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TITLE TRRL'S Microcomputer Accident Analysis Package (MAAP) - A Standard for SARTTO Countries?

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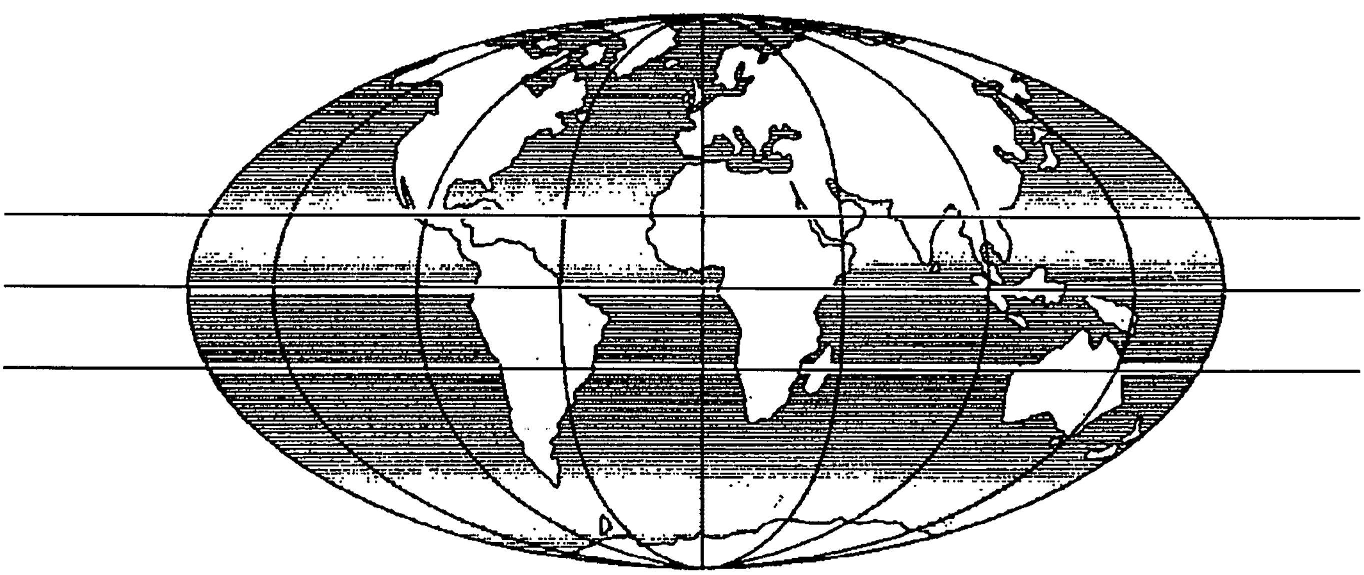

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TRRL'S Microcomputer Accident Analysis Package (MAAP) - A Standard for SARTTO Countries?

by C J Baguley

1. Introduction

TRRL fully supports one of the stated aims of SARTTO in trying to achieve improvements in the quality of accident data among its member countries by introducing a standard road accident form and recording system to be used within each country. In order to be able to monitor and improve road safety it is essential to have a reliable source of accident data and to use that database effectively. National and regional accident investigation relies heavily on the use of cross-tabulations to give a general overview of safety of the network, identify groups of the population most at risk, monitor trends, and identify common physical circumstances of accidents. At the local level accident investigation involves locating the worst sites or areas for remedial action and is more likely to include referral back to the police accident report, sketches and witnesses' statements to try to identify common factors.

To satisfy all three levels of analysis the Overseas Unit of TRRL has over many years developed a Microcomputer Accident recording and Analysis Package (MAAP) specifically for use in developing countries. It is currently being used by central or local governments or research institutes for particular areas in 17 different countries. For storage of national databases MAAP is being adopted, or is currently in use, in 6 countries which, in the African continent, include Botswana, Ghana and Zimbabwe. There is also a very recent pilot experiment to introduce the Package in Swaziland. TRRL therefore wish to propose the adoption of MAAP as the SARTTO standard.

2. Background to MAAP

The Road Safety Section of the Overseas Unit of TRRL was formed in 1972 and in the early years demonstrated that road accidents are an extremely serious problem in developing countries with fatality rates as much as 40 times greater than those occurring in the more industrialised countries. In one sample of 20 countries, road accidents accounted for 10% of all deaths in the 5-44 year age group, ranking as the second most common cause of death. [The most common cause was the multiple category of 'all other accidents, homicide and suicide'.]

Little progress can be made in improving the road accident situation in a country until the problem itself has been clearly defined. Accident statistics must be collected over a sufficient period of time so that an understanding is gained of where most accidents are occurring, what classes of road, types of accident etc., and whether common causes can be identified. However, the Overseas Unit found in those early years that the analysis of road accidents in the majority of developing countries tended to be rather haphazard and slow. The data was unreliable and many countries were still largely dependent on paper records. Where mainframe computers had been used for national accident records, the computers often suffered long-term breakdowns due to difficulties in obtaining spare parts and/or repair expertise; software tended to be inflexible; and again the data was error prone.

The Overseas Unit recognised the potential and growth in the use of microcomputers at that time, and so began work in 1981 on the production of a microcomputer-based accident recording and analysis system. This initially began as a joint project with the Egyptian Government where accident data for most of the major highways out of Cairo were required to be computerised to assist in the planning of a programme of countermeasures to combat the high accident rates on these interurban roads.

During the 1980's the Package was refined and its use has become more widespread as the relative cost of microcomputers diminished and more and more people have now gained access to one. The style of programming that has developed with microcomputers with its emphasis on interaction and 'user friendliness' has helped to promote their use and is particularly helpful to developing countries.

3. The accident report form

All accident data originates from the police report and it is therefore essential to have excellent cooperation from the police in this exercise. The data recorded should be a good compromise between satisfying the police needs (chiefly concerning prosecution of guilty parties) and the needs of the engineer and researcher in identifying major locations and causes of accidents. The police must be able to appreciate the necessity for the data they are required to collect and superfluous items should be avoided to minimise their workload and encourage accurate data recording.

Much effort was originally devoted to producing an ideal or 'model' accident report booklet. This booklet (see sample pages in Appendix) is intended to be carried by all police officers attending the scene of road accidents and includes a combination of text and symbols which are arranged clearly and simply against a coloured background. This particular format was chosen in an attempt to make form filling a less onerous task, the police officer in most cases simply ringing the relevant level of each item (or feature) of the accident thereby minimising the amount of writing and time required to look up specific codes. The form is thus designed such that data can be entered directly onto computer, obviating the need for transfer of data onto a separate coding sheet (an unnecessary transcription where errors can be easily introduced).

It is recognised that there will inevitably be valid reasons why the standard 'model' accident booklet cannot be introduced worldwide in its precise form. Some items will be deemed to be unnecessary for certain applications and some countries will require additional items of information. For example, the police in Indonesia have themselves suggested that several specific additional fields be included on the report form one of which is an estimate of the degree of windscreen tinting. It is believed that this could well play a role in accident causation as it has become very fashionable in Indonesia for vehicle owners to have tinted windscreens. There is currently no legislation governing this vehicle customisation and thus many types of tinting have come into use. It is hoped that collection of this data will eventually provide valuable evidence as to whether tinting is in fact a hazardous feature so that necessary legislation can be drafted and enforced.

Unlike some accident packages, MAAP will allow the user to configure the package, for ease of data entry, to the information that is required (ie. to be identical to the accident form in use) rather than have a completely fixed data format. The only requirements of the software are that the accident form must have items sorted into 5 sections, namely: i) General, ii) Vehicle/Driver, iii) Passenger casualty, iv) Pedestrian casualty, and v) Further details. Also, at least 3 key fields must be specified which, when combined, uniquely define an accident.

It has proved beneficial to have the accident reporter actually enter his own data onto computer if at all possible. This maintains his interest in seeing the data to its final storage destination for immediate inclusion in any analysis, and thus tends to promote more accurate data recording. The fact that the police have their own computerised records also means that they are more likely to make use of it, for example, in targeting their enforcement measures more effectively to the peak accident times and places. However, this is of course only practical where resources permit and perhaps in countries which tend to have a relatively high level of 'computer keyboard literacy'.

The accurate location of accidents is a most important aspect of the accident investigation process and thus its importance must be stressed to the accident reporter. As well as the standard collision sketch provided on most accident forms, the TRRL 'model' form also has space provided for a general location sketch where a small map can be drawn showing local landmarks, roads, buildings, etc. to help subsequent pinpointing of the exact location of the accident. To use all the facilities of MAAP, accident locations in towns should be defined by both of two standard methods:-

i) map grid coordinates (ideally of a national grid system where adequate maps exist); <u>and</u>

ii) a Node-Link-Cell system where all main intersections on a town map are given unique numbers (Nodes). The Links are sections of road between these junctions and are simply referenced by the two Node numbers at each end. Cells are another system of unique numbers for areas of the town bounded by these Links.

The maps used for coding accident location should have both the national grid coordinates and the Node-Link-Cell system superimposed; an example of part of such a map is shown in Fig. 1.

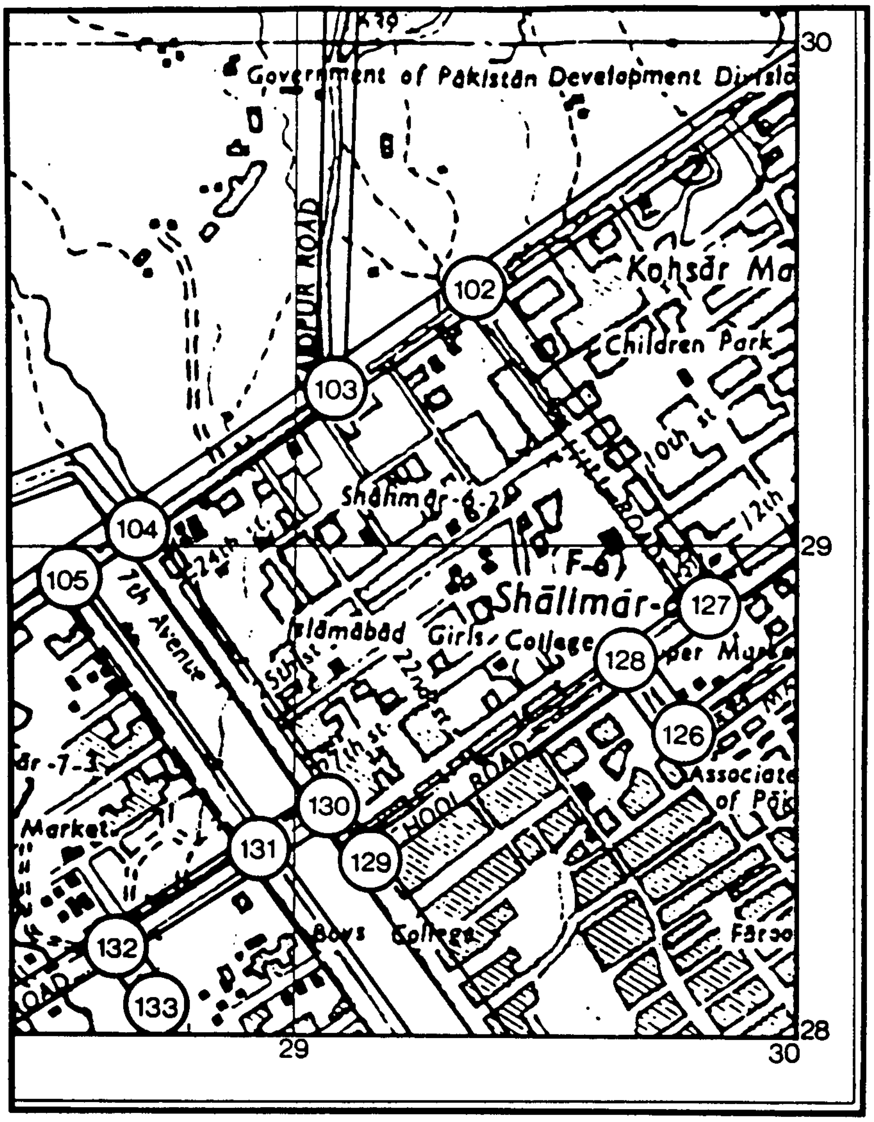


Fig. 1 **Example of part of a nodal map for Islamabad, Pakistan.**

For the major rural routes where intersections are much more widely spaced, it is normal practise to define accident location to the nearest kilometerage from the beginning of the road. For accurate recording this will mean that kilometre posts will need to exist along each highway. Although installation of kilometre posts can be a relatively costly exercise they are invaluable for highway maintenance purposes as well as accident recording, and are also beneficial to motorists in locating turn-offs, destinations and their position in the event of breakdown.

4. The software

The Package comprises a number of separate programs which can be operated from floppy disk (enabling use on even the more basic microcomputers) or, more commonly, from hard disk. The programs can be divided into two main groups:-

a) those for entering and updating data, and for creating and backing up files; and

b) those for analysing the database.

The main menu of the Package is shown in Fig. 2 below.

```
          T.R.R.L. ACCIDENT ANALYSIS PACKAGE ver 4.02
                   (C) CROWN COPYRIGHT 1984,1987

                        *****************
                        ** MASTER MENU **
                        *****************

NEW ACCIDENTS.......................................... 1

FILEHAND (Check and Add New Accs. to 'SON' File) ....... 2

NEWFILE ............................................... 3

COPYFILE .............................................. 4

SELECT (Find accidents of selected type) .............. 5

STANDARD CROSS TABULATIONS ............................ 6

NON-STANDARD CROSS TABULATIONS ........................ 7

DETAILED ACCIDENT INVESTIGATION ....................... 8

FINISH FOR NOW ........................................ 0

                    Please select (0-8): _
```

Fig. 2 **Main menu of MAAP**

4.1 Entering new accident records

The first option from the above menu (program NEWACCS) is normally used solely by the person responsible for entering data after each police report form has been fully completed and checked. The user is prompted for each item in turn and the value entered is checked by the program to be within the valid range. There are also other logical checks carried out as the data is entered; for example, that the severity of the accident is consistent with the most severe injury recorded in the casualty sections; or if the 'Weather' item has been coded as 'Raining' that 'Road surface condition' is coded as its most likely correct level of 'Wet'. With experience, 10 to 20 accidents an hour can be entered. These are initially placed in a temporary 'New Accidents' file which is later checked (ideally by a separate supervisor) before adding to the 'Master file'. This is carried out using FILEHAND, the second option above, which can also be used to edit records on the master file.

As the amount of information recorded per accident varies according to the number of vehicles and casualties involved, non-standard record lengths are used to store the data so that a maximum limit (eg. maximum number of casualties) does not have to be fixed, thereby conserving disk space. The data is saved in ASCII code and a maximum of approximately 5000 records can be stored on one floppy diskette.

4.2 Backing up the database

The 'Master' or 'Son' file can contain many thousands of records which nowadays usually reside on hard disk. The third option of the main menu, NEWFILE, is used simply to open a new Son file so that space is reserved on the disk equivalent to the maximum number of records that can be stored on a floppy diskette. As with all computer files it is essential to keep regular back-up copies of data as many man hours or weeks can be wasted if the main master file is corrupted or the computer develops a major fault. A 'family tree' system is therefore recommended for back-ups using two floppy disks labelled 'father' and 'grandfather'. The option, COPYFILE, can then be used to copy the Son file to the Father diskette perhaps daily, and to the Grandfather diskette weekly.

4.3 Selecting particular accident records

The remaining four options from the main menu (Fig. 2) are used to analyse the data. The fifth option, SELECT, enables the user to identify a particular record or group of records by applying set conditions to a file search. For example, a record could be located by specifying its reference number (if known) or by date and location. Working files can also be created by setting conditions, for example, i) all accidents along a certain length of a road or area of city, ii)accidents between two dates, or iii) casualties of a particular age group or vehicle type. Analysis of working files using subsequent program options can often be carried out much quicker than accessing a much larger Son file.

4.4 Cross-tabulations

Cross-tabulations are one of the most common requirements for accident analysis and the use of a computer system enables relatively quick exploration of the data to establish general patterns of accidents. The two options in the main menu (6 and 7) offer ways of producing such tables. STANDARD CROSS TABULATIONS are normally a set of about ten of the most commonly required tables which can be preset by the user and which can then be applied to any data file simply by selection from a screen menu. However, less frequently required tabulations can be produced using the NON-STANDARD option of main menu where the two axes of the tables are specified by their item number.

The user is always queried for which of the three different types of tabulation he or she requires. These are tabulations either by:

i) ACCIDENT frequencies - where the number of recorded accidents in each requested category are displayed;

ii) CASUALTIES - where the number of people injured are included; or

iii) VEHICLES - where counts of the number of vehicles in the specified categories are given.

The user is also asked whether he wishes to apply any conditions to the cross-tabulations produced, for example, to include only nighttime accidents, accidents along a 100km section of highway, or casualties within a certain age group.

It is possible to print out tables of up to 32 columns wide by 90 rows. The tables can be exported to other commercially available spreadsheet or word processing/desktop publishing packages, if required. TRRL supply a simple interface macro to a powerful, yet relatively inexpensive, spreadsheet package called QUATTRO such that the user can, without having to learn how to use this package, produce graphical representations of the tables produced by MAAP (ie. in the form of bar charts or pie diagrams). An example of output produced in this way is shown in Fig. 3.

TRRL Microcomputer Accident Analysis Package

STANDARD ACCIDENT TABLE 8 TYPE A: ALL ACCIDENTS

ACCIDENT RECORD FILES: PNG88
CONDITIONS SET: NONE

HOUR	Sun	Mon	Tue	Wed	Thu	Fri	Sat	Total
	DAY OF WEEK							
00/01	31	12	15	20	15	29	59	181
02/03	24	8	8	9	11	24	55	139
04/05	19	13	7	6	12	20	30	107
06/07	25	62	45	54	40	69	80	375
08/09	48	101	84	85	80	94	100	592
10/11	52	100	96	97	93	107	120	665
12/13	57	89	76	69	84	97	83	555
14/15	71	95	99	96	112	108	103	684
16/17	53	104	95	82	105	142	113	694
18/19	56	51	48	47	68	93	106	469
20/21	27	34	21	28	38	51	74	273
22/23	18	26	22	28	42	77	45	258
Total	481	695	616	621	700	911	968	4992

(Total Number of Accidents on File = 5095)

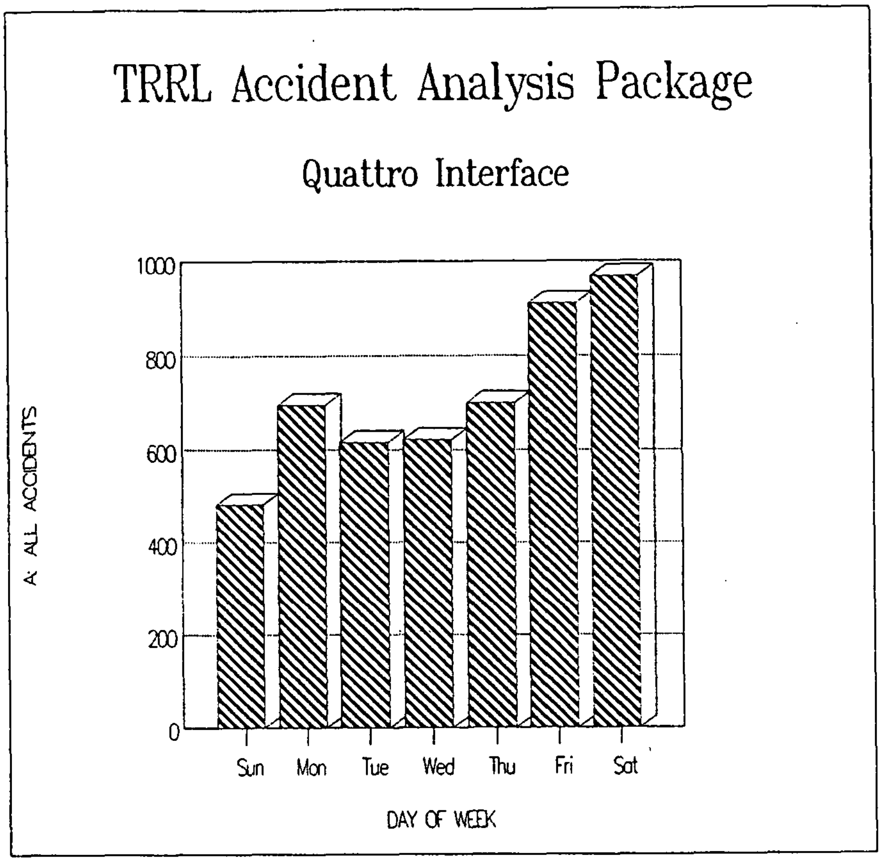


Fig. 3 **Example of cross-tabulation outputs by MAAP and via QUATTRO**

4.5 Detailed accident investigation

This final option of the main menu is used to display the geographical location of accidents and also to help identify patterns of accident, normally at a particular location. The programs were initially written such that only pseudo-graphics are displayed (using a limited number of ASCII characters) so that output can be obtained using any microcomputer and printer. However, as IBM graphics have now become an international standard work is currently in progress to improve these programs by including true graphics.

The three main programs offered within option 8 are as follows:-

i) ACCROUTE where a histogram of accident frequencies are displayed along an urban or interurban highway by kilometerage as in Fig. 4. These can be printed in 1km sections as shown or grouped

```
                              ACCIDENTS ON A ROUTE
                              ********* ** * *****

                    ACCIDENT FILE:        ASH88
                                          ASH87
                    CONDITIONS SET:       ROUTE NUMBER = 4

--------------------------------------------------------------------------------

   KILOMETRES       ACCIDENTS
         200        1   x
         201        3   *xx
         202        1   *
         203        1   *
         204        0
         205        2   *x
         206        2   *x
         207        2   xx
         208        18  ***xxxxxxxxxxxxxxx
         209        0
         210        12  ****xxxxxxxx
         211        7   **xxxxx
         212        3   xxx
         213        1   x
         214        8   *xxxxxxx
         215        3   xxx
         216        1   x
         217        0
         218        4   *xxx
         219        0
         220        3   xxx
         221        5   **xxx
         222        2   xx
         223        3   xxx
         224        6   xxxxxx
         225        0
         226        0
         227        1   x
         228        3   xxx
         229        3   xxx
         230        0
         231        0
         232        1   *
         233        3   xxx
         234        2   *x
         235        1   x
         236        3   xxx
         237        2   *x
         238        3   xxx
         239        3   *xx
         240        5   *xxxx
--------------------------------------------------------------------------------
        Total=      118
--------------------------------------------------------------------------------
                        * Fatal     x Injury or Damage
```

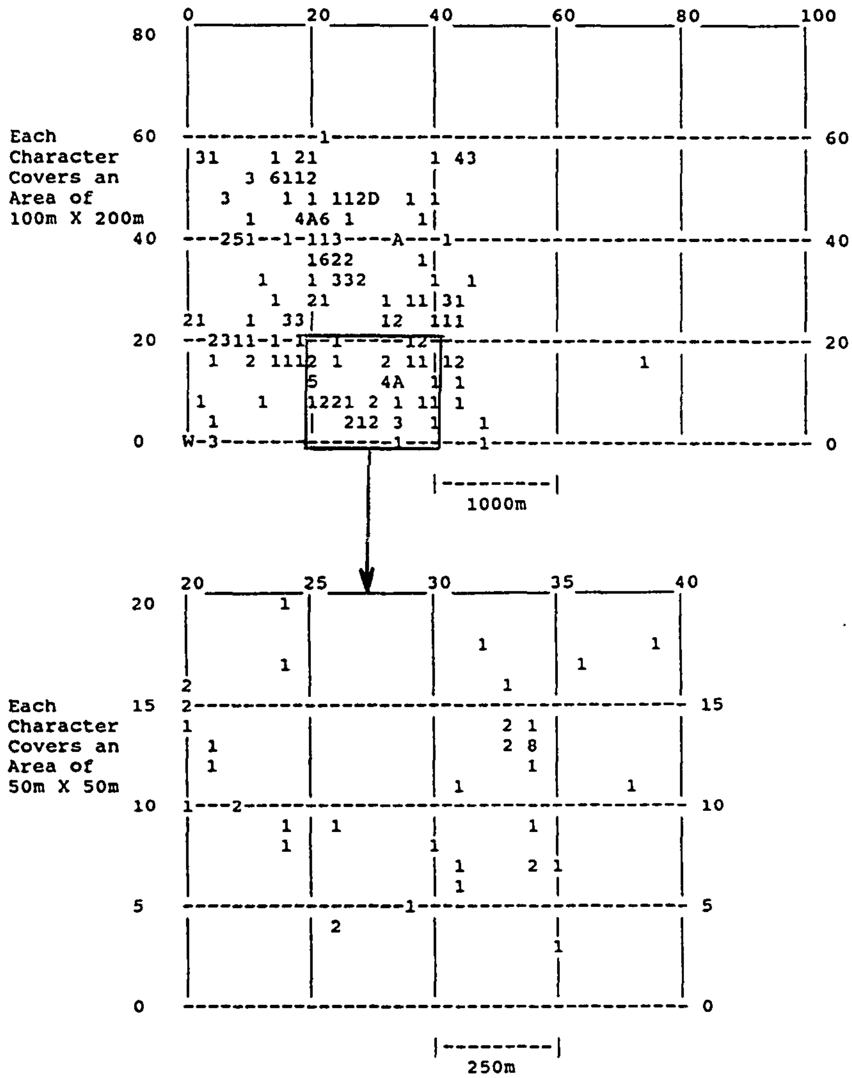
Fig.4 **Example of ACCROUTE output for a section of major highway in 1km intervals.**

together in, for example, 5km or 20km sections. For urban areas routes across a town or city can be defined using a sequence of nodes (major junctions) and accidents on the connecting links will also be included.

ii) ACCMAP produces an overlay of accident frequencies principally for a town or city. The program uses the grid coordinates of the accident to plot frequencies on a summary map as shown in Fig. 5. Normally each character on this summary map on the screen represents an area of 200m by

```
                    ACCIDENT MAP
                    ******** ***

          ACCIDENT FILE:      ACCFILE1
          MAP SERIES          12
          MAP CODE            013
          CONDITIONS SET:     NONE
```




```
===========================================================================
Characters used to Code Accident Numbers :-
1=1  2=2  3=3  4=4  5=5  6=6  7=7  8=8  9=9  A=10 B=11 C=12 D=13
E=14 F=15 G=16 H=17 I=18 J=19 K=20 L=21 M=22 N=23 O=24 P=25 Q=26
R=27 S=28 T=29 U=30 V=31 W=32 X=33 Y=34 Z=35 >35=*
===========================================================================
```

Fig. 5 **Example of accident maps generated by ACCMAP.**

100m. Where more than 9 accidents are located in such an area letters have been used, ie. A=10, B=11 etc. to * for more than 35 accidents. The user can, however, zoom in on a particular area of interest on the summary map to produce a larger scale map where each digit represents a 50m by 50m area. It is hoped that eventually it will be possible to plot the data over an actual road map displayed on the screen.

A further option in this program allows the user to list the worst locations on the map in order. A similar facility also exists to produce listings of the worst nodes and links.

iii) STICK is used to produce a stick diagram normally at a single site. This is a technique used to visually search for patterns in the accident data. The location can be defined by kilometre, map coordinates, node or link numbers and the program searches the specified data file(s) and represents each accident by a column or stick of accident parameters as in Fig. 6.

```
                          STICK DIAGRAM ANALYSIS
                          ***** ******* ********

                   ACCIDENT FILE:       ACCFILE1
                   CONDITIONS SET:      NODE 1 =         237
                                        NODE 2 =         000

=====================================================================
    | 1 | 8 | 11| 5 | 10| 7 | 3 | 4 | 2 | 6 | 9 | 13| 12| 0 | 0 | 0 | 0 | 0 |
--- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
MM  |10 |11 |11 |11 |11 |11 |10 |10 |10 |11 |11 |12 |12 |   |   |   |   |   |
DD  | 1 | 2 | 6 | 1 | 3 | 6 | 2 | 5 | 4 | 3 | 2 | 6 | 2 |   |   |   |   |   |
HH  |05 |06 |06 |07 |10 |11 |13 |13 |14 |15 |15 |16 |17 |   |   |   |   |   |
SEV | V | s | s | V | V | V | e | V | s | V | V | V | V |   |   |   |   |   |
PED |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
--- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
<-\ |   |   |   |   |   |   |<-\|<-\|   |<-\|<-\|<-\|   |   |   |   |   |   |
/-> |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
 U  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
O/T |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
>>  |   |   |   |>> |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
--- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
 +  | + | + | + | + | + | + | + | + | + | + | + | + |   |   |   |   |   |   |
*N* |   |*N*|   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
DIR |4  |4  |4  |3  |4  |3  |1  |3  |1  |4  |2  |4  |1  |   |   |   |   |   |
    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
--- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- --- ---
=====================================================================
MM =Month            DD =Day of Week     HH =Hour of Day      SEV=Severity
PED=Pedestrian       <-\=Left Turning    /->=Rght Turning      U =U Turning
O/T=Over Taking      >> =Nose to Tail     + =Junction         *N*=Night
DIR=Direction
=====================================================================
Stick Number = Accident Code Number:-
 1 =00023  2 =00076  3 =00116  4 =00167  5 =00196  6 =00224  7 =00259  8 =0030
 9 =00311  10=00323  11=00427  12=00507  13=00542
=====================================================================
```

Fig. 6 **Example of a stick diagram output.**

The user can define different parameters to produce many different sticks which can be selected for particular applications. A stick diagram for a site can be quickly re-sorted into ascending order of any of the listed parameters, for example, the columns in Fig. 6 have been sorted by hour of day; the top line of the table indicates the original order in which the columns were displayed from the accident file search. It can be seen from Fig. 6 that right-turning accidents at this junction tend to occur between the hours of 1300 to 1600. Again graphics will eventually be provided to produce more appropriate symbols to represent the accident parameters.

5. Some current examples of MAAP applications

5.1 Papua New Guinea

Although, over the past 10 years Papua New Guinea has had one of the best nationwide road accident reporting systems in the Third World, its Department of Transport and Police were experiencing difficulties with their mainframe computing facilities and found that they needed more in-depth analyses of accidents than their system could provide. In 1987, therefore, they took the opportunity to improve the police accident report form in both its content and the ability to enable direct entry of data from the form onto microcomputer using MAAP. They have transcribed the preceding five years of data and now have over 40,000 accidents on their micro system.

The fatality rate in PNG is relatively high at 60 deaths per 10,000 vehicles per annum, which represents about 15 per cent of vehicles on the road being involved in accidents each year. MAAP is therefore being used extensively to tackle this poor road safety record by identifying the major common factors both at individual blackspots and nationwide [eg. rollover accidents are the biggest single producer of casualties in PNG giving rise to 30% of all casualties, most of who were travelling in the rear of pick-up type vehicles].

The Department of Transport now uses MAAP to produce and publish an annual report of the road accident situation which forms the basis of its safety improvement programme. It is currently looking into ways of protecting pick-up passengers (eg. roll-over bars,back-supports) and is carrying out studies of driver alcohol levels (14% of all accidents are reported as 'Alcohol Suspected') and the effect of geometric design standards on accident rates (eg. horizontal and vertical curvature, gradient, road width and shoulder width, drainage ditch design - particularly in roll-over accidents).

MAAP is also used to produce a list of the worst sites along the major rural highways so that site studies can be carried out and suitable countermeasures introduced. The Package will, of course, also be used to evaluate the effectiveness of these countermeasures over an appropriate number of years. The types of improvement already being implemented include the installation of roundabouts at many uncontrolled major/minor intersections, the provision of footpaths alongside rural roads, chevron boards at hazardous bends, and improved warning devices before narrow bridges.

5.2 Botswana

MAAP has been used in Botswana since 1986 when it was introduced as a pilot project in the Gabarone district. It was quickly accepted by both the police and highway engineers and has been made the national standard since mid-1987. Accident forms from all police stations are sent to headquarters for checking, completion of coding and input onto IBM microcomputer. The data is subsequently copied via floppy diskette to the Road Safety Office for analysis.

As well as the use of grid coordinates, all major towns have been given a system of node numbers for major junctions. Kilometre posts have also been installed along all main interurban roads. Accidents on these roads are located by road number, nearest kilometre post and direction to the nearest feature.

Botswana is a rapidly developing country and with the increase in motorisation has come a quadrupling of accident rate over the past 10 years. In 1989, 3900 people were either killed or injured in a total of 6300 recorded accidents. MAAP has been used top identify the main features of these accidents. For example:-

i) 50 % of the accidents occur at weekends.

ii) Side impacts account for 26% and nose-to-tail collisions 20% of accidents.

iii) Collisions with animals are relatively frequent at 14% of the total but these account for 33% of all accidents occurring in darkness.

iv) Most of the junction accidents (44%) occur at T-junctions.

Over one third of the recorded accidents in Botswana occur in the Gabarone district and 26% of the casualties are pedestrians. MAAP has been used to identify the worst junctions and links, and a programme of accident countermeasures is being drawn up.

5.3 Pakistan

In 1987 the Karachi Development Authority installed MAAP in their computer section to store accident data for Karachi, the largest city in Pakistan. It has a population of six million people which generate 45% of all the motor transport in Pakistan. A small team from the Traffic Engineering Bureau of KDA regularly visit the police stations of Karachi and code data directly from the police accident records.

It was quickly recognised that perhaps the most disconcerting feature of the safety record of the city was the large number of pedestrians killed and injured on its roads. For example, in 1987 of the 588 killed, 54 per cent were pedestrians and 73% of these casualties were injured whilst actually crossing the road. Although at-grade zebra crossings are plentiful in Karachi, driver behaviour studies demonstrated that virtually no drivers stopped for pedestrians waiting at crossings and consequently few pedestrians used them. The provision of safer crossing places which people would be encouraged to use was therefore seen as a main priority.

The remedial action which is currently undergoing trials at a number of sites is the use of raised zebra crossings with a standard layout of graded road humps on each approach. It is hoped that these self-enforcing speed reducing measures will also make drivers more likely to give way to pedestrians (as all traffic will be decelerating to very low speeds to cross the humped zebra) and will attract high levels of pedestrian usage (partly because the need to step down from the kerb is removed) at these slowest points on the road. MAAP will, of course, be used to monitor the effect of these measures on accidents and in identifying sites for future engineering action plans. It is also hoped that a national database will soon be set up at the National Transport Research Centre in Islamabad.

6. Conclusion

Many years of development including much actual operating experience have gone into the production of the current version of TRRL's MAAP and most users now appear to be content with its practical application. It is a very simple and easy to use package and its in-built range of analysis features facilitate use at both a very localised level (eg. in regional offices or police stations) and by larger regional or national organisations.

It is likely that MAAP will be in service for much longer than many commercial packages. The latter often suffer data incompatibility problems when upgraded versions of the software are produced; older versions quickly tend to be no longer supported; and the user has to purchase the upgrades. The development of MAAP has been funded by the UK Overseas Development Administration and the Package is made available free-of-charge, under the terms of a signed licence agreement, to all governments or research establishments in developing countries.

At least four African countries are already using or intending to use MAAP for their national accident databases. This should enable comparisons to be made easily between similar regions, which in turn may give valuable insights into how road safety can be improved in areas with high accident rates. It is therefore strongly recommended that SARTTO joins this group of countries sharing compatibility of data by considering the adoption of this Package as their standard.

GENERAL DETAILS

18 SEVERITY OF ACCIDENT	fatal 1	injury 2	non-injury 3				
19 DAY OF WEEK	Sun 1	Mon 2	Tues 3	Wed 4	Thur 5	Fri 6	Sat 7
20 SPEED LIMIT	30 1	40 2	50 3	60 4	70 5		
21 WEATHER†	clear 1	rain 2	fog 3	dust 4	other 5		
22 LIGHT CONDITION†	daylight 1	night street lit 2	night street unlit 3				
23 GENERAL ROAD DESCRIPTION	straight and flat 1	curved only 2	inclined only 3	curved and inclined 4			
24 TRAFFIC MOVEMENT	one-way 1	two-way 2	both* 3				
25 ROAD SEPARATION	with median 1	without median 2	both* 3				
26 ROAD SURFACE TYPE	bitumen 1	gravel 2	earth 3	concrete 4			
27 ROAD SURFACE QUALITY	smooth 1	potholed 2	rutted 3	corrugated 4			
28 ROAD WIDTH	m	if separated by a median, measure width of one carriageway only					
29 SHOULDER WIDTH	m						
30 SHOULDER TYPE	paved 1	un-paved 2	no shoulder 3				

*only possible at junction

†AT TIME OF ACCIDENT

GENERAL DETAILS (continued)

31 ROAD SURFACE CONDITION†	dry 1	wet 2	other 3					
32 JUNCTION TYPE	not at junction 1	2	3	4				
	5	6	7	other 8				
33 JUNCTION CONTROL	not at junction 1	police 2	signal 3	police and signal 4				
	signals not working 5	stop sign 6	give way sign 7	un controlled 8				
34 HIT AND RUN ACCIDENT	not hit-and-run 1	hit-and-run 2						
35 COLLISION TYPE	nose-to-tail 1	side collision 2	head-on collision 3	hit pedestrian 4	hit animal 5	hit obstacle 6	rollover 7	other* 8
36 AT ROADWORKS	no 1	yes 2						
37 ROAD NARROWING	none 1	one-way bridge 2	two-way bridge 3	other* 4				

† AT TIME OF ACCIDENT

*EXPLAIN ____________________

VEHICLE 1 DETAILS

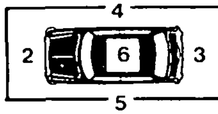
38 Vehicle make		39 Year of manufacture	
Vehicle model		Licence number	

40 VEHICLE TYPE		41 VEHICLE MANOEUVRE	
Bicycle	1	Turning right	1
Motor cycle	2	Turning left	2
Car	3	'U' turning	3
Station wagon	4	Crossing traffic stream	4
Light goods vehicle	5	Merging	5
Pick up	6	Diverging	6
Medium goods vehicle	7	Overtaking	7
Heavy goods vehicle	8	Going ahead	8
Minibus	9	Reversing	9
Bus	10	Sudden start	10
Tractor	11	Sudden stop	11
Animal drawn	12	Parked off road	12
Other*	13	Parked on road	13
		Other*	14

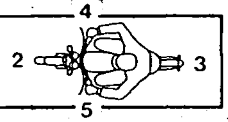
*EXPLAIN

VEHICLE 1 DETAILS (continued)

42 VEHICLE DAMAGE (circle damage)



1 no damage
7 multiple
8 damage no details



43 VEHICLE LOADING

legally loaded	Illegal — load was:				
	protruding in front	protruding from rear	protruding from side	too high	other
1	2	3	4	5	6

44 TYRE BURST	no	yes

45 VEHICLE LIGHTS	For THIS vehicle, did faulty lights or misuse of lights contribute to the accident?	no 1	yes* 2

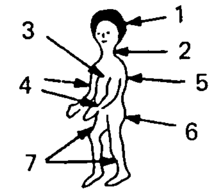
*EXPLAIN

46 LENGTH OF SKID MARKS ______ m

VEHICLE 1 DRIVER DETAILS

NAME			
ADDRESS			
47 DRIVER SEX	male 1	female 2	
48 DRIVER AGE			
49 LICENCE No		PROFESSION	
50 SEVERITY OF INJURY	fatal 1	injured 2	not injured 3
52 SEAT BELT	worn 1	not worn 2	
53 ALCOHOL/DRUGS suspected	neither 1	alcohol 2	drugs 3

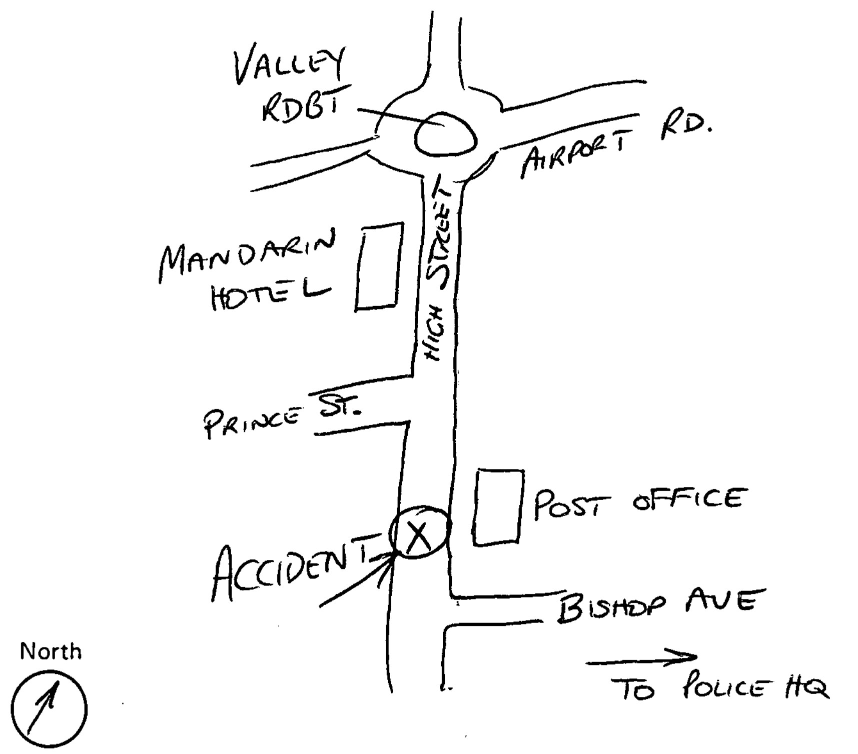
51 TYPE OF INJURY



GENERAL LOCATION SKETCH – ALL ACCIDENTS

SHOW WHERE POSSIBLE

Names of roads Location of accident North direction	Location of nearest main road if accident on minor road	Relation of accident site to significant buildings landmarks etc



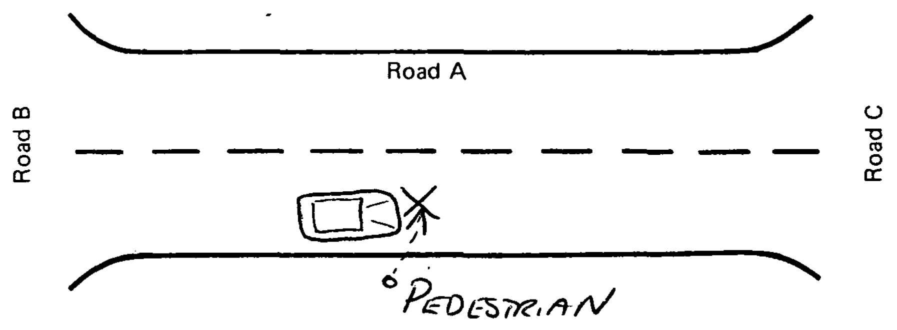
OFFICE USE ONLY

74 Map series		75 Map code	
76 1st (across) coordinate		77 2nd (up) coordinate	
78 Main road		79 Minor road	
80 Node 1		81 Node 2	
82 Direction of travel of vehicle at fault			

North 1	NE 2	East 3	SE 4
South 5	SW 6	West 7	NW 8

COLLISION SKETCH – NON-JUNCTION ACCIDENTS

Show direction, position and reference number of each vehicle involved



Accident road name A _HIGH STREET_
Name of road B _BISHOP AVE_ Distance from accident 350 ~~km~~/m*
Name of road C _PRINCE ST._ Distance from accident 200 ~~km~~/m*
*CIRCLE INFORMATION TO BE RECORDED

COLLISION SKETCH – AT JUNCTION ACCIDENTS

Draw layout of junction clearly
Show names of roads on diagram

Show direction, position and reference number of each vehicle involved