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Editorial

Welcome to the Spring 1998 issue of Reporter. As the poet probably meant to say, in Spring a young man's fancy turns to thoughts of the forthcoming one-day SIR Conference. This year we have a programme which is sure to raise the sap of even the most withered oak, and details are in this issue together with a booking form. The June one-day Conference is becoming increasingly popular, and the Committee look forward to meeting as many SIR Users as possible.

Several of our Committee members are currently looking suitably bronzed in the wake of having attended the 1998 International Conference in Florida, which by all accounts had an interesting and stimulating collection of papers. As the tan evaporated in the pale British sun, one of the attendees was able to pen a therapeutic review of the proceedings, and it appears for the edification of us all in this issue.

Forvus have by now distributed the new version of SIR widely in the UK, and there must be many sites which are now using it, at least on an experimental basis if not yet for production work. We at Reporter would be particularly interested in hearing reactions to the new version from as wide a variety of users, locations and applications as possible. How do your experiences of 4.0 compare with the review article which appeared in the last issue, particularly with running times of jobs? With the rapid growth of NT in the commercial sector, it is wise for us all to get to grips with the GUI version sooner rather than later, since the marginalisation of DOS continues apace.

Having now produced a GUI version of SIR, the owners of the package must now be relishing the challenges which lie ahead, the most immediate being a commercial release incorporating Open DataBase Connectivity. We understand that considerable progress has already been made towards this, and look forward to news of a release date in the not too distant future.

Michael Staley

Note from the Chair

Having just returned from the International Conference, I have hopes that things are going to move in the right directions with SIR. We had demonstrated a new spreadsheet type interface to allow updating in a rows and columns format.

E P O R T E R

We were promised ODBC for October 1998 with version 4.1 and JDBC in version 4.2. See elsewhere in this issue for a full conference report.

The next International conference will be in Edinburgh in June 1999 so don't book your holidays then as I am sure you will want to attend to see what the developers have up their sleeve for future versions. There will not be an Edinburgh one-day conference this or next November nor a London One-day next June so we can concentrate on the International conference.

Our own London one-day conference is in June where you can see an alternative SIR interface plus a spreadsheet type interface, both created with version 4.0's API interface, amongst other interesting presentations. Book your place now to ensure you can see what can be done.

Dave Doulton

11.40	BBC Audience Data SIRvices	Dave Greatorex, BBC
12.10	Report on SIR 98 conference in Florida	Frances Williams, Essex University
12.30	Lunch	
13.45	Forvus News	Steve Flack, Forvus
14.00	SIR 4.1 demo	Kathy Brooks, Forvus
14.30	SIR API	Dave Doulton
15.30	Tea/coffee	
15.45	WDL'ing my Archive	Niels Veldhuijzen, CITO
16.15	TBA	
16.45	Panel	
17.00	Review/summary	
17:10	Finish and wine and cheese	

Abstracts

From SIR to Oracle - An Initial View from a Reluctant Escapee

After more years than I'd like to count working in SIR, I have now sadly moved on to designing databases using the market leader - Oracle. Taking away all the hype and marketing surrounding Oracle, I shall provide an initial comparison of the two systems from the view of a seasoned SIR exponent and a new Oracle database designer. This review of the David versus Goliath battle should hopefully provide a thought-provoking analysis of the benefits of the two systems.

Toni Moulin

Using a Workflow System (Staffware) with SIR at the DfEE

The paper looks at how a new survey system was developed using Staffware and SIR. It describes how the workflow management software integrates with SIR and how this differs from the way that SIR has been used in the Department previously.

It looks in some detail at the F503G 1997 survey and how the system was developed. It covers how processing was affected, cost savings achieved and the impact of changed working methods on completion of the project.

Jenny Simpson

Events

June 25, 1998	SIR Users Conference London
June 1999	International SIR Conference, Edinburgh

User Conference June 25, Forvus House London

Programme

10.00	Coffee and Registration	
10.30	Welcome	Dave Doulton, Southampton University
10.40	From SIR to Oracle - An Initial View from a Reluctant Escapee	Toni Moulin TN/AGB
11.10	Using a Workflow System (Staffware) with SIR at the DfEE	Jenny Simpson, DfEE

BBC Audience Data SIRvices

The paper gives a brief summary of how the BBC Audience Data Services section processes TV and Radio Audience Measurement data, using SIR as the main tool to develop and maintain online databases for use by the BBC's researchers and analysts. One particular aspect of this work, the validation of Programme Transmission titles is then described in more detail.

Dave Greatorex

SIR API

The API session demonstrates several applications developed using the API and shows how the API calls are made. The applications include several cgi programs to access SIR databases on the W.W.Web using C programs; a C program to display data from a SIR database in a DOS window; a Visual Basic Program to show access to SIR records using a grid interface, including update, insert and delete options. Dave will also demonstrate a Visual Basic Program which provides an alternative development environment to the one provided.

Dave Doulton

WDL'ing my Archive

For some years now I have run a private SIR database containing titles and authors of papers on statistical and psychometric subjects. These papers are stored in the most unsystematic way in cardboard boxes: randomly; without the database these boxes would be of no use to me. Since the introduction of SIR 4.0, I replaced the horizontal and vertical menus, used for locating papers in the boxes and adding papers to the database, by WDL dialogue boxes. I hope to show some of these dialogues, and to comment on their pros and cons.

Niels Veldhuijzen

Review of International Conference in Florida

Tony Reardon from SIR PTY opened the conference proper with a paper titled '**Evolution of SIR**' in which he gave a potted history of the development of SIR from version 1 through to version 4.1 and beyond. Tony explained how, for the development of SIR V4, he recognised the need to maintain compatibility with previous versions whilst making the system flexible, portable, easy to convert and less error prone and thus worked on a single version for all platforms with good quality control and testing. He described the new structure and features of SIR 4.0 and whetted our appetites for SIR 4.1, due to be released for testing in October.

Tony introduced the next session as well, titled '**Windows Description Language**'. WDL defines a graphics interface to SIRDBMS which creates menus and dialogs for the user, and commands and/or parameter lists which can be passed to SIR. It is machine independent. Windows can have a title and a menubar with pull-down menus. A dialog is a GUI window with a group of objects whose size is determined by its components. The types of objects that can be defined are Buttons, Check Boxes, Radio Buttons, Labels, Lists and Text and these can be placed either horizontally or vertically within the dialog. When a button is pressed action happens and information is taken from the rest of the dialog.

Dave Doulton from Southampton University took over from Tony with a paper entitled '**Using WDL**' and demonstrated a system he has written using WDL. This was a model which shows the effects of all the available options including file



browsing and the different dialog objects. It also high-lighted some problems with WDL - sometimes it was necessary to make a selection more than once to get the correct response. Dave also considers it necessary to be able to independently

size dialogs. He showed how WDL can be written using PQL but explained that it can be difficult to make design decisions within a program. His conclusion was that WDL is much nicer to view than Forms but is more difficult to write.

The afternoon session commenced with **Tom Shriver** from the Indiana Heart Institute giving a paper entitled '**Extending SIR's Schema**'. Tom has to manage five versions of a one million record database with 4000 variables in 75 record

types and has problems managing disk space and synchronising the databases. His solution has been to build a multi-database schema tool which handles data definitions and is easy to maintain. He explained how he has developed a Schema Database with record types of DATABASE, RECTYPE, KEYFIELD, VARIABLE etc. that enables him to define new data types such as YES/NO, build different databases excluding unnecessary variables and merge different database schema versions.

Kathy Brooks from SIR (UK) concluded the afternoon with training sessions on '**SIR Tabulate**' and '**SIR Full Report Writer**'. Kathy commenced her session on tabulations by explaining the difference between Control Variables and Observation Variables. She went on to explain how output is controlled by the order in which variables are listed, how tables can be nested and concatenated, the different statistics that can be obtained and how print can be formatted. Finally she showed us that getting percentages from TABULATE is not that difficult after all!

In her second session, Kathy explained how the SIR Full Report Writer gives total control over the structure and appearance of any report by using PQL commands, breakpoints, complex computations and key-driven sorting. She explained how break levels specify the breakpoint conditions and the actions to be taken and how to produce a report with multiple breakpoints. For those of us who don't often use TABULATE or REPORT it was a timely reminder as to how useful they can be.

The first session on Tuesday morning was a paper entitled '**SIR Information and a UK Mental Health Service**' given by **Andrew Burnham** and **Patricia Horan** from the Leicestershire Rehabilitation Services. They explained how Leicester Rehabilitation provides rehabilitation psychiatry for patients with severe mental illness and why the previously uncoordinated system has been replaced with RACCOON - Rehabilitation and Continuing Care Operations on Network. Their client-centred database records details of clients, carers and locations. There is a high level of validation of input data which is received from many sources and output is required for many different bodies. They described various problems they have encountered and various things they wish to do but felt that overall it has been a very successful project - confirmed by the award it won at the Healthcare 98 Conference for "Best Use of IT in Community Care".

Tony Reardon then introduced a paper on '**The SIR Applications Program Interface**' which enables a programmer to write DBMS/PQL or SQL commands to access a SIR database from other languages such as C, C++ and Visual

Basic. Text is sent between the calling program and SIR running interactively. Tony described how the three DBMS API functions - SirDBMS_init, SirDBMS_Exec and SirDBMS_Stop operate, with SirDBMS_Exec being the one which actually sends DBMS commands to the PQL program/retrieval. SQL API has three equivalent commands.

Whilst most of us were still trying to work out exactly what the API is, Dave Doulton demonstrated some superb examples of systems he has written in his presentation '**Initial Use of the SIR API**'. His first example demonstrated how information on staff at Southampton University (with photographs) can be obtained across the Web using either PQL or SQL queries. The second example to access the Company Database was written in Visual Basic (VB). Data was displayed in scrollable, resizeable grids. Dave then showed us a test environment, also written in VB, which he uses to test WDL scripts. He then showed us a system, written in C, which displayed Southampton University computer service's user data in a non-graphical way. Dave explained that there were one or two problems with the way API works but he demonstrated to the rest of us what a powerful system it is and well worth getting to grips with!

Tuesday morning concluded with **Randy Banks** from Essex University presenting a training session on '**SIR Compiler Directives**'. Randy reminded us what a powerful language PQL is, particularly if you use compiler directives. He explained the use of global variables - both system and user-defined, positional parameters and special characters. He then went on to explain the use of various PQL commands including REMARK, PRINT BACK, CLEAR OUTPUT, GLOBAL, CALL, RUN MEMBER, INCLUDE FILE/BUFFER, FINISH, CIF...END CIF and DO REPEAT...END REPEAT. His extensive notes provided a superb reference on these and many other commands.



Tuesday pm was taken over by Tony Reardon presenting two papers. The first was a fascinating insight into the internals of SIR entitled '**SIR 4.1-The Development Process**'. Tony went into some detail about the internal structure of SIR telling us

about SIRTRAN, SYSTEXT, Macros, SetSymbols, Micros and Managed Tables. He



ent set up is very unreadable Fortran s on table space and ; to conflicts between describe how he has n for V4.1, removing generating structured space and PQL stack only by the available er concern ourselves good to know that it reliable.

n showed us some of t from SIR 4.1 in a presentation entitled '**SIR 4.1 - Features & Demonstrations**'. A new spreadsheet interface will allow the creation of Excel save files and a new graphics interface will provide an improved and updated version of SIR Graph. Both of these use licensed component libraries. He also demonstrated how it will be possible to generate WDL from a schema by selecting record types and variables and creating dialog boxes. There will also be an Open Database Connectivity (ODBC) interface to (Windows) ODBC enabled applications and new PQL and Forms GUI interfaces.

The first session of Wednesday morning was divided into two training sessions. **Tom Shriver** did a session for people who are relatively new to SIR entitled '**Introduction to PQL**' whilst the rest of us were treated to a **Tips & Tricks** session from **Kathy Brooks**. Kathy started her presentation with a look at database and tabfile internals, explaining how free space affects performance and how loading factor can be used to control it and then discussed the advantages and disadvantages of tabfiles. Disaster Recovery was the next subject she tackled, describing the causes, symptoms detection of and precautions taken to avoid database corruption. However, should disaster strike, Kathy explained how, with the help of VERIFY FILE and various utilities it is normally possible to recover a corrupt database. Her last tip was on the use of Executable Retrievals, retrievals which do not require compilation every time they are run. She explained how to use ATTRIBUTES to determine file names at run time and the use of NARG() and SARG() to evaluate positional parameters at run time.

In the next session **Dave Baxter** from SIR Pty demonstrated an internet interface he has developed to the SPR database he manages in a paper entitled '**Internet Interface to Your SIR Data**'. All developers, regardless of what platform and what version of SIR they are running, want access to the SPR database and he has enabled this by building an internet interface to it. He explained how data is passed to and from the CGI internet interface and SIR using Perl scripts and PQL. The result is that everyone can access

(and update) 'bug' reports via a very attractive interface.

Richard Shaw, from the San Francisco Heart Institute then introduced a paper on '**Cardiac Data Reporting Needs**'. Dick works with Heartbase, a cardiac database which is widely used in hospitals across the USA. He described its evolution from 1983 and why SIR was chosen. Over the years the amount of information stored has increased dramatically and so have the reporting demands both internally within the hospitals and externally from government and professional bodies . However, SIR's flexibility has enabled Heartbase to evolve as cardiology has evolved and will continue to do so in the future.

The final paper of the conference was entitled '**Special Studies in SIR**' and was given by **Nick Gawrit** from SIR (Americas) Inc. Nick has worked closely with Dick Shaw on the development of Heartbase and he described how special studies are required when there are short term data needs for special projects. This enables responsive changes to be made without schema modifications and the assessment of certain variables before making permanent changes. He described that this could be done by creating new record types that control fields and variables and the naming of fields and by controlling data entry by use of key structures directly linked to records. Nick then demonstrated how he had done this with Heartbase.

The conference ended with a round table discussion on **the Future Development of SIR**. One of the great advantages of SIR International



Conferences is to be able to discuss problems and requirements with the developers (and owners) of SIR. Requests included a printable version of the documentation to be include on the release CD, ODBC

connectivity with Unix databases, proper comma delimited input and output files, tabfiles for use with Master and multiple databases within retrievals.

Before everyone disappeared for a 'barbi' by the pool, Randy proposed a vote of thanks to Mo Reardon, Managing Director of SIR Pty, who had looked after us superbly throughout the

conference, sorting out problems with the hotel and organising all the social events.



This was certainly the best conference that I have ever attended and I came away feeling that SIR has a great future in front of it. All the papers should soon be available on SIR Pty's Web site - www.sir.com.au.

Frances Williams

Profile of Dave Greatorex

Dave Greatorex is Systems Development Manager for Audience Data Services, responsible for providing systems for the analysis of BARB (TV) and RAJAR (Radio) Audience data for researchers throughout the BBC. He has recently joined the User Group Committee.

I am married with three children aged 7, 5, and 18 months, 2 dogs, a cat and half a dozen chickens. As I live in the New Forest & commute to London each day I don't have much time for many other activities, apart from running - I've completed 4 marathons & umpteen half marathons -, tennis when I can fit it in & reading.

Before joining the BBC I worked for the Paper, Packaging & Printing Research Association (PIRA) after spending an industrial training year with Unilever at their Isleworth Research laboratory. In 1974 I joined BBC Computer Services as a junior programmer on permanent loan to the Audience Research department. My first task was using PLAN to convert 5 track paper tape systems into 8 track paper tape systems. We used PLAN & FORTRAN to write bespoke analysis systems - having to get special permission from the computer centre to run anything over 16k in size - programs had to be efficiently written in those days!

Since then I have been part of the BBC Audience Research IT unit in its various forms apart from 8 months when I left the BBC to work for a market research firm called CRC before being head-hunted back. Broadcasting Research, as it was then known, finally ceased to exist in April 1997, and the researchers were devolved around the BBC and the IT Unit became Audience Data Services. We continue to develop systems to enable the corporation's researchers and business strategists to access BARB and RAJAR data both in report form and by providing access to online databases.

As those of you who have attended SIR conferences over the last few years will be aware, most of these databases are SIR databases running on SUN UNIX servers, with researchers accessing them either via TELNET sessions or, increasingly via client server systems. We have used SIR for over 10 years now, initially on ICL 2900, mainly on UNIX boxes and, although there are areas where it could be improved, it has so far proved to be the most suitable platform for our type of data which involves both a good deal of number crunching and frequent changes to systems as new channels come online. Whether or not we ever get into WDLing remains to be seen.

Dave Greatorex

Profile of Lisa Zaninetti

Lisa Zaninetti is an Analyst Programmer in Audience Data Services at the BBC. She has recently joined the User Group Committee.

I originally completed a BA in Business Studies at Oxford Brookes University, during which I worked for 3M for my sandwich year as a Marketing Assistant. There I decided my future did not lie in the marketing of telex machines, especially if I had to live in Bracknell. After completing my course I worked briefly managing PR clients' listings back in London before deciding I needed to flee the country for as long as possible. I managed it for eighteen months during which I travelled and worked in Australia for a year on a Working Holiday visa and then travelled through Asia for six months, completing it on the Trans Siberian Express. On return to the UK I worked in Marketing for Psion PLC for eighteen months. This is where I first contemplated a career in computing.

Having discovered that it was much too exciting a field to be missed (!), I embarked on an MSc Information Systems - a year's conversion course

- at the University of Brighton. This aimed to make Arts graduates into 'hybrid IT professionals'. As part of this course I completed a summer project at the Broadcasting Research Department at the BBC and went on to work in the department for six months afterwards. I then left to join BT as an Analyst Programmer on a huge project called COSMOSS (aptly named) using DB2 and COBOL. After eighteen months, I felt this was not for me, and was able to rejoin the BBC in September 1996.

I try to keep slightly fit with aerobics a couple of times a week and the (very) odd run. I am a keen film goer- especially Woody Allen films (you either love them or hate them) and enjoy travelling. I recently returned from a 3 week trip to India which was very hard work and have decided that next time I'm taking a less arduous trip!! I do occasionally resort to some DIY and enjoy the ideas of home improvement if not necessarily the practice.....

Under the supervision of Janet Dyson and Tracy Kirk, I did a SIR beginners course in January 1997 at Forvus and have been having fun with SIR ever since..... This has included dealing with various DBA issues - maintenance of the various databases we hold in SIR, solving user problems. Projects I have been involved with are producing a set of Archive Databases from our original Explorer database which holds Television Audience Measurement data, testing a new improved Television Audience Analysis system, with new improvements written by Janet, and making it available to users. Future projects for ADS include a redesign of the Programme Database (our biggest and most used system) and automation of monthly reports using SIR data, with formatting in Excel.

Lisa Zaninetti

Forvus News

Good-byeeee!

Well, after reporting in the last newsletter that we are growing staff-wise, sadly I have to now report a temporary period of negative expansion at FORVUS. **Tracy Kirk** has decided to go to pastures new and has taken a job with Tricon Restaurants International, owners of the Kentucky Fried Chicken chain. She will be a Systems Development Analyst at their head office, and not standing behind the counter in a pretty stripy number dishing out the chicken wings. **Suzanne Moll**, who has worked for us for the last 8 years has left us. Most of this time was spent as my assistant, and a few of the more

uncharitable people here say she was therefore due a break! She has gone to be PA for one of the head honchos at IBM in London. **Lina Stoto**, our receptionist, is also on the move. She is going to IBM - Hang on, anyone see a trend here? **Philip Truscott** has gone back to America (*not* to IBM) but will still be carrying out QStat development for us. At least we think he has gone – his bike is still chained to our railings! It's getting hellish expensive around here, with all the going-away pressies!

Bucking the trend, **Mohana Eesvaran** is coming back to work for FORVUS as Lina's replacement. Mohana went to work for HM Prison Wandsworth for a while, so should feel quite at home when she returns to FORVUS House.

Award Winning SIR



I am pleased to announce that an application, designed and developed by Janet Dyson of Forvus and Dr Harry Andrews of the Rehabilitation Services, using SIR software, has won a prestigious award. At the recent

Healthcare 98 Conference held in Harrogate a system developed for the Rehabilitation Services, part of Leicestershire Mental Health Services Trust, won the award for "Best Use of IT in Community Care".

Essentially the system maintains a detailed history of contacts between each client (patient) and their carers. By building a data profile on each client, the system records the type and variety of care clients receive whilst being resettled in the community. The system uses drop-down menus and staff using it have access to a number of pre-defined reports as well as the facilities to produce ad-hoc reports as required.



I would like to take this opportunity to congratulate both the Rehabilitation Services and Janet on the award.

Quality in Initial Teacher Training

FORVUS has recently been awarded a contract to collect information on initial teacher training from 107 training establishments. This information will be used to produce performance tables for initial teacher training.

The compilation of the tables involves the collection and assimilation of information from the 107 providers. FORVUS designed and developed screen based data entry systems using Microsoft Access. These systems provide field based range and value checking procedures, as well as consistency checking. A telephone helpline has been set up to deal with any queries and offer advice to the providers throughout the project.

Forvus Benefits the Benefits Agency

Tracy Kirk has been keeping herself busy carrying out consultancy work for the DSS Analytical Services Division in Leeds. ASD maintains a number of databases relating to different types of benefits that are available, the databases providing 'snap shot' samples of customers where the correctness of the benefits claims has been reviewed by Benefits Agency staff.

The data arrives from the Benefits Agency offices in either Access or Excel-readable format, and through various processes gets stored in SAS. Tracy has been looking at the SAS end of things to develop front-end systems which will enable ASD in Leeds to analyse the data more easily.

Steve Flack

Graduate Opportunities in IT

London SW4

£16,000 - £20,000



Forvus is an IT consultancy organisation involved in the development and operation of statistical and data management systems using a range of software tools. Clients include central and local government departments, market research and pharmaceutical companies.

We are looking for one or more graduates to carry out programming and administrative tasks related to major government projects. The work requires accuracy and the ability to work under pressure.

Ideally candidates should possess a good degree in a numerate subject, and have good interpersonal skills. Some experience of MS Access, Visual Basic, SIR or SAS would be an advantage.

Forvus is located in pleasant surroundings at Clapham Common. Company benefits include annual bonus, free life and travel insurance, personal pension scheme and up to five weeks annual leave.

Please write enclosing CV to:

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Frequently Asked Questions

How can I convert my existing SIR 3.2 user menus to WDL?

This question was in the last issue of Reporter, but appears again because of popular demand.

David Baxter at SIR Oz has written a PQL program which produces a WDL script from a user menu. You can download his program from the SIR Oz web site. Visit

<http://www.sir.com.au>

and pick 'Downloads'. This program is listed under 'Handy Utilities and PQL Programs'. Alternatively go direct to this page at

<http://www.sir.com.au/software/download.html>

Can I use a variable in the first record of my report when it is not calculated until the last record in the db has been processed.

You can mess around with dummy records, but Tom Schriver came up with using the functions GLOBALN and NGLOBAL. The example below needs to know the total number of records before it can work out the percentages.

```
| Full report with percents
retrieval
set NUMRECS (0) | Total number of
  review records
process cases
```

```
. process rec REVIEW
. get vars RATING
. compute NUMRECS = NUMRECS + 1
. perform procs
. end rec
end case

write 'NUMRECS is ' NUMRECS
C Put final value of NUMRECS into a
  global called TOTRECS
compute DUMMY =
  globaln('TOTRECS',NUMRECS)

report filename = temp.rep / sort =
  rating
before report
. heading /'Rating' 20t 'Frequency'
  30t 'Percent'
. page eject
c Retrieve the value in the global
  TOTRECS at the start of the report
. compute TOTRECS =
  nglobal('TOTRECS')

break level 1, RATING
. initial block
. set NUM (0)
. detail block
. compute NUM = NUM + 1
. at end block
. write RATING [vallab(RATING)] 20t
  NUM 30t [NUM/TOTRECS*100] (f7.2)
end break level
end report
```

Here is the output:

Rating	Frequency	Percent
2 Poor	1	1.56
3 Acceptable	13	20.31
4 Good	32	50.00
5 Very Good	18	28.12

Kathy Brooks

HTML scrambles the input and output, what can I do?

This subroutine takes the string passed by POST or GET from a form and converts it back to the original string i.e. replaces + by space and converting %3D into = etc.

```
subroutine dehtml (x) returning (y)
  replace
  string *254 x y
  ifthen(pack(x) eq "")
  . compute y=x
  else
  . compute y=replace(x,'+', '
    ',len(x),0,0)
  c this is a space          ^
  . compute st=0
  . loop
  .   compute
  .     z=abs(srst(sbst(y,st+1,len(y)-
  .       st),'%'))+st
  .   if(z eq st)exit loop
  .   compute st=z
  .   compute s=upper(sbst(y,1,z-1))
  .   compute
  .     e=upper(sbst(y,z+3,len(y)-z+3))
  .   compute d1=sbst(y,z+1,1)
  .   compute d2=sbst(y,z+2,1)
  .   recode h1=d1 ("A"=10) ("B"=11)
  .     ("C"=12) ("D"=13) ("E"=14) ("F"=15)
  .     (CONVERT)
  .   recode h2=d2 ("A"=10) ("B"=11)
  .     ("C"=12) ("D"=13) ("E"=14) ("F"=15)
  .     (CONVERT)
  .   compute y=s+char(h1*16+h2)+e
  . end loop
  . compute y=trimlr(y)
endif
return
end subroutine
```

Dave Doulton

SIR UK User Group Committee Members 1997/98

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You can email the whole committee by addressing your message to **sug.comm@essex.ac.uk**