

SAS/EIS: SPRINTing to the Rescue

SPRINT INTERNATIONAL Global Voice Engineering Executive Information System

Jay Jacob Wind, Aspen Systems Corporation

Claude Griffith and Glenn Phillips, SPRINT INTERNATIONAL Global Voice Engineering

SAS and SAS/EIS are registered trademarks of SAS Institute, Inc., Cary NC.

Abstract

This paper describes our adventures installing a multi-featured SAS Executive Information System (EIS) for SPRINT INTERNATIONAL Global Voice Engineering. We cover the capabilities and limitations of SAS/EIS and demonstrate graphical examples.

SPRINT INTERNATIONAL handles millions of international phone calls each month from countries such as Australia, France, Germany, New Zealand, and United Kingdom (UK), to more than 200 countries including the U.S. As SPRINT INTERNATIONAL expands, it continuously aims to improve its worldwide service. To track and summarize call set-up time, holding, and duration, we installed a powerful Executive Information System (EIS) using SAS/EIS for Windows on a Dell Pentium desktop computer. The EIS takes advantage of many SAS/EIS capabilities. To use those capabilities, however, we had to overcome numerous EIS limitations.

What is an EIS?

An EIS is a computer system designed to summarize and display data in the form of graphs and tables to enable managers quickly to see status and trends without requiring them to do any programming.

Key features of an EIS include:

- **DRILL DOWN:** To make a graph or table, to select one row of data, and to expand that row to a new graph or table
- **TRANSFORM:** To flip a chart into a table or vice-versa, without re-selecting data
- **OBJECTS:** To use menus (DESKTOPs) to list options, each with its own push-button (ICON), to allow you to call other objects, such as other DESKTOPs; graphics (CHARTs); variance reports or tables (VARREP's); calls to non-EIS SAS programs (EXECUTEs), e.g., canned reports and macro definitions; and EXITs

SPRINT INTERNATIONAL's Requirements

We designed our EIS to fulfill these key requirements:

- Store and analyze datasets containing millions of calls
- Select by country
- Select by summary type, e.g., from where the call originated or to where the call terminated
- Select by time period, e.g., most recent month, by hour; most recent month, by day; most recent week; five most recent weeks; previous month
- Select how to represent variables with various formats
- Display data on graphs, tables, and "canned" reports
- Drill down or transform graphs to tables at any time

Our First Phase:

- We installed SAS/EIS software on a Dell Pentium desktop with 24 MB RAM and 500 MB storage
- We downloaded mainframe data for one month of UK/hourly data
- We wrote a program to read UK hourly data
- We used SAS/EIS **METALIST** tool to "register" UK/hourly dataset into EIS
- We used SAS/EIS **METABASE** tool to register all UK/hourly variables into EIS
- We wrote a program to split a month of data into five individual weeks, and to summarize hourly data into daily data
- We used SAS/EIS **BUILD** tool to write a SAS/EIS DESKTOP object to select time period, e.g., Hourly, Daily, or Weekly (Week 1/2/3/4/5)
- We developed various SAS/EIS data analysis objects:
 - Horizontal Bar
 - Vertical Bar Chart
 - Pie Chart
 - Variance Report Table
 - Call to external SAS programs
- We wrote a SAS/EIS DESKTOP object to select among the various data analysis objects
- We tricked VARREP not to display certain columns, using a length of 1 and a **BLANK** format:


```
PROC FORMAT; VALUE BLANK OTHER=' ';
```
- We tricked VARREP to display certain columns as hundreds, using a **HUNDS** format:


```
PROC FORMAT; PICTURE HUNDS
OTHER='0000009.999' (MULT=10);
```
- We wrote a program to convert data from Australia, France, Germany, and New Zealand into a form similar to UK
- We built a DESKTOP object to select country, e.g., Australia, France, Germany, New Zealand, or UK
- We discovered that the SAS/EIS **LIBNAME** object had an "unwanted feature," a warning that wouldn't go away. So instead, we used SAS/EIS **EXECUTE** objects to run macros to reassign the **LIBNAME** to which the **METABASE** applied:


```
%LET &SWITCH=GERMANY; or
%LET &PERIOD=HOURLY;
LIBNAME DATA "&SWITCH&PERIOD";
```
- We used Screen Control Language (SCL) to control the title bar at the top of the EIS screen:


```
INIT:
SWITCH=SYMGET('SWITCH');
PERIOD=SYMGET('PERIOD');
CALL EXECCMD('SETNAME "'||SWITCH||
' '||PERIOD||'" data');
RETURN;
```

Our First Phase (Continued)

- We built a SAS/EIS DESKTOP object for summary type, e.g., from where the call originated or to where the call terminated; and for text format for encoded variables
- With data from all these countries, we quickly overwhelmed the 500 mB storage, so we added another 500 mB disk drive ("D:"). Then we moved the SAS/EIS programs and data to the D: drive, but kept SAS itself on the C: drive. This configuration lasted about one month.

Our Second Phase

Soon, after several users wanted to use the EIS at their own work stations, we allocated 2 gB on our Novell network, moved the EIS data to a network "O:" drive, and modified all the programs to point to O:. We then installed SAS and copied all EIS programs to each user's PC. We discovered that performance time slowed down by a factor of 2, but at least everyone had access to the EIS.

Our Third (And Current) Phase

When SAS Version 6.10 and Windows 95 (Beta) became available, we moved the EIS programs on the O: drive along with the data. Performance time speeded up by a factor of 4. Finally, we modified everyone's AUTOEXEC.SAS to look for the EIS on the O: drive.

We see a few problems now:

- While one user BUILDS the EIS, others cannot use it
- We can run the EIS just fine from RUNEIS, but if we BUILD and TEST the EIS from PROGRAM EDITOR with ASSIST, Windows 95 crashes completely

What's Next

We plan to continue to add and upgrade the EIS:

- Roll out the EIS to other PC users
- Simplify the database loading process
- Add data from more countries
- Add capabilities to analyze MODEs as well as sums
- Develop more canned reports
- Use new advanced SAS/EIS features:
 - EXPANDER, the expandable line report
 - MULTCOL, the multi-column report

EIS Data Structure

EIS variables fall into two classes:

- **ANALYSIS VARIABLES:**
 - Attempted Calls (ATTEMPTS)
 - Completed Calls (COMPLETE)
 - Call DURATION seconds/minutes/hours
 - Call HOLDING seconds/minutes/hours
 - Call SETUP seconds/minutes/hours
- **CLASS VARIABLES:**
 - Originating Country (SWITCH)
 - Destination Country (DESTCNTY)
 - Destination Region (REGION)
 - Trunk Line (TERMTRNK)
 - Trunk Carrier (CARRIER)
 - Trunk Route (ROUTE)
 - Year (YEAR)
 - Date (CALLDATE)
 - Date Week Ended (SUNDAY)
 - Day of the Week (DAY)
 - Hour of the Day (CALLHOUR)
 - Day and Hour (DAYHOUR)

EIS Menu Structure

EIS users see a series of DESKTOP menus:

- Select trunk type, e.g. originating or terminating
- Select a switch (country), e.g., Australia; France; Germany; New Zealand; UK
- Select a time period, e.g., Month, by day and hour; Month, by day; Week 1/2/3/4/5, by day and hour; Previous month, by day and hour
- Summarize how to format TERMTRNK, e.g., Carrier; Media; Product; Overflow; Route; Description; Size; Use

EIS Reports

One can then select a Custom Report:

- Horizontal Bars
- Vertical Bars
- Pie Charts
- Aggregate Tables
- Ratio Tables
- Expandable Tables
- Multi-Column Tables

... or select a Canned Report, a SAS program called by EIS EXECUTE objects and using EIS macro variables.

The following pages illustrate the various screens that comprise the EIS.

For more information, please contact

Aspen Systems Corporation
Jay Jacob Wind (703) 920-5193

SPRINT INTERNATIONAL
Global Voice Engineering
Claude Griffith (703) 689-5438
Glenn Phillips (703) 689-7421

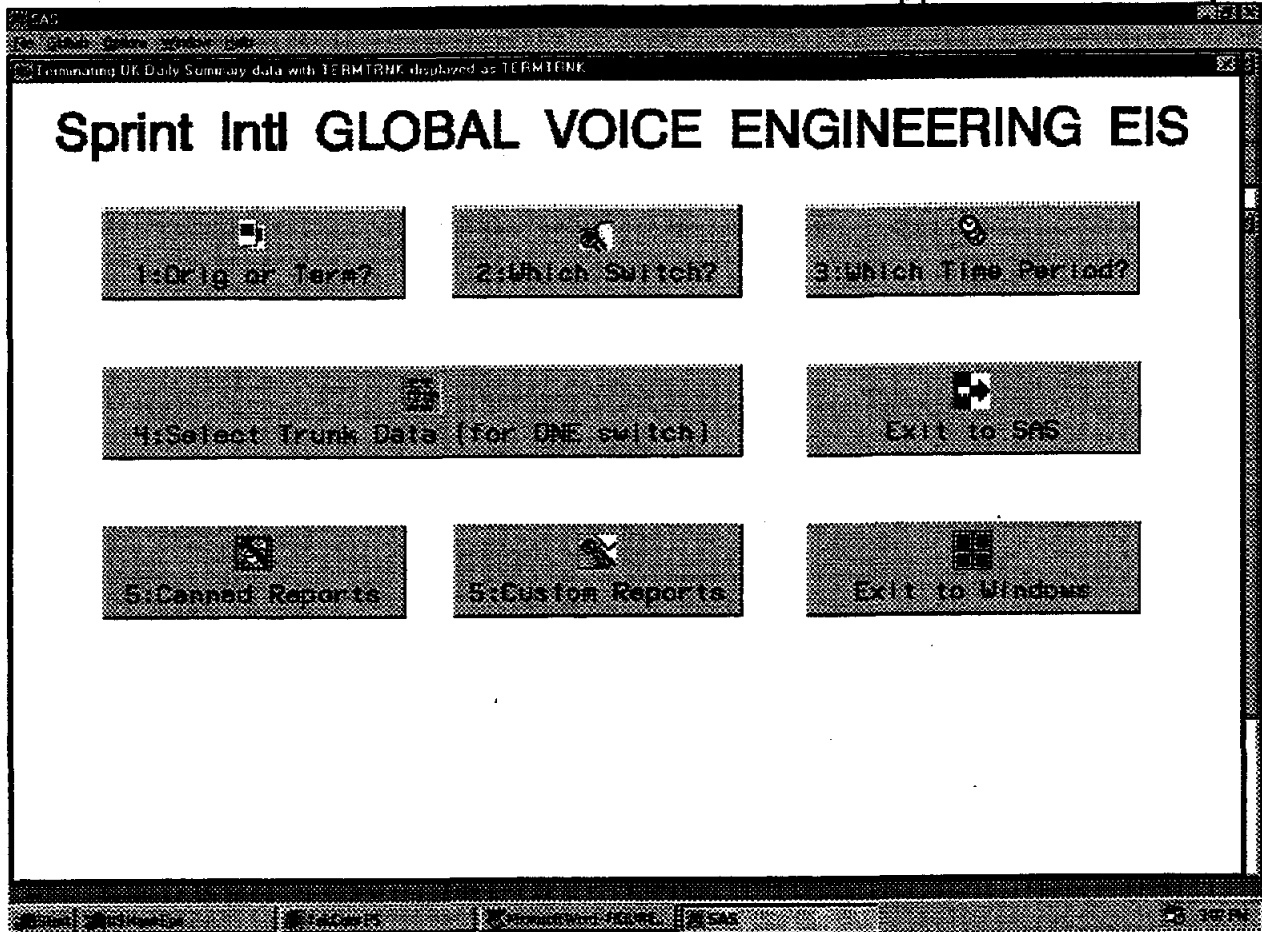


Figure 1. Main Menu

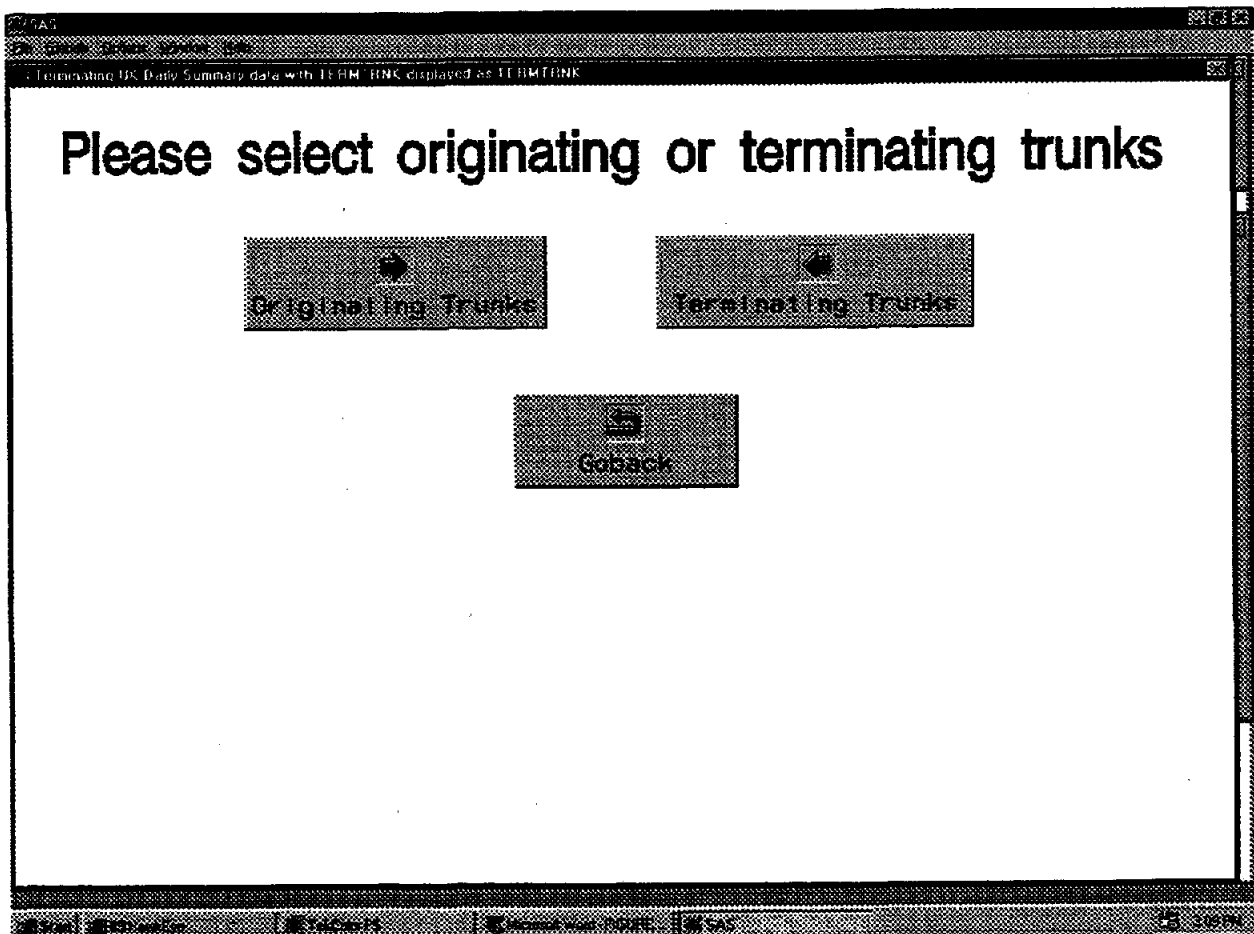


Figure 2. Trunk Type Menu

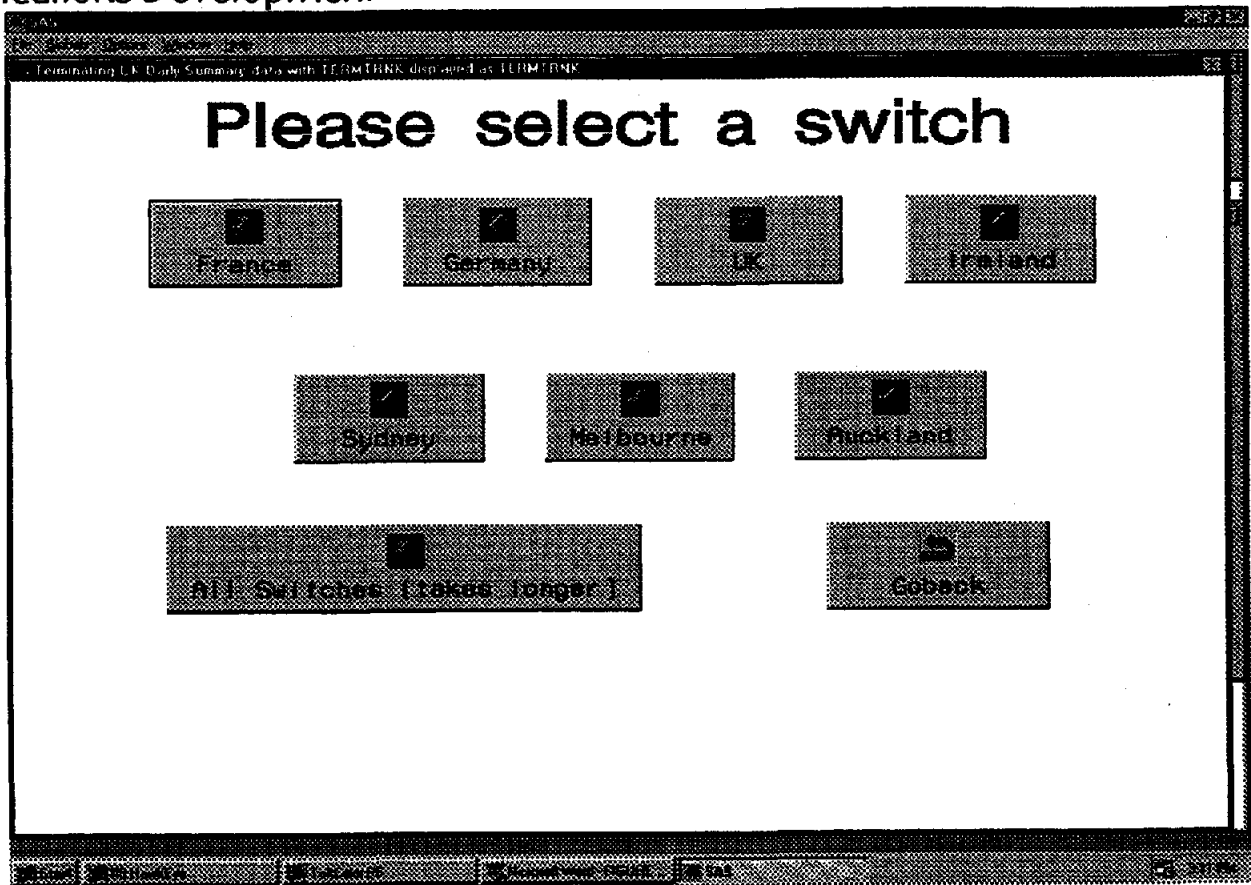


Figure 3. Switch Menu

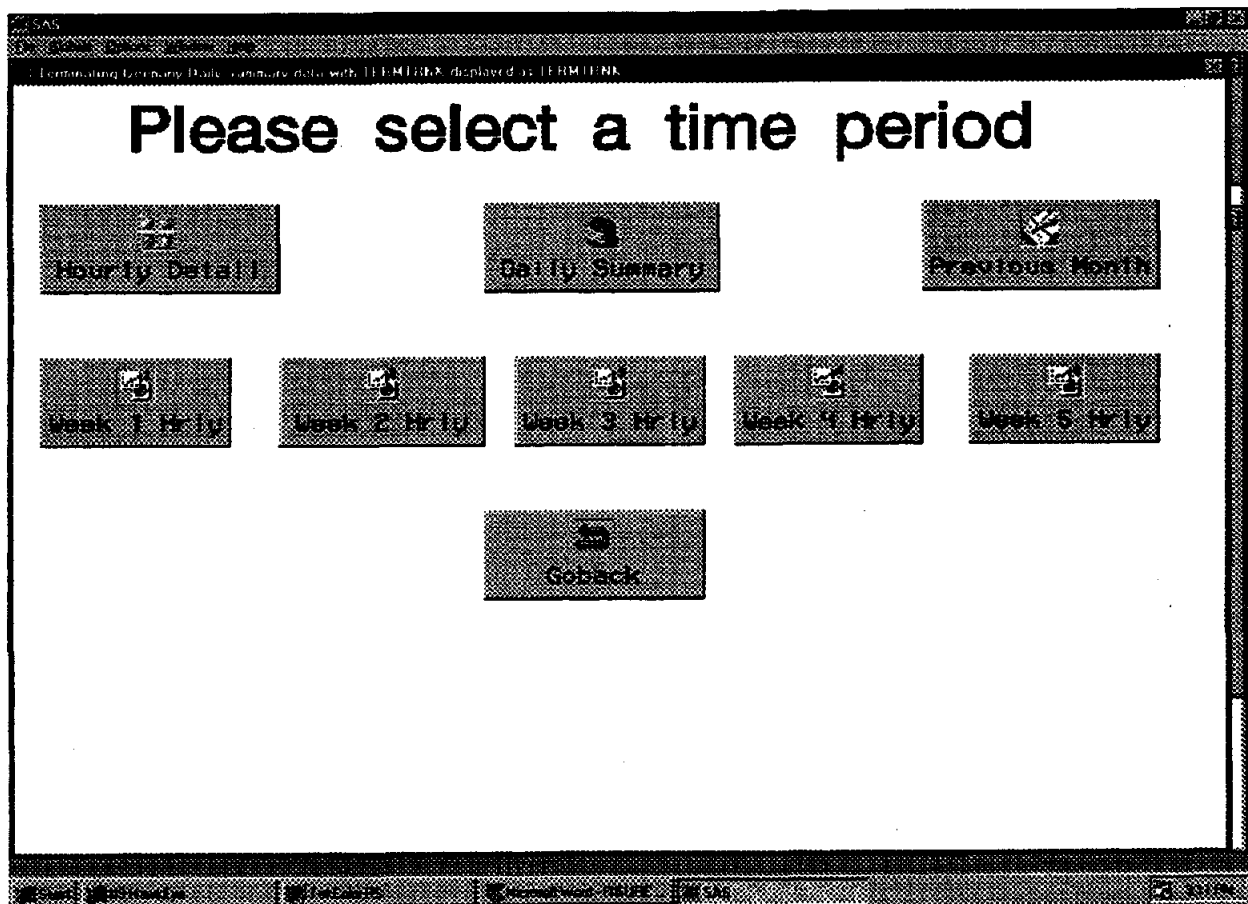


Figure 4. Time Period Menu

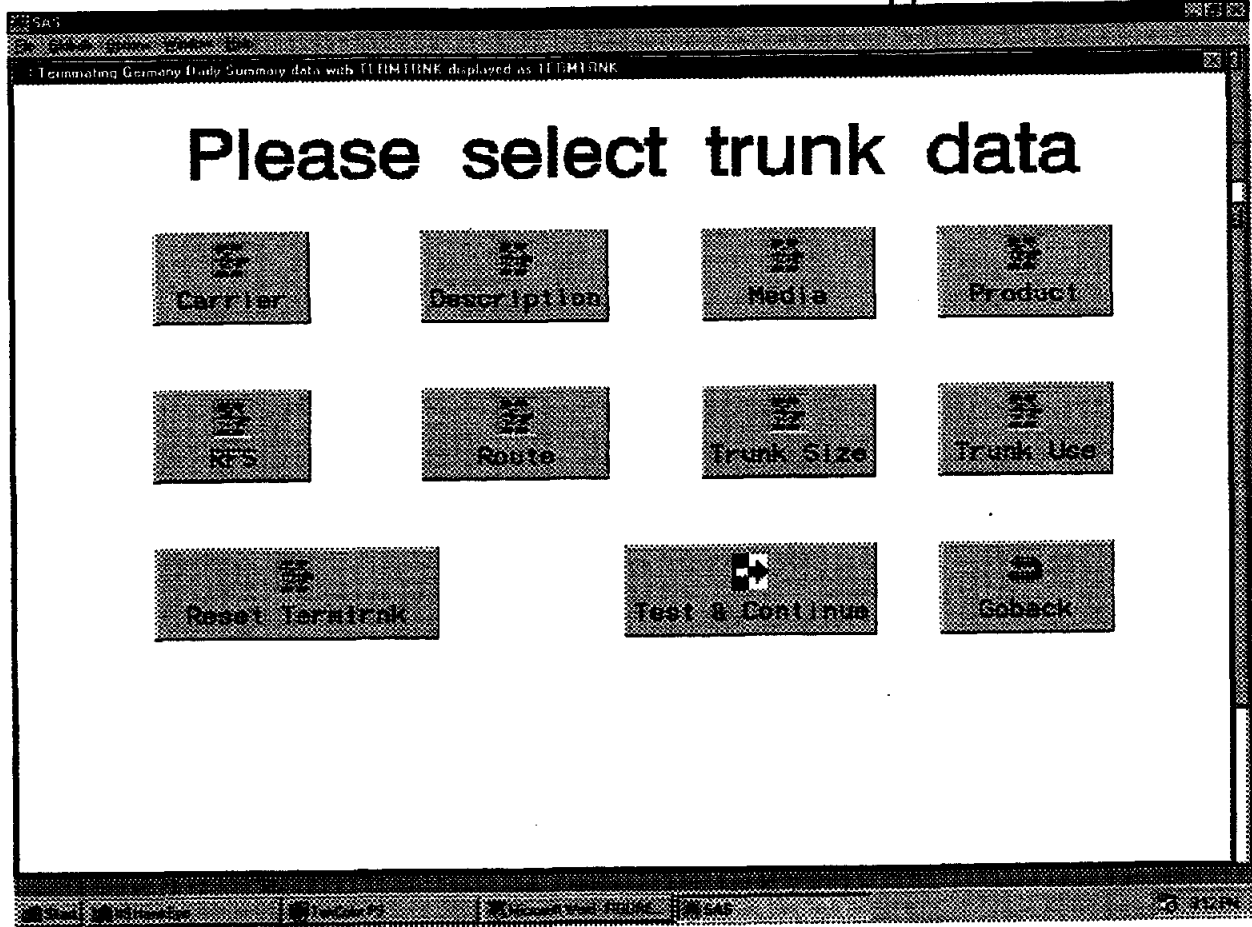


Figure 5. Trunk Formatting Menu

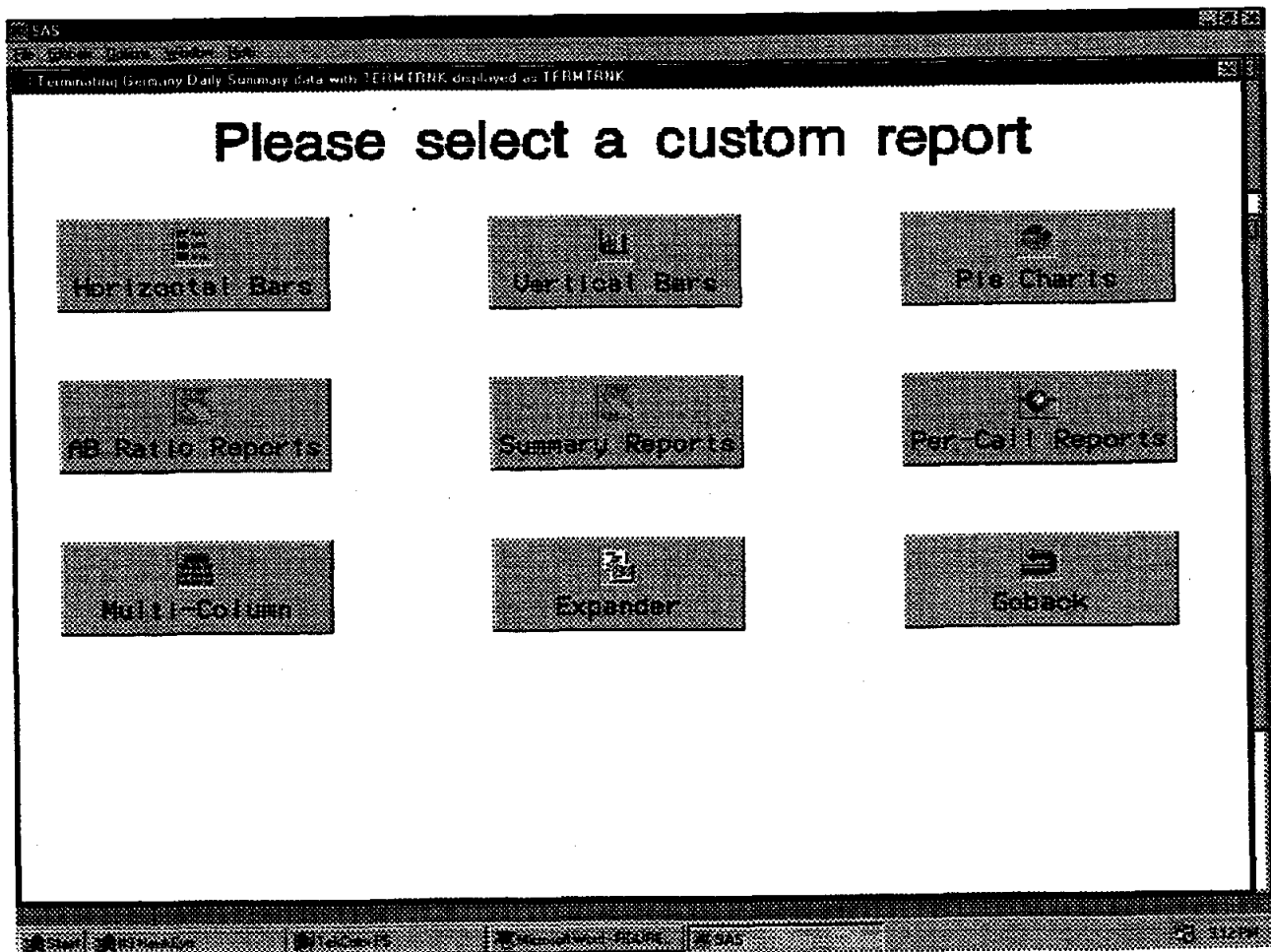


Figure 6. Custom Report Menu

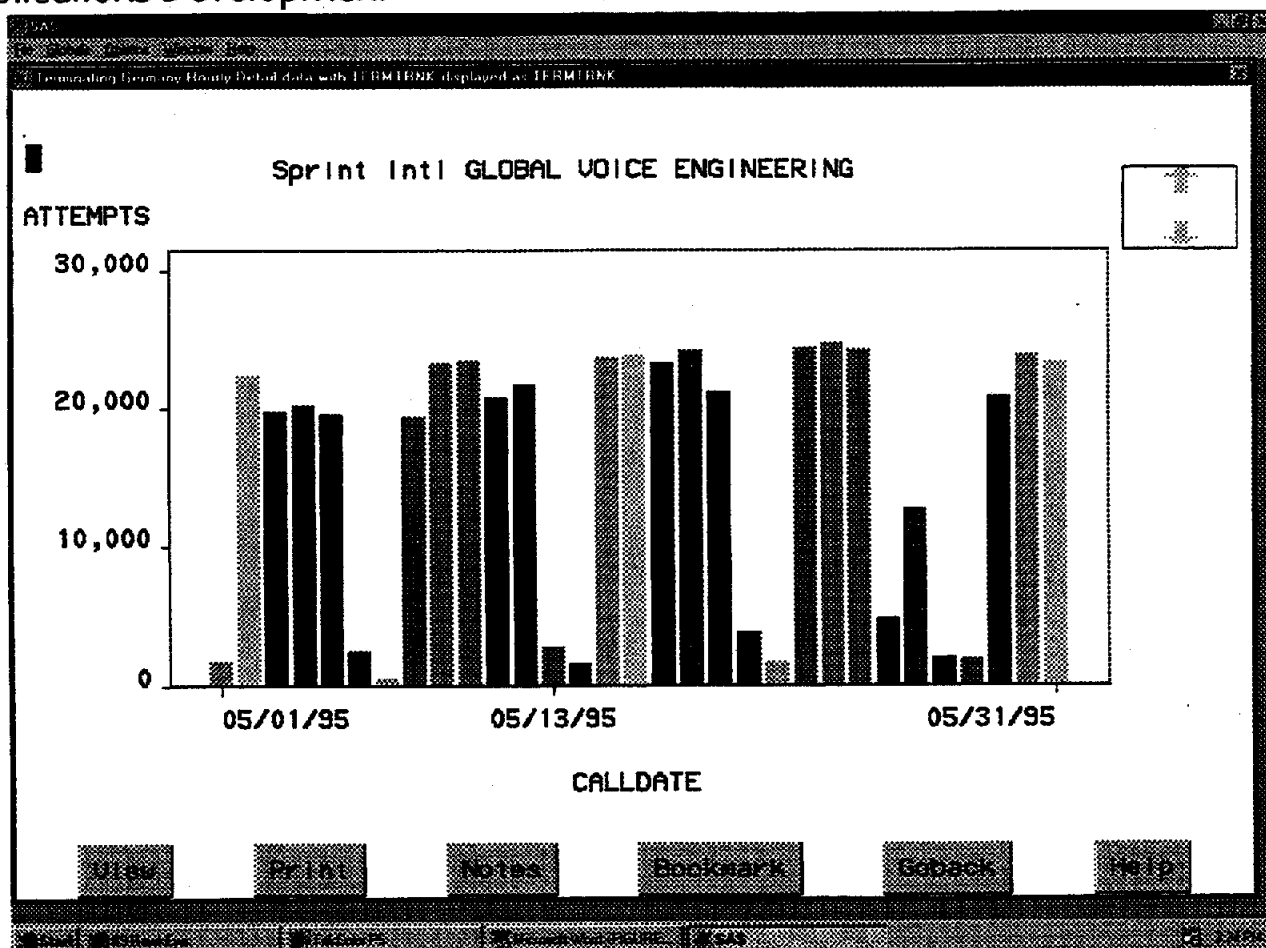


Figure 7. Sample Vertical Bar Chart, by Date

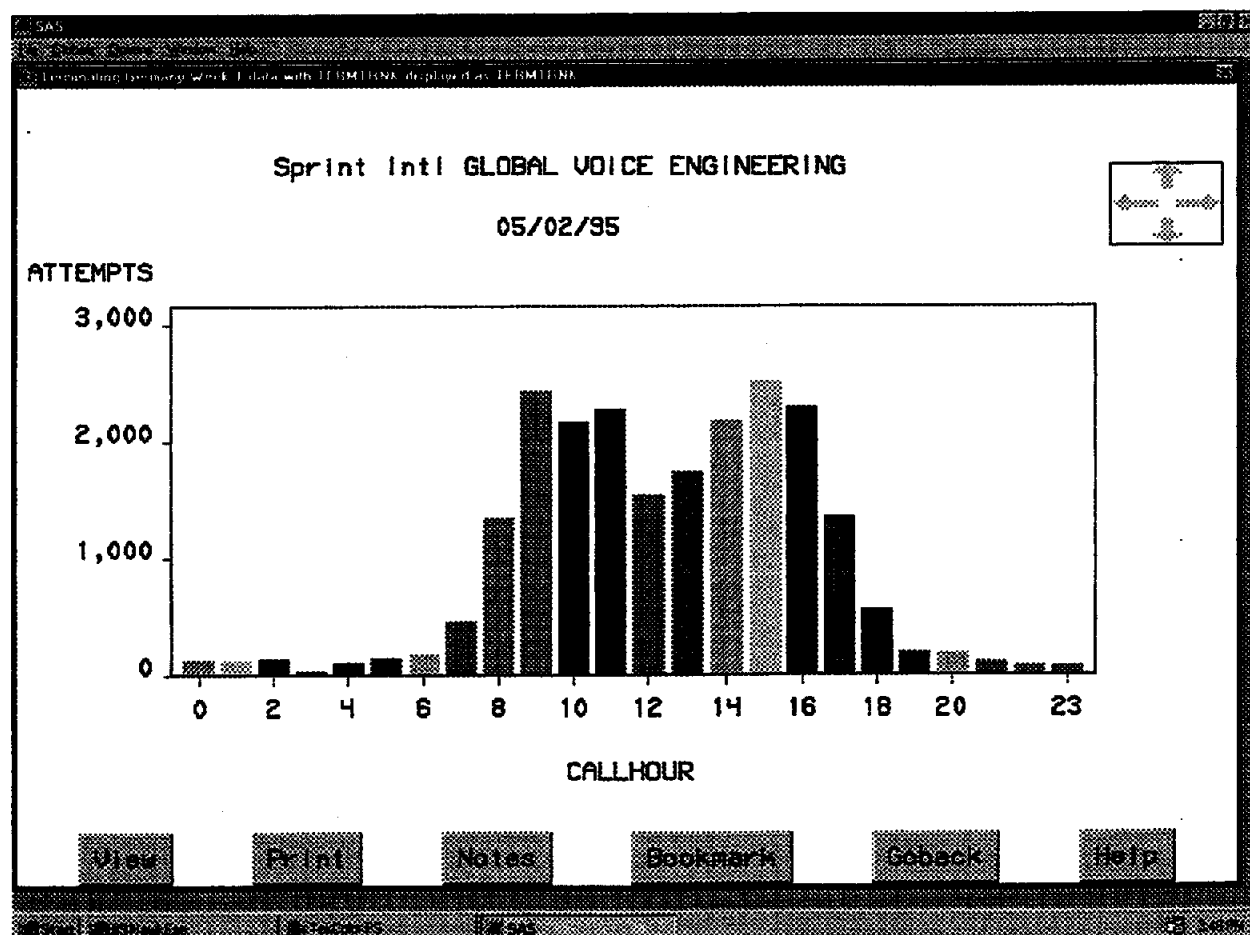


Figure 8. Sample Drill-Down on One Date, by Hour

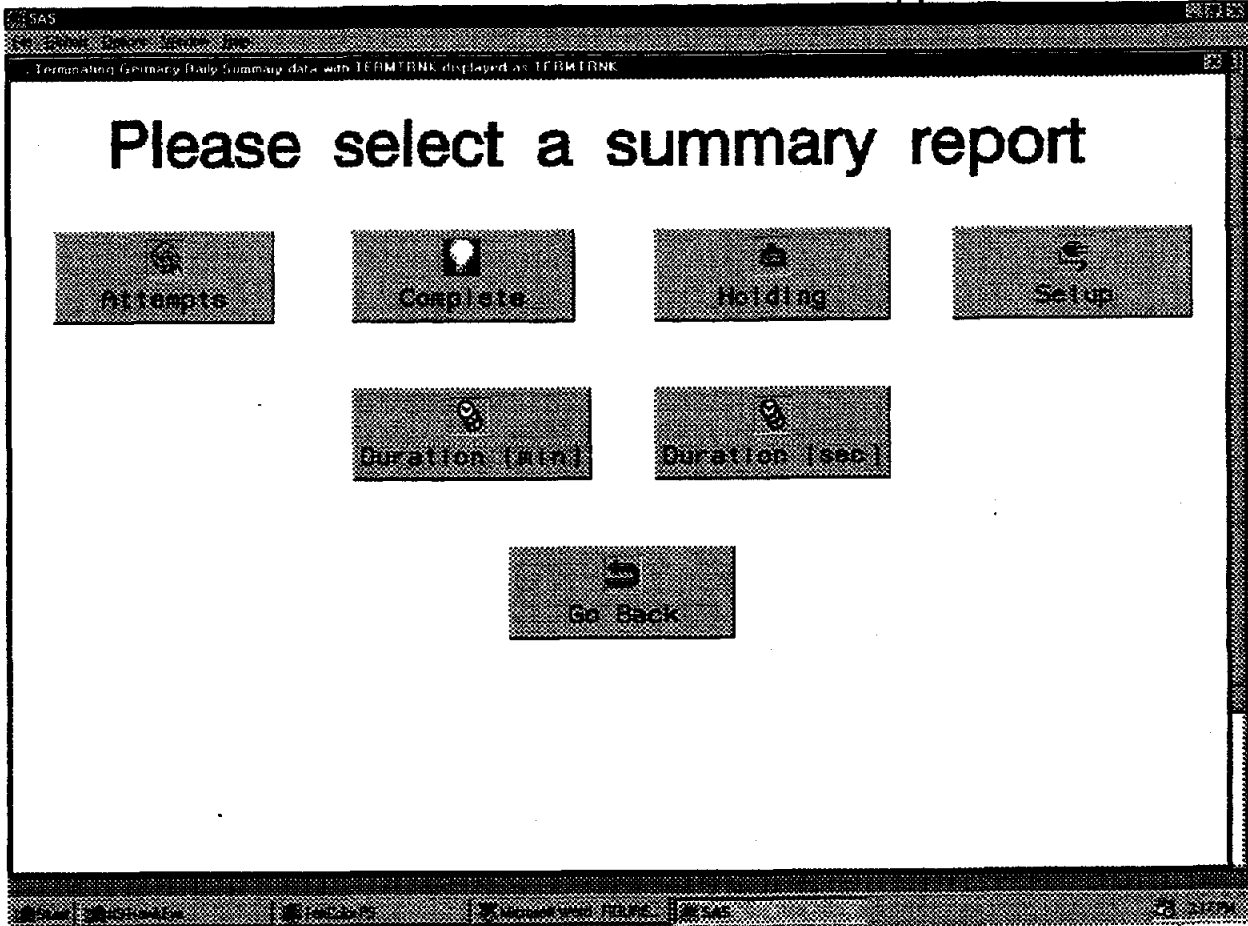


Figure 9. Summary Report Menu

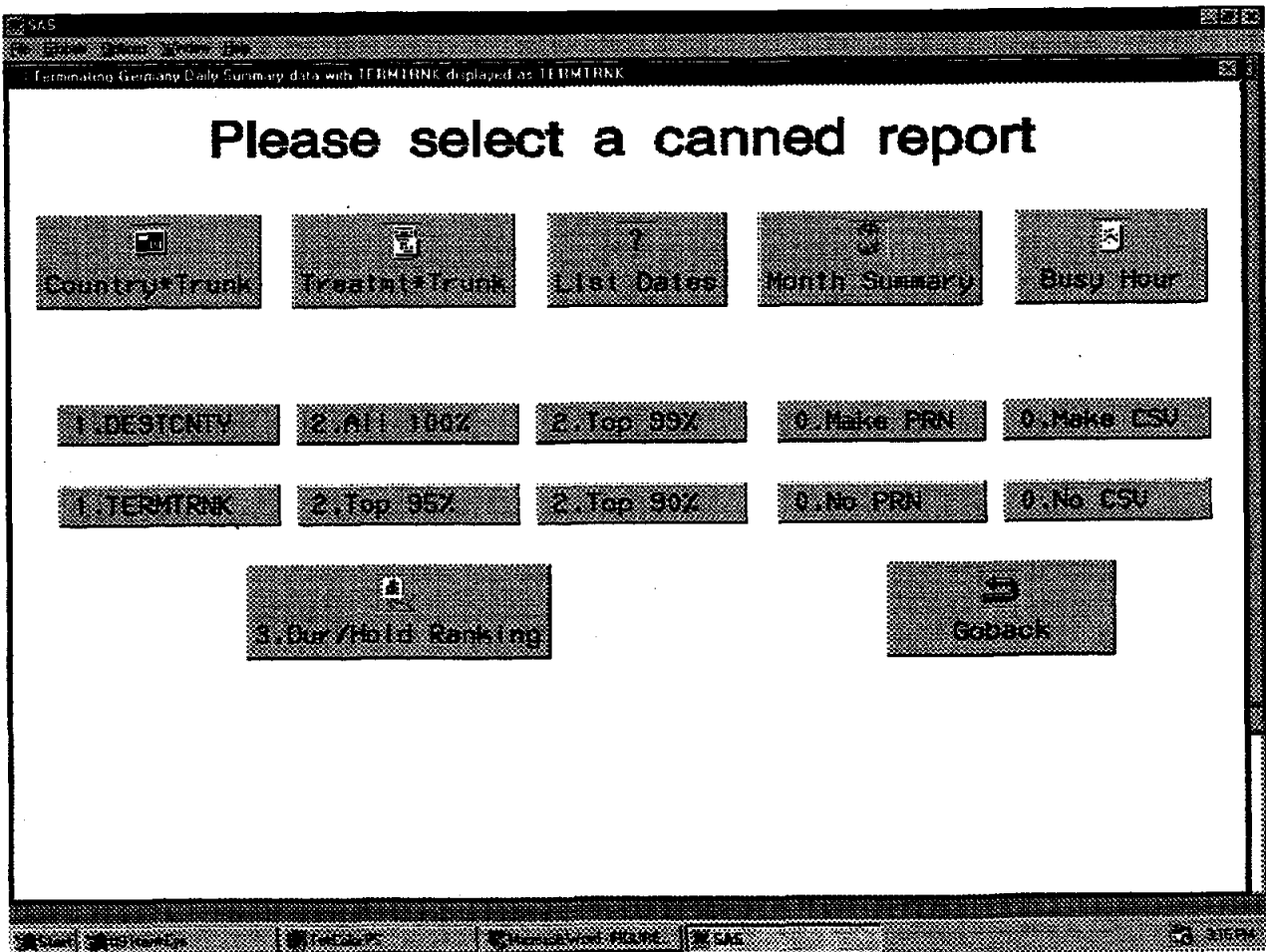


Figure 10. Canned Reports Menu