Mr. Sten Bergman studied electronics at the Royal Institute of Technology in Stockholm and graduated in 1964. Since then he has been working at Sveriges Radio (SR), mostly in the electroacoustics field. He is responsible for the implementation of the dynamic RDS functions described in this article.

S. Bergman

The computerized handling of programme-related RDS information

Sveriges Radio has developed a computer system for the processing of programme-related RDS information. The aim has been to produce a flexible, automatic system with low operating costs which can be adapted to a variety of production methods. The hardware is based on standard personal computer products and it offers a cost-effective solution to the implementation of dynamic RDS functions.

1. Introduction

As long ago as 1980, discussions were held within Sveriges Radio (SR) about the possibility of offering programme-related information within the Radio Data System (RDS). The view was expressed, at that time, that additional personnel would be needed to keep the information up-dated, since someone would have to generate the RDS data for each programme item manually, at a terminal in the originating studio.

It was clear that with such a concept it would be difficult to implement programme-related RDS information, owing to the high operating cost. The only solution would be to find a method of gathering the information automatically.

On further examination of the matter, it was discovered that the programme planning department was at that time compiling the schedules manually, by a "cut and paste" method. A study was nonetheless just beginning with a view to using a word-processor, and it was realised that this could solve many of the RDS problems because such a system would contain almost all the necessary information.

In 1983 a test system was built for the purpose of verifying the ideas and gaining operational experience. This was of invaluable help when the new system was being specified.

2. Hardware and communications

The RDS computer can be any standard PC-AT compatible machine, installed in the broadcaster's distribution centre. It can be connected directly to sub-units in studios and other operational areas in the production centre, or to units at outside-broadcast venues via a modem. The sub-units may be computer work-stations, PCs or specialized RDS terminals such as the one shown in *Fig. 1.*

The system has been made flexible to facilitate the use of different communications protocols. At the present time, the ESbus protocol [1] is used on the national radio network and a Novell LAN (local-area network) is used for the regional radio service.

Original language: English.
Manuscript received 29th November 1990.

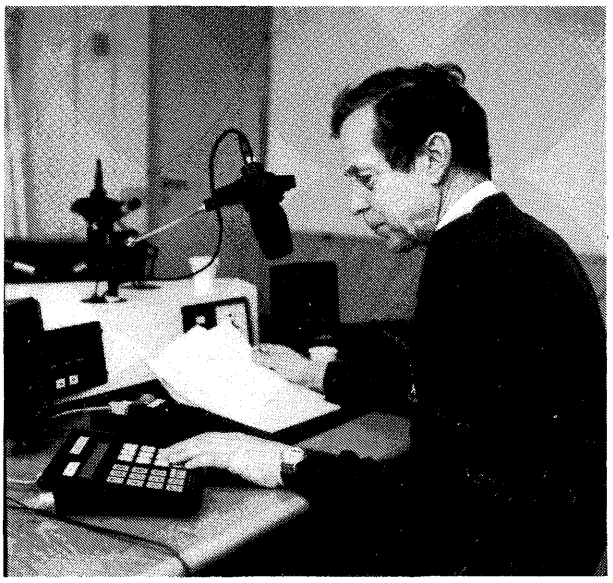

Fig. 1
An RDS terminal in a studio. The "execute" button can be seen to the right of the terminal.

Communication with the RDS coders at the transmitting stations uses a modified HDLC (high-level data-link control) protocol which can be adapted to suit the input protocols of different types of RDS coder. The data structure follows closely the RDS specification [2]. *Fig. 2* is a block diagram of the distribution system.

3. Software

The system is based on the principle that the RDS computer should be looked upon as a "letter box". Each programme item is represented as a "letter" consisting of the Programme Item Number (PIN), Programme Type (PTY), Music/Speech switch (MS), Decoder Identification (DI) and Radio Text (RT). This "letter" is transmitted on demand from the continuity control room or the production studio.

The software includes also a number of set-up parameters (see *Section 3.2.* below) which are handled from the system control terminal.

The software is written in the C language and is run under MS-DOS. The RDS computer can process schedules for up to five different networks, and is already prepared for the possible future introduction of new RDS services such as the In-House (IH) and Transparent Data Channel (TDC) applications.

3.1. Principle of operation

The system has two main modes of operation. In the first (see *Fig. 3*), there is a separate communications line for each link in the system, joining the programme schedule computer, the controller terminal and the terminals which control the RDS information sent to the transmitters. In the second mode the connections are made via a LAN, and all functions of the system can be processed from any of the computers in the network (*Fig. 4*).

The two modes were developed to suit the different operational methods of the national and regional radio services. They both operate within the standard software installed in the RDS computer.

The national radio uses mode 1 (*Fig. 3*), and the programme planning department produces the programme schedules for the three networks using a word-processor (WordPerfect). These schedules are stored in a Microvax II computer in the same department. From these schedules a special variant is "filtered out" which contains the information needed for the generation of RDS information.

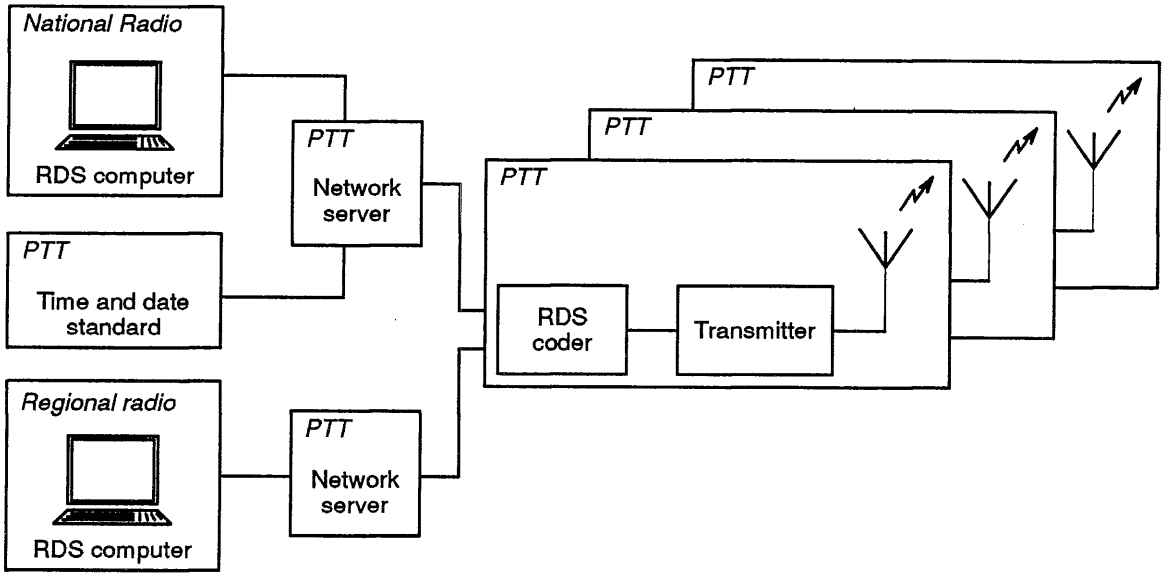

Fig. 2
RDS data distribution network in Sweden.

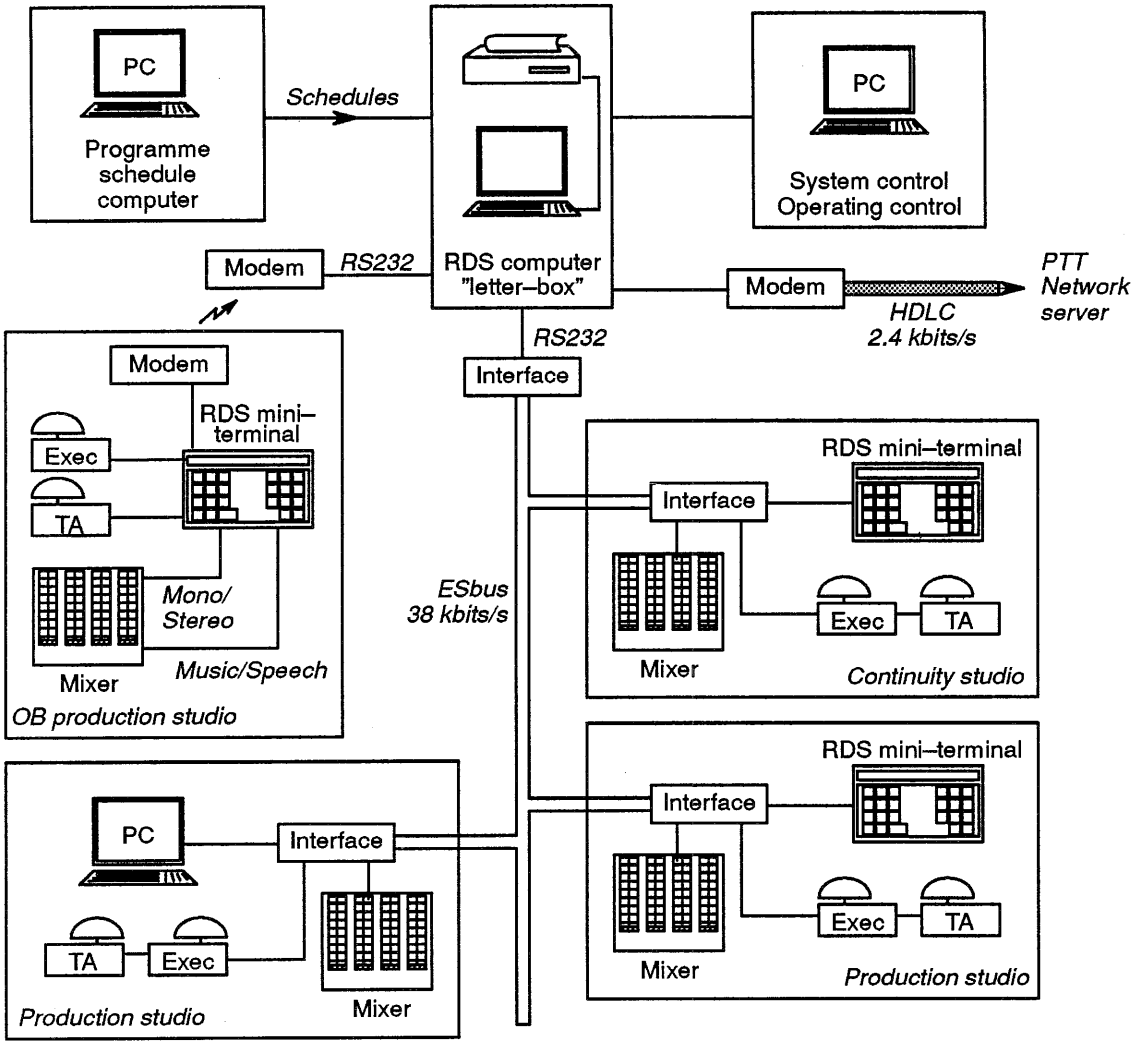

Fig 3.
"Mode 1" RDS system used on the national radio service, with separate inputs for different functions.

PIN is the nominal starting date and time for each programme, and this is easily extracted from the published schedule.

RT is the programme title, also taken from the schedule.

PTY is generated from production numbers combined with recognizable patterns (letter combinations) in the programme title. The rules for this process are held in a control data file.

MS and DI information can also be derived from the schedule (note: the only options available at present for DI are mono/stereo).

The programme schedules for the next day are fed automatically into the RDS computer at a pre-defined time of day, where they are held in an area of RAM (with battery back-up), until the RDS data are required for transmission in response to orders from the studio. The RDS computer therefore contains schedules for the current and next day.

In mode 2, which is used by the regional radio service (*Fig. 4*), it is possible either to load prepared schedules into the RDS computer directly, or to write and edit the schedules on-line from any of the PCs connected to the LAN.

3.2. System control

The system control software serves to define and set up the basic parameters of the system. These include functions such as the activation of the addresses for terminals and other peripherals, the definition of the addresses for transmitters or groups of transmitters, and the definition of events to be logged and printed (error lists, for example).

Access to the system control software is governed by passwords.

3.3. Operational control

The operating control software is the basic element used by the programme controller in the day-to-day use of the system. It is possible to make late changes in the programme schedules, to set

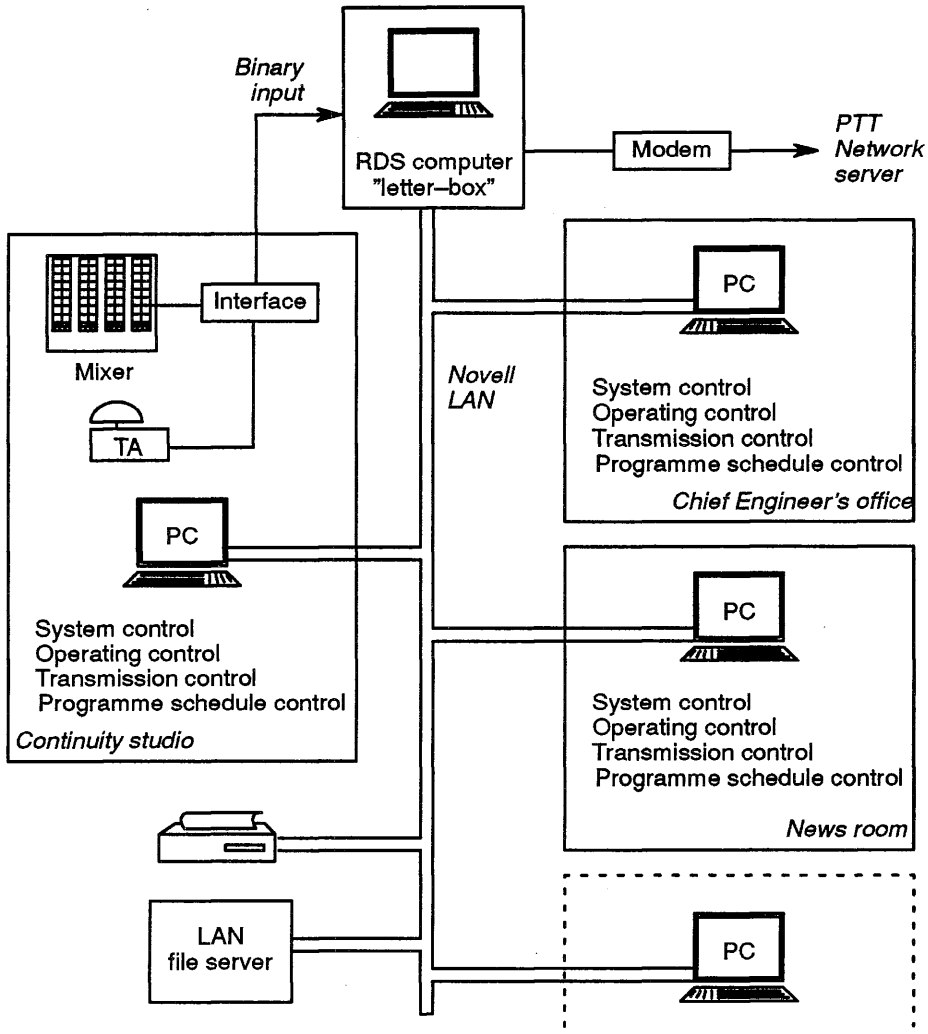

Fig. 4
"Mode 2" RDS system using a local-area network for a regional service.

different Programme Service names (PS) for up to eight different time-slots during each day of the week, set conditions for the dispatch of the next item ("letter") in the schedule (see below), to set the time for the automatic loading of the next day's programme schedule, etc.

4. Dynamic control

The most important function of the entire system is the correct dispatch of the RDS data corresponding to the next item in the programme schedule: PIN, PTY, MS, DI and RT. This function is adaptable to various operating conditions and can be activated in a variety of ways.

a) In *time-controlled* mode, the RDS data are transmitted automatically, as soon as the PIN corresponds to the actual time.

b) In *manual* transmission mode the continuity announcer or any other person who knows when the programme goes "on-air" pushes an "execute" button to initiate the transmission of the RDS data (*Fig. 1*).

c) In *semi-automatic* mode the data are sent when an electrical contact is closed within a pre-defined time window around the nominal start time. Using this method it is possible to use the end switch of a fader (for example, the announcer's microphone fader). This method also eliminates the risk of sending more than one set of RDS data for any new programme.

The Music/Speech switch can be controlled in a similar way during live broadcasts, by using the end switches on faders carrying spoken material from the announcer, news room, etc.

The DI information is at present controlled from the programme schedule and, for example, all news bulletins are broadcast with the switch set to "mono". In future it is envisaged that the DI switch will be controlled automatically by an assessment of the stereo content of the programme signal.

Radio Text (RT) usually carries the programme title, although it can also be written and edited from

the production studio and carry information related to the current programme such as music titles, names of participants, or telephone numbers.

A general-purpose hardware system has been developed to interface these functions to the various studio consoles.

In the mode 2 configuration used by the regional radio service, all the dynamic functions can also be controlled from the keyboard of any of the terminals on the network.

5. Traffic Announcements

The Traffic Announcement flag (TA) is set by the closure of an electrical contact, in the same way as for other functions described above. The flag can be activated automatically by a cue tone on the tape cartridge carrying the musical traffic jingle, or manually, using a push-button operated by the traffic news announcer. A flashing light minimises the risk of the TA flag being left on permanently.

An RDS terminal in the traffic studio permits the preselection of the transmitters which are required to set the TA flag during the next announcement. In this way, only those receivers which are in the area concerned by the message will be activated. Listeners in other areas, who may have turned down the volume or are listening to a tape cassette, will not be disturbed by irrelevant traffic information.

The spoken message is of course distributed over the whole network, so anyone who is listening to the programme service in question will hear it. This feature is especially important when the Enhanced Other Networks (EON) feature is introduced, since the receiver will only switch over to the traffic channel when messages concerning the area in which the listener is driving.

6. Alarm messages

The RDS alarm code (PTY code 31) can be initiated in a similar way to the TA flag. The alarm can be set to operate at any transmitter, or group of transmitters, from the continuity studio in Stockholm, or from any regional station within its coverage area. To prevent abuse of the alarm, a security code has to be used.

In the near future, the alarm code will be used to connect all programme channels in parallel, at each transmitter site addressed by the alarm code, to the basic channel which carries the spoken alarm message. In this way, all listeners in the region will be alerted independently of their choice of programme service. This is an important feature, until EON is implemented on all receivers.

7. Conclusions

The system described here is in service on the Swedish national radio and on several regional services. Unfortunately, there are not yet any receivers on the market which can process all the dynamic RDS functions which are implemented.

Sweden is among the leaders in the implementation of dynamic RDS data, alongside the United Kingdom, and is keen to encourage the receiver manufacturers to develop home receivers which exploit this information.

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