computing and consulting services are provided for members and others in planning and transport especially in relation to recent research.

Constitution
In common with most other research associations the Company has the constitution of a non-profit distributing company limited by guarantee as specified in the Memorandum and Articles of Association. The Company is controlled by a Board of Directors which is broadly representative of planning and transport in local authorities, consulting firms and academic institutions.

Membership
Membership is open to local authorities, government departments, consultants, academic institutions, transport undertakings or other bodies with an interest in the development of better quantitative methods in design, analysis and evaluation in planning and transport.

Publications
During the year there were seven editions of the Newsletter which has a circulation approaching 1500.
Sixteen sets of seminar proceedings and three sets of symposia proceedings were published. The layout and standard of printing of these proceedings has also been markedly improved.

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A suite of transportation analysis programs for the ICL System 4/70

By: Wigan M. R.; Gyenes L. G.
Agency: Road Research Laboratory.
Sponsor: Road Research Laboratory.
Assembly: Fortran IV, Basic Assembly Language ICL System 4/70.
Purpose: To provide a basis for research studies using alternative network proposals or individual road improvement schemes using cost benefit techniques.

Principles: The main computational methods used by the program are those described in the Ministry of Transport Memorandum No. T.5/67.
The computer output gives for both the existing and future test network a table of data relevant to each road link and the total annual travel cost. A first year rate of return is computed if the capital cost of constructing future networks is known.
Flexibility: Travel cost in pence per vehicle mile is computed within the program for each network link using the expected average vehicle speed and a standard vehicle composition.
The expected average vehicle speed in m.p.h. may be determined in any of the following ways:
1. Direct data input.
2. Be computed internally using an observed speed/flow relationship.
3. Be computed internally using the road width and traffic demand.
The number of accidents per million vehicle miles on each link can be either direct input data or computed internally for each link using a road category method.
The M factor average day to annual flow conversion factor is computed internally for each link using the heavy vehicle percentage composition figure.
Size: No limit.
Compatibility: Output on line printer.
Availability: Through P.T.R.C.
Documentation: Description of method see MOT No. T.5/67.
Other versions: None.

(b) Preliminary Estimate of the Total Construction Costs of Road Schemes in Rural Areas

Programmer: Shaw M.
Agency: P.T.R.C.
Sponsor: P.T.R.C.
Assembly: C.D.C. 3300, Fortran IV.
Purpose: The program computes an estimate of the total construction costs of alternative network proposals or individual road improvement schemes.
Principles: The program makes use of Ministry of Transport analysis into past construction costs using regression analysis techniques on variables reflecting site topography, geology, demography, geography and meteorology.
Flexibility: The method is applicable to both new roads and improvements to existing; and to both motorway and general purpose roads.
Size: No limit.
Compatibility: Output on line printer.
Availability: Through P.T.R.C.
Other versions: Results of further work will be incorporated when available.

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transformation analysis models on large networks. To this end considerable attention has been paid to the flexible use of backing store and overall program control so that long chains of programs forming model structures can be run in a straightforward fashion. Provision is made for generalised cost functions – composed of time, cost, and distance elements – to be associated with network, tree, and skimtree files throughout the suite.

**Flexibility:** All programs available under the system may be called up in any order, as all data is transferred through standard format files on backing store. The use of disc and tape is completely at the programmers' disposal at run time. Flexible checkpointing and operator communication options are an integral part of the system.

Due to the research bias of current and likely future applications of the system, the number of options open for each basic program in the suite is too large to detail here.

The area of storage allocated for the details of each link in the network contains this information in packed form. The inclusion and extraction of this data is carried out through a set of standard masks, and the user may redefine these masks if he wishes, thereby allowing trade-offs in the allowable range of values for any of the link descriptors; however, the maximum number of nodes (3600) (and links) are constraints external to the packing structure.

Size: The current versions of RRLTAP are defined for 999 zones, a maximum of 11 interleaved matrices in a single matrix tape, 4000 one-way links, and 3600 nodes. In this configuration the overlaid suite requires 101 kb of store (exclusive of supervisor software), but including 1/0 buffers. The minimum configuration required is a single disc drive, but this reduces the effective size of the suite. The full configuration used at present is four 9-track tape drives and one 7-2 mzb disc on which the program also is resident.

**Compatibility:** Several programs are available under RRLTAP overlaid control to convert CDC3300 TAP-format files to the RRLTAP formats. Network definition cards punched in CDC 3300 TAP format may be used by the RRLTAP network build/update overlay.

Most of the routines are essentially IBM 360-compatible, and although full advantage has been taken of certain ICL 4/70-specific features these are mainly confined to non-essential overlays such as the utilities.

**Data checking:** All overlays carry out a data-checking stage, and execution of that overlay is terminated with an error message if an error is found.

An extended data-set is currently under development: this is intended to analyse the data flow through the backing files for extended sequences of overlays, and ensure that checkpoints, physical file changes, and file overwrites follow the programmer's intentions.

**Availability:** The basic set of overlays forming RRLTAP is currently running in limited production at RRL. Further facilities are under development. Enquiries should be channelled through the Director of Road Research, Road Research Laboratory, Crowmarsh, Berks RG11 8AU, England.

**Documentation:** (1) Operating Instructions. (2) A user's manual (English only) for running under the current ICL Operating System (J-800/900) is in course of production.

**Other versions:** None.

**PRINCIPLES**

The basic constraints imposed by the J-series of ICL disc-based operating systems are quite severe: if data is to be transferred from program to program via backing store the measures to be taken to ensure programs are executed in a given sequence are onerous and error-prone. This would not be a material disadvantage for more commercial applications, but for research use it is unusual to run less than 8–10 programs in strict sequence, as this would form a single complete stage in a modelling operation.

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* The transportation Analysis Suite was written by Freeman Fox, Wilbur Smith and Associates.
**TSW 29** Edit matrix-format files.
**TSW 32** Remove gaps in network nodal numbering.
**TSW 33** Graphical printout of trip “length” distributions.

**UTILITIES**

**TSW 92** Option to refer operator to a checkpoint to be issued at end of execution of the current overlay if operator requests early job termination.
**TSW 95** Print-out of timing data, together with full details of current disc, tape, and slow files and the current run description.
**TSW 96** Checkpoint routine.
**TSW 97** Operator communication.
**TSW 98** Copy RRLTAP files (i.e. Tape-tape, disc-tape, etc.).
**TSW 99** File print routine, graphical and hexadecimal output: provision for checking data blocks beyond end of file.

This list is not exhaustive, and other facilities are under development for inclusion under RRLTAP control.

*Indicates routines written to implement a simple trip demand model.

*Indicates routines for conversion between the Freeman Fox Wilbur Smith TAP suite on their CDC 3300, and the RRLTAP System on the ICL 4/70.

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**14 R. TRAVERS MORGAN**

**(a) Model Program – T1062**

**Programmer:** Johnson K. R.
**Agency:** R. Travers Morgan and Partners.
**Sponsor:** Ministry of Transport.
**Assembly:** Program name T1062, runs on IBM 360/65 (512K bytes), language Fortran H.

**Purpose:** Predicts inter-zonal travel by mode.

**Principles:** The program carries out the computations and matrix manipulations connected with trip distribution and model split. The program incorporates the function $e^{-\lambda t_i/n}$ in the distribution and modal split phases. It is possible to restart the program at many points in the program.

**Flexibility:** There are numerous options which are described in the user’s manual.

**Size:** 320 zones.

**Compatibility:** The input and output are compatible with the IBM London Data Centre Package.

**Data checking:** The data is checked when read by the program wherever possible.

**Availability:** The program has been used extensively for the South-East Joint Planning Study.

**(b) 1130 Traffic Suite**

**Programmer:** Johnson K. R.
**Agency:** R. Travers Morgan and Partners.
**Sponsor:** R. Travers Morgan and Partners.
**Assembly:** Computer, IBM 1130 2B and CIL 30° drum plotter. Language, Fortran.

**Purpose:** The suite includes programs to carry out most of the data processing for small traffic studies. The programs include:

1. **Node numbers to be drawn or not.**
2. **Assignment flow plotting (any size network can be handled)** (see T504 – Traffic volume plotting program).

**Availability:** The programs are currently running on the sponsor’s 1130. For further details contact K. R. Johnson (01-836 5474).

**Documentation:** User’s manuals.

**Other versions:** Some larger versions have been translated for use on an IBM 360. The rest will be translated in the near future.

**(c) T504 – Traffic Volumes Plotting Program**

**Programmer:** Johnson K. R.
**Agency:** R. Travers Morgan and Partners.
**Sponsor:** R. Travers Morgan and Partners.
**Assembly:** Computer, IBM 1130 2B and CIL 30° drum plotter. Language, Fortran.

**Purpose:** The program plots the output from a traffic assignment.

**Principles:** The sponsor’s program T501 produces LKPLOT cards from data output by the IBM London Data Centre Assignment Program TN2. The sponsor’s own assignment program produces output that is directly usable by T504. The following are options.

**Flexibility:**

1. **Size of the drawing.**
2. **Node numbers to be drawn or not.**
3. **Volumes only plotted.**
4. **The network can be drawn.**
5. **Load and Relief or Overload diagrams can be plotted, i.e. two assignments can be subtracted and the result plotted (and similarly capacity minus volume). The positive volumes are distinguished from the negative by shading.**
6. **The order of drawing links can be optimised so as to minimise plotting time.**

**Size:** Any number of links can be handled.

**Availability:** The program is currently running on the sponsor’s 1130. For further details contact K. R. Johnson (01-836 5474).

**Documentation:** User’s manual.

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**15 ALAN M. VORHEES AND ASSOCIATES**

**Transportation Improvements Programming System**

**GENERAL DESCRIPTION OF TRIPS**

TRIPS is a comprehensive and integrated system of computer programs designed for transportation and land use planning. The system includes separate but fully compatible programs specifically designed for public transportation planning as well as highway planning and urban activity analysis.

The original suite of programmes for public transport planning was written by Alan M. Voorhees and Associates under contract to the U.S. Department of Housing and Urban Development in 1967. This suite is described in some detail in the later section Public Transport Planning System. Subsequent to the original development of these programs, written for the IBM 7090/94, the public transport planning suite has been rewritten for the IBM 360 and has been considerably improved and expanded.

Highway planning programs included in TRIPS were developed by Alan M. Voorhees and Associates in conjunction with the Ontario Department of Highways in 1968/69. These programs were written directly for the IBM 360 and offer considerable improvement over previously utilised programs written for the IBM 7090/94. A very great wealth of knowledge and experience in transport planning and programming has been incorporated in the development of TRIPS. All programs in TRIPS are in operation and are fully maintained and documented.

Following is a brief description of the more important features of TRIPS and a listing of the more important component programs.

**1. CHARACTERISTICS OF TRIPS**

TRIPS provides the user with an integrated, comprehensive