The MPEG-2 Monitoring Systems R&S®DVM100/DVM120 [*] have been joined by a new member of the R&S®DVM family – the Digital Video Measurement System R&S®DVM400 (FIG 1). This highly compact portable MPEG-2 test platform offers a wide variety of test, analysis and monitoring functions for digital TV. Adaptable to customer requirements

The R&S®DVM400 is a compact, portable MPEG-2 test platform that offers a wealth of test, analysis and monitoring functions for digital TV. You require neither a laptop nor an external monitor to operate the system since it comes equipped with an integrated, high-resolution colour display. Due to its modular design and versatile options, it can be customized to meet your needs.

The measurement system includes a powerful computer platform with all common interfaces and three slots for optional boards. A broadband recorder and generator board can be installed in the first slot. A fast analyzer board as used in other systems of the R&S®DVM family is available for the second slot. It can be used to optionally monitor up to four transport streams simultaneously. The third slot has been designed for future add-ons. Since both optional boards function independently of each other, the R&S®DVM 400 can be configured either as a pure recorder and generator or as a pure analyzer. If both boards are installed, special features are available. For example, a recorded signal can be sent directly within the system to the analyzer board for later analysis. Or, if a signal is monitored, the analyzer board can directly trigger the recorder and generator board to perform event-driven recording.

The R&S®DVM400 measurement system is the right instrument for numerous applications. Its large scope of functions make it an effective tool in the research and development of DTV components.

FIG 1 The Digital Video Measurement System R&S®DVM400 provides a wealth of test, analysis and monitoring functions for digital TV.
Due to its compact size, it is also ideal for mobile use, for example for troubleshooting in DTV networks. Since the R&S®DVM400 includes all the functions of the R&S®DVM100, it can also be used for monitoring transport streams (TS). It can be expanded by the MPEG-2 Monitoring System R&S®DVM120 to monitor more than four TS.

Robust and modular

For operation purposes, the R&S®DVM400 is equipped with a high-resolution colour display, keys and a rotary knob as well as a fast computer with a large hard disk for the system software. In addition to the conventional USB and Ethernet PC interfaces, alarm outputs for signalling are available. An input for an external 10 MHz reference clock is available for measurements that require precise time referencing. The base unit has two parallel interfaces (input and output) for transport stream data. They are complemented by switchable ASI/SMPTE-310M transport stream interfaces on the optional boards.

Once the analyzer base option or the recorder and generator base options has been installed, the MPEG-2 functions become available. Other board options ideally adapt the measurement system to user-specific tasks (FIG 2).

Comprehensive monitoring functions

The system monitors more than 120 parameters of each transport stream and records them in the event of an error. The following monitored parameters are worth particular mention:
- Data rates of individual element types of the transport stream (video, audio, data, PAT, PMT, etc)
- Conditional access status
- MIP parameters (used for single frequency networks)
- Transport stream modifications (addition or omission of elements and more)

FIG 2 By adding two optional boards and complementary options, the R&S®DVM400 can be expanded to handle customer-specific tasks.
It is particularly helpful to monitor transport stream modifications if these modifications are correctly signalled but are not intended. This may be the case, for example, if a program fails completely, including PMT and the reference in the PAT.

**Detailed analysis functions**

For transport stream analysis, the R&S® DVM400 provides different interpreters for packets and tables, analysis tools for PTS and PCR as well as graphical displays of bit rates and table repetition rates. A special feature consists of the new analysis functions for data broadcast applications (FIG 3). Versatile measurements and display formats for the transmission methods are available, e.g., multiprotocol encapsulation and Data or Object Carousel. Thus, transmission of IP over DVB, SSU, MHP, teletext, VPS and many more data services can be analyzed; plus, the structures used can be visualized in an easy-to-comprehend manner.

**Recorder and generator functions**

In combination with the monitoring and analysis options, the recorder and generator functions make the R&S® DVM400 a versatile MPEG-2 test platform. Thus, the system can be used for monitoring and as a powerful recorder and generator with the following features (and numerous others that are familiar from the R&S® DVG and R&S® DVRG):

- Seamless and endless transport stream generation
- Data rates of up to 214 Mbit/s
- Hard disk space of up to 160 Gbyte

* Expected to be available as of the end of 2004.
Effective and convenient operation

Numerous sophisticated features and functions of the R&S® DVM family help users to manage complex test tasks and facilitate operation:

◆ Structured, clear and flexible configuration of the system and monitoring parameters
◆ Signalling of events/errors with the aid of specific colour symbols in the transport stream element list and other displays
◆ Graphical display with zoom function of the PCR values of a program with a duration of up to one hour
◆ Straightforward dialog for configuring the monitoring parameters
◆ Possible deactivation of the monitoring activities for individual parameters and/or TS elements

Other examples are the event navigator and the assistant, which are described in the following.

Event navigator

As a special feature, the R&S® DVM400, together with the event navigator, supports filter functions for report entries (FIG 4). It is thus possible to quickly find the following entries:

◆ Entries for a PID (e.g. all entries for PID 100 of a video)
◆ Entries of the same type (e.g. all entries for an incorrect PMT repetition period)
◆ Entries for a PID and of the same type

Moreover, all entries can be filtered according to their classification (alarm, warning and information).

Assistant

The powerful assistant makes the use of the different analysis tools highly effective and easy. When a transport stream element is selected, the assistant suggests all analyses or measurement result displays useful for this element. Especially if an error is detected, fast and detailed analysis becomes possible. The assistant is ideal for less experienced users because it enables them to easily obtain the required measurement results.

Summary

Regardless of the requirements placed on the measurement function and measurement scope of MPEG-2 transport streams, the Digital Video Measurement System R&S® DVM400 is the ideal tool. It is easy to operate and, owing to its compact design, highly suitable for mobile use. Since options can be added easily and as needed, it can be equipped to match specific tasks at the time of purchase and then expanded to handle additional customized tasks that arise in the future.

Thomas Toergte

Abbreviations

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>DTV</td>
<td>Digital television</td>
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<tr>
<td>DVB</td>
<td>Digital video broadcasting</td>
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<tr>
<td>IP</td>
<td>Internet protocol</td>
</tr>
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<td>MHP</td>
<td>Multimedia home platform</td>
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<td>MIP</td>
<td>Megframe initialization packet</td>
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<tr>
<td>MPEG</td>
<td>Moving Pictures Experts Group</td>
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<tr>
<td>PAT</td>
<td>Program association table</td>
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<tr>
<td>PCR</td>
<td>Program clock reference</td>
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<tr>
<td>PID</td>
<td>Packet identifier</td>
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<tr>
<td>PMT</td>
<td>Program map table</td>
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<tr>
<td>PTS</td>
<td>Presentation time stamp</td>
</tr>
<tr>
<td>SSU</td>
<td>System software update</td>
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<td>TS</td>
<td>Transport stream</td>
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<td>VPS</td>
<td>Video program system</td>
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More information and data sheet at www.rohde-schwarz.com (search term: DVM400)

REFERENCES