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Data Module Documentation

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Preface

       This note reviews the current levels of data module documentation
and the various procedures used, certain difficulties are discussed, and
a proposal made for a revised system.

1.   Current types of documentation

       Information relating to data modules may be found principally in
four documentation 'systems'. A discussion of each system will now follow.

1.1   Control Room Documentation

       This system[1] was introduced in 1975 when data modules were in
the process of being designed and written. Each data module programmer was
asked to fill in a set of 12 tables for each data module. The intention
was to provide a set of standardised information sheets which would be used
for hardware testing, software and hardware debugging, and as an aid to
writing applications programs. As a result of this scheme, there exists
in the Main Control Room three binders containing these information sheets,
which are ordered on an alphabetic basis.

       The current status of these forms leaves a lot to be desired.
During the building of the accelerator, strong emphasis was made on the
completion of certain forms (notably those summerising the distribution of
equipment numbers, the actions of properties, and the allocations of MPX
addresses), whilst the other forms were largely ignored. Furthermore, since
the commissioning of the SPS, the updating of these forms has been less than
systematic. Hence today, with certain exceptions, the control room document-
ation is neither up-to-date nor complete.

       To get this system of information sheets complete and up-to-date,
and to maintain it that way, will be a non-trivial commitment.

1.2   Data Module Handbook

       A system was introduced in 1977 for the introduction of blocks
of comments in source files[2,3]. These Comment Blocks could thus be retrieved
by a scan program for the automatic generation of a manual complete with
an extensive index. A manual for SPS functions was produced in this manner,
and a manual for data modules and functions has recently been released[4].

The Comment Block system allows for two different levels of information - information relevant to the user, and information relevant to the implementation of the module or its incorporation into the control system.

The objective of the above scheme was to form manuals which summarised the characteristics of each module, which was widely available, which had a good indexing system, and which could be updated from time to time without much difficulty. The limitations of this approach are that schematics cannot be embedded in the documentation, and that the documentation is terse and not suitable as tutorial information on data modules. These difficulties may be circumvented by requiring that the programmer produces suitable notes for tutorial purposes, and gives the relevant references in his Comment Block.

Experience to date with this system has shown it to be a convenient way of assembling distributed information into an integrated manual. Furthermore the addition of these comments to the actual program listing have often made the programs themselves more easy to understand. The quantity and quality of the information collected together into the manual depends, of course, on the amount of thought and time each programmer is able to give to his modules.

1.3   Group Notes and Reports

Various groups have issued papers, notes or reports which include sections on how the data modules are used to control their equipment.

1.4   On-line Display

Realising that it is easier to maintain a file rather than hand-filled or typewritten sheets, some programmers have now started supplying NODAL programs which supply Data Module information direct to a VDU. Even more, some programs get their data module information direct from Data Module tables, so that the information display is inherently up-to-date.

2.   Discussion on Control Room Documentation

The previous section has indicated that the greatest problem area is that associated with Control Room Documentation. For this reason a summary of the information content of this system is given in the attached table. The difficulties inherent with this system appear to be two-fold. First, the pen and pencil approach, though organized on a tabular basis, is not suitable for a rapidly changing environment. It is partially unsuitable when one wishes to understand the correlation between old and new. Second, there is no gain but a loss through having two objectives of the system, namely operation (e.g. programming), and maintenance. A clearer separation between these two objectives makes for a simpler situation whereby if the documentation is unsatisfactory for operating the accelerator then the Operations Group may legitimately complain, and if the documentation is unsuitable for maintenance, then that is ultimately the problem of the data module programmer or his group.

An inspection of the table shows that the other systems of documenta-
tion used at the SPS, namely group notes, SCAN comments, and on-line file
or process data displays, are each appropriate for the different classes
of the information on Control Room Documentation Forms. Namely, relatively
static information may be contained in group notes, slowly changing informa-
tion and references may go into SCAN type documentation, and more rapidly
changing information may go into files for computer display. The next
section describes this division in more detail.

3.   Suggestion for Control Room Documentation

It is suggested that data module information is divided into three
groups and handled in the following manner.

3.1   On-line and changing data

Under this heading comes data module distribution (form 1),
initialisation data (form 6) and hardware address assignments. This informa-
tion may be collected by interrogation of files and tables associated with
the control system. Furthermore programs can be written which compare old
files with new files and conveniently flag what has changed, thus portray-
ing the evolution of the change. Such a system can fit within the frame-
work of the DM Service Tree/Master File Approach which has been outlined
recently[5].

3.2   Relatively static but terse information

This includes the following information:

- User level: user software/hardware status bit assignments, surveill-
            ance program names, error codes.

- Maintenance level : data table layout, maintenance related software/
            hardware, status bit assignments, fixed data descript-
            ions, hardware module interface details.

This may be incorporated within the appropriate SCAN comment block,
and used for the generation of user and maintenance manuals, copies of which
could be in the Control Room. The maintenance manual, of which there will
not be many copies, could be updated relatively frequently. Users could
always inspect the TSS source file for the very latest information. A
function for on-line display of such information will be provided and this
may be the basis for an on-line interrogation of DM documentation. The inclu-
sion of this information in the source file will also aid the understandability
of the program.

3.3   Tutorial information

Descriptions of the use of data properties, where complex are pro-
bably best handled by an off-line note, with diagrams where necessary. The
user level comment block may contain a reference to such notes. These text
portions of such notes could be established by a report generator such as
RUNOFF or similar, making subsequent changes straightforward.

4. Conclusion

The current types of documentation have been summarised, and it has been shown that the Control Room Documentation System employed at present could be replaced by a simpler system which is easier to maintain. The introduction of on-line documentation has already laid a firm base for the revised system, and the arrival of a standardised data module support tree, with on-line display of data module information, will generalise what is already existing for specific modules.

References

1. L. Burnod, M. Tyrrell, Data Module (DM) Information Forms, Lab II-CO/CC/Int.Note/LB/MT/75-21.

2. S.J. Mellor, SCAN, SPS/AOP/Int.Note/77-4.

3. G. Jennings, M. Tyrrell, Documentation of Functions and Data Modules, SPS/AOP/Int.Note/77-3.

4. G. Jennings, SPS Nodal Functions and Data Modules, SPS/ACC/GJJ/79-12, May 1979.

5. T. Stokka, On-line Data Module Support (in preparation).

6. G. Jennings, Function Maintenance Manual, SPS/ACC/GJJ/79-15, May 1979.

7. G. Jennings, Data Module Maintenance Manual, SPS/ACC/GJJ/79-14, May 1979.

Distribution

Data Module List

Table

Classification and Contents	Primary Objective	DM Form No.	General Status	Rate of Change	Comments
DM Distribution Distribution of DM across SPS system building, computer mnemonic, DM sizes DT constant, NODAL genetic name and subnames, unit No. range, and equipment numbers.	User	1	most DM's have this form completed, but dated.	high	Building name, DM and DT sizes and DT constant not needed. <u>Suggestion</u> Distribution information may be retrieved by an on-line program. If this takes too much time, it could be done once and this file stored.
Properties Description of the action of properties on the equipment Property mnemonic, protection code, R/W, and units	User User	2	most DM's have this completed	low	Tabular arrangement too restrictive for describing action. Schematics and examples needed to communicate understanding of equipment. Summarised in DM User Manual.
Data Table Contents of data table, DT width implicitly implied. Properties used to access respective columns	Maintenance	4	often not filled in	low	May be part pf %%% scan documentation in source file.
Fixed Data Table Contains information which is set or read, and used in execution of properties, but <u>not</u> unit related. Contains value, properties used to access this entry, value returned to NODAL and entry description.	Maintenance	5	rarely completed	low	Purpose of this table has never been clear to many DM programmers. This information may be part of %%% scan documentation in future.

Details of Data Table Constants associated with Individual Equipments. Used to indicate values of those properties which, though unit related, are constant. Contains equipment No., name, DM name, each unit No., property names and values.	User	6	very rarely completed		Could be displayed on-line from file used for initialisation.
Data Table Status Information Contains assignment description of bits in software status word, some of which are standard. Fields left for associated hardware module, selective or digital, and bits scanned by FASP.	Mainten-ance/User	7	rarely filled in never completed	low	Highly suitable for inclusion into SCAN type documentation, at the appropriate level. (User or maintenance).
Status Information not in the Data Table Contains assignment description of bits in hardware status word. Fields left for associated hardware module, selective or digital and bits scanned by FASP.	Maintenace	8	rarely filled in	user	Highly suitable for inclusion into SCAN type documentation, at the appropriate level. (User or maintenace).
Hardware Address used by the DM Contains eq. numbers, Eq. name, generic NODAL name, N values and MPX addresses.	Maintenance	9	usually filled in, but some missing. Many forms are now dated.	high	One of the critical forms. Often referred to if an addressing error is suspected. Takes time and effort to maintain clearly. Does not easily show past history of address assignments. An ideal candidate for on-line display with data from DT address colums and or files.

Hardware Modules controlled by the DM Fields for MPX type/CAMAC type and No. or fraction of module used by one equipment.	Maintenance	10	rarely filled in	low	Table does not convey much information. Ideal for inclusion within %%% comment block.
Hardware Module Details Fields for command, command number, function, sub address, and associated properties.	Maintenance	11	rarely filled in	low	Of debatable value, especially if listing is available. May be incorporated into %%% block in cases where applicable.
DM Error Code List Contains Error Code numbers and associated descriptions.	User	12	usually completed	low	Now incorporated into DM User Manual.
Missing Information 1. References 2. Names of Test/Diagnostic Programs 3. Names of Surveillance Programs.					May be included into SCAN information at user level.