



DAB Multiplexer DM001

Fully compatible with STI

- Modular design
- Processed input signals, physical:
V.11/X.21, G.703, WG1/2
logical:
ETI(NI), STI(PI, G.704/2),
STI(PI, G.703), STI(PI, V.11),
DAB Audio, G.704
- Output signal ETI(NI) or ETI(NA)
- Internal buffer for asynchronous signals
- STI (service transport interface) in line with EN300797
- Processing of all defined fast information groups
- Support of all types of reconfiguration
- Versatile clock synchronization capabilities
- Alarm signalling contacts

Characteristics and uses

DAB Multiplexer DM001 is part of the Rohde&Schwarz product line for DAB transmission links. It is fully compatible with DAB standard ETS300401 and based on the multiplexer which has proven itself in the DAB pilot projects of Deutsche Telekom and Fraunhofer Institut für Integrierte Schaltungen.

The multiplexer is a central element in a DAB network. It combines the incoming audio and data channels to form the ensemble transport interface (ETI), which drives the subsequent COFDM modulators and thus the complete transmitter network.

The 19" multiplexer of three height units comprises up to three input modules with max. 12 physical inputs and a DSP board. Two output modules are used to generate the ensemble ETI and the back channel (STI-C).

The multiplexer features a flexible structure of up to 30 logical input channels for various data formats and protocols. DM001 also has a large internal buffer to store asynchronous signals, ie signals not locked to the network clock.

The fast information channel (FIC) can be generated from internal or external information. For example, fast information groups (FIG) can be fed externally which have been generated by a PC.

DM001 supports time-synchronized, dynamic reconfigurations. To this end, it is locked to a reference time and clock.

Operation

DM001 is configured by means of a PC. The user software ensemble controller (EC) runs under WindowsNT and enables sequence control, the configuration of DAB ensembles and the querying of all relevant status and error parameters.

Further functions are:

- Definition of service provider profiles
- Definition and selection of configurations as single configurations or transmission schedules
- Display of status information
- Display and storage of error events
- Input and download of service information
- Selection of output signal ETI(NI) or ETI(NA)

Input interfaces

- V.11 input signal
- WG1/2 with the same channel in each of the 16 timeslots
- ETI(NI) input signal
- G.704 input signal
- Service transport interface (STI) available as STI(PI, G.704/2), STI(PI, G.703), STI(PI, V.11)

Output interfaces

- ETI(NI) available at two outputs or ETI(NA) (in line with ETS300799)
- STI(PI, G.704/2) as back channel in STI-C

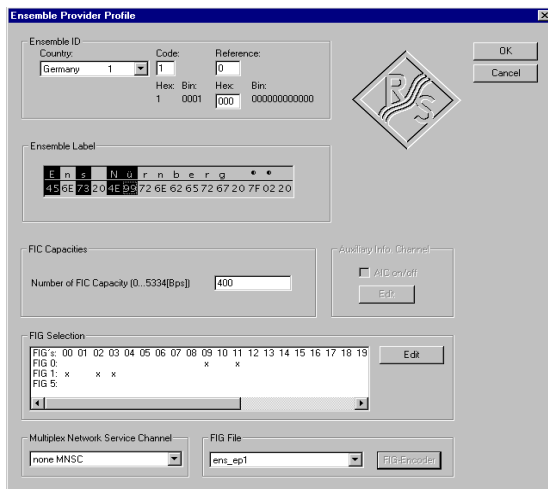
Additional interfaces

- Up to four serial RS-232 interfaces for PC control and other tasks (eg GPS time)
- Relay interface for error signalling

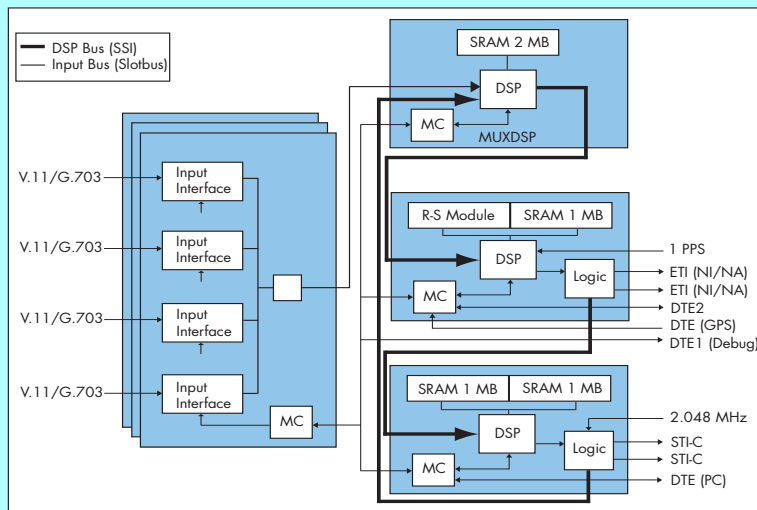
Synchronization

The multiplexer processing clock and ETI output signal can be synchronized to the following signals:

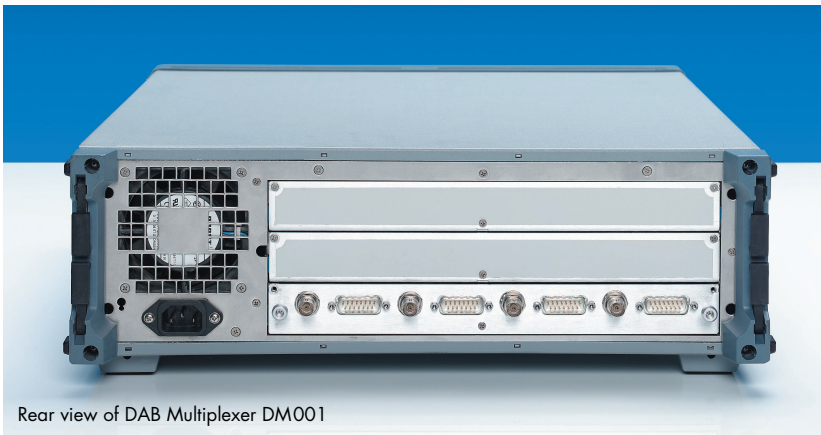
- 2.048 MHz clock, sinewave or TTL
- Internal crystal oscillator (drift ≤ 50 ppm)
- Synchronization of output signal to 1 pps pulse of a GPS receiver



Input mask for ensemble configuration of DAB Multiplexer DM001



Block diagram of DAB Multiplexer DM001



Rear view of DAB Multiplexer DM001

Implementation

The implementation of the contribution network is based on the principle that a service provider should be autonomous in the flexible utilization of the capacity assigned and should not be disturbed by any other service provider. This is ensured by defining general conditions for the ensemble in the multiplexer configuration in a service provider profile (SPP). These conditions include for instance capacity limits, the maximum number of service components and services as well as predefined numerical ranges for assignment of identification codes (eg subchannel ID), which must be

unambiguous in an ensemble. The SPP is entered with the aid of the multiplexer control software EC under WindowsNT. The SPPs of several service providers are integrated into an ensemble configuration which is loaded into the multiplexer.

In DM001, a FIG (fast information group) database is generated for each service provider for the service information applied via STI in the form of FIG files. From this database, the fast information channel is generated. All audio-relevant definitions such as data rate, protection level, service label, etc are made upon configuration of the source encoders. The definition or

modification of the DAB configuration (ie subchannel and service organization) are made in the control file manager of the service provider, with the MCI (multiplex configuration information) being generated. In addition, time-controlled activation via a defined scheduling table is possible.

Overview of STI

The service transport interface (STI) is the interface between service provider (SP) and ensemble provider (EP). In the unidirectional data part subchannel data are transmitted via this protocol from SP to EP. The bidirectional STI-C forms the communication path which is used for exchanging status information and dynamic reconfigurations between SP and EP. The STI-C is also used for transmission of FIG files as well as for harmonization of SP and EP, eg regarding time and profile. This allows synchronized actions within an ensemble. Seamless dynamic reconfigurations thus become possible, eg changing the data rate of audio programs without program interruption, and can be decentrally initiated by the SP. Moreover, the service information (SI) for a given configuration, which is transmitted on the fast information channel (FIC), can be dynamically applied via STI-D.

Service providers operating without STI

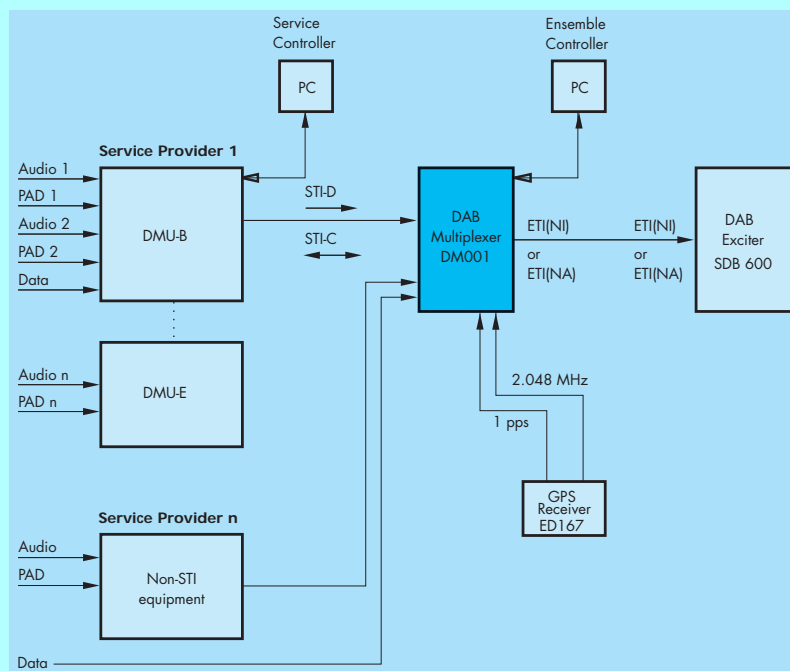
DAB Multiplexer DM001 ensures continuing operation with existing source encoders which do not supply STI signals or with encoders from the DMU family without STI option. For non-STI service providers, therefore, an SPP is entered under EC, plus the subchannel and service organization (multiplex configuration information or MCI) as before. The service informa-

tion for the services thus defined can be generated with the aid of the FIG encoder (comes with EC).

Features of STI implementation

- Interface between service provider and ensemble provider, for STI(PI, G.704/2), STI(PI, G.703) and STI(PI, V.111) signals with combined or separate feeding of STI-D and STI-C
- Start of seamless dynamic reconfiguration via STI-C
- Input of all audio-relevant parameters, MCI parameters and generation of FIGs at the service provider
- Generation of fast information groups for service provider and ensemble with the aid of the FIG encoder
- Input of service provider profiles and generation of ensemble configurations with the aid of control software EC under WindowsNT
- Processing of FIG files within an STI signal (in a FIG database) for dynamic feed of service information
- DM001 output signals ETI(NI, G.703) and ETI(NA, G.704) in line with ETS300799
- Back channel for STI-C in line with STI(PI, G.704/2)
- Continued support of previously used (non-STI) feed formats for audio and data channels as well as simulation of service provider function in EC

Typical system application of DAB Multiplexer DM001



Specifications

Signal inputs

G.703 (inputs 1 to 12)	G.703/G.704, 2.048 Mbit/s, BNC, 75 Ω
V.11 (inputs 1 to 12)	symmetrical clock, data, sync pulse, RS-422, 15-contact sub-D male, 110 Ω
1 PPS	time reference pulse, eg for GPS (1 pps), triggered on positive edge, TTL, BNC, 75 Ω
2.048 MHz	sinewave 2.048 MHz, <5 V (V _{pp}), BNC, 50 Ω

Signal outputs

(G.703 signals 2.048 Mbit/s, BNC, 75 Ω)	
ETI	G.703-OUT 1/2 ETI(NI), ETI(NA)
STI	G.703-OUT 1/2 STI(PI, G.704/2)

Serial interfaces

(asynchronous with/without handshake, 9600/19200 baud, 9-contact sub-D male, RS-232)

PC	DM 001-EC coupling
Time	GPS time
DTE1	PC debugger, no handshake
DTE2	STI-C back channel (optional)

Parallel interfaces

Alarm	1.5-contact sub-D female, 5 relay contacts, 3 switching inputs, TTL
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General data

Nominal temperature range	+5 °C to +45 °C
Operating temperature range	0 °C to +50 °C
Storage temperature range	-40 °C to +85 °C
Humidity	meets DIN-IEC 68-2-30, class II
Mechanical resistance	
Random	10 Hz to 300 Hz; 0.003 g ² /Hz
Shock	max. 40 g, 45 Hz to 2000 Hz
EMC	meets EN 50081-1, EN 50082-1, EN 61000-3-2
Power supply	85 V to 132 V / 180 V to 265 V (AC), 47 Hz to 63 Hz
Power consumption	70 VA to 140 VA, depending on configuration
Dimensions (W x H x D)	427 mm x 132 mm x 460 mm (19" desktop model of 3 height units)
Weight	10 kg to 15 kg, depending on configuration

Ordering information

DAB Multiplexer

Basic unit with 4 inputs and ETI(NI/NA), STI-C	DM001	2058.5408.41
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Options

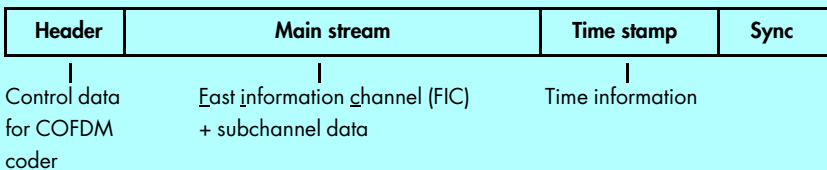
Input Module (4 input ports)	DM001-I	2073.7608.02
Retrofit Kit	DM001-U	3532.2002.02



Multiplex signal

The output of DM001 is the ensemble transport interface (ETI) with a data rate of 2.048 Mbit/s. This interface is organized in 2 layers: ETI(NI) and ETI(NA).

ETI(NI) frame structure



ETI(NI)

The network-independent layer ETI(NI) has a 24 ms frame structure. It is used for transmission via satellite or microwave links.

ETI(NA)

The network-adapted layer ETI(NA) is used for transmission via telecommunication networks. It has a frame structure in line with G.704 and features Reed-Solomon coding. To enable dynamic delay compensation, additional time information is inserted into the frame structure. To this end, a time reference signal (eg GPS) is applied to the multiplexer.

Interface	Electrical specifications	Brief description
ETI(NI)	G.703	Serial data stream with a data rate of 2.048 Mbit/s, cascadable
ETI(NA)	G.704	G.704 frame structure, Reed-Solomon coding and time synchronization

Fax Reply (DAB Multiplexer DM001)

- Please send me an offer
- I would like a demo
- Please call me
- I would like to receive your free-of-charge CD-ROM catalogs

Others: _____

Name: _____

Company/Department: _____

Position: _____

Address: _____

Country: _____

Telephone: _____

Fax: _____

E-mail: _____



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