

DIGITAL TV TRANSMITTERS

DVB-T, DVB-H

Air cooled

100 mW to 2000 Watt



Transmitter

Re-transmitter

Transposer

REF : DTC - DTV ARX/2005/D4495 UK



Sagem Communication
Groupe SAFRAN

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1 TV TRANSMITTER

For more than 30 years now, **SAGEM** expertise has been behind the implementation of analog and digital TV transmitters all around the world. These transmitters take benefits of **SAGEM** experience in the design, manufacturing and installation of analog TV transmitters. **SAGEM** full range of possibilities covers all the frequency bands designed as VHF-I, VHF-III and UHF bands and most of the different TV standards as L, B, G, K, I, M,...., in a variety of power and redundancy configurations :

AC 31 product line: From 2 to 200 Watt. 4 U to 8 U, 19" racks for low power transmitters and transposers . 1+ 0 or 1+ 1 configuration available.

AC 22 product line: From 100 Watt to 2 kW . 42 U , 19" cabinets, for medium power transmitters and transposers. Dual drive and native power amplifiers redundancy or 1+1 configuration available.

AC 32 product line: From 500 Watt to 2,5 kW.. LDMOS technology. Dual drive and native power amplifiers redundancy or 1+1 configuration available.

Based on its involvement in DVB-T deployment in Europe, SAGEM introduced his new **DIGITAL TV TRANSMITTER line** for UHF Band.

2 THE DIGITAL TV TRANSMITTER LINE

SAGEM digital TV transmitters range according to the **DVB-T** is designed to meet the needs of a continuously evolving broadcasting market and guarantees quality and reliability in small and medium power transmissions.



DTX 600 D : 600 W dual drive (Re-) Transmitter

2.1 SEVERAL OUTPUT POWERS AND REDUNDANCY CONFIGURATIONS :

SAGEM DIGITAL TV TRANSMITTERS line covers a wide range of output power; configurations using Single Drive, Dual Drive (DD) and Passive Reserve (1+1 PR) architectures; and transmitter, re-transmitter and transposer equipment.

Transmitter is fully compliant with DVB-T standard and allows to convert an ASI signal to RF signal.

Re-Transmitter is used to regenerate and amplified RF signal. It allows to simplify the associated transmission network and to reduce cost. Thanks to digital regeneration (demodulation and re-modulation), the output signal is without additional noises.

Transposer or gap-filler re-broadcasts the signal at the same frequency in case of SFN mode or at a different frequency in case of MFN mode.

<i>Transmitter</i>	DTH 2000	DTH 1500	DTH 1000	DTH 600	DTH 300
<i>Re-transmitter</i>	DRH 2000	DRH 1500	DRH 1000	DRH 600	DRH 300
Output power	2000 W	1500 W	1000 W	550 W	280 W
Configuration	Single drive, Dual drive, Passive reserve				
Amplifier unit (*)	8xUD250	6xUD250	4xUD250	2xUD250	1xUD250
Cooling system	Air cooling system				

<i>Transmitter</i>	DTX 1200	DTX 600	DTX 300
<i>Re-transmitter</i>	DRX 1200	DRX 600	DRX 300
Output power	1200 W	600 W	300 W
Configuration	Single drive, Dual drive, Passive reserve		
Amplifier unit (*)	12xUD100	6xUD100	3xUD100
Cooling system	Air cooling system		

<i>Transmitter</i>	DTC 120	DTC 60	DTC 30	DTC 15	
<i>Re-transmitter</i>	DRC 120	DRC 60	DRC 30	DRC 15	
Output power	120 W	60 W	30 W	15 W	
Configuration	Single drive or Passive reserve, other on request				
Cooling system	Air cooling system				

<i>Transposer / Gapfiller</i>	DPC 120	DPC 60	DPC 30	DPC 15	DPC 0.1
Output power	120 W	60 W	30 W	15 W	0.1 W
Configuration	Single drive or passive reserve				

- DTH/DRH range is based on a common 300 W amplifier module (UD 250) and provides output power from 2 kW to 300 W
- DTX/DRX range is based on a common 100 W amplifier module (UD100N) and provides output power from 1 kW to 300 W
- For each model, output power is adjustable over a 0 to 3 dB range to suit the specific broadcasting requirement of each site.
- RF multiplexing and channel output filters are not considered in the product definition.

2.2 DESCRIPTION

Each transmitter includes all electronic circuitry from the MPEG2-TS input, to RF output.

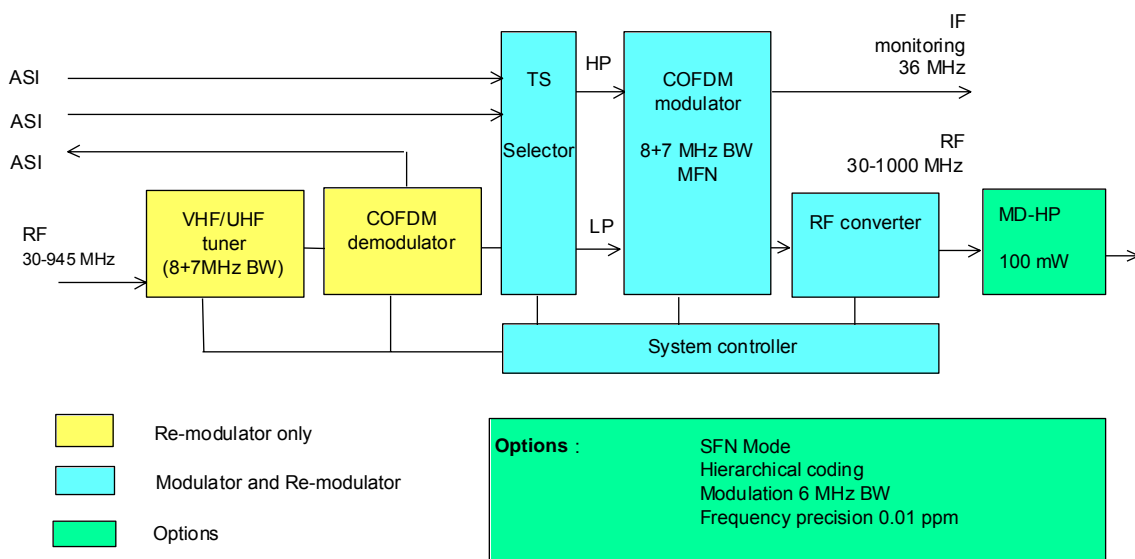
2.1.1 MODULATOR OR RE-MODULATOR:

The (Re-) Modulator includes all base-band and RF signal processing:

- MPEG2-TS-ASI interface Inputs
- Channel Coding and modulation according to ETSI EN 300 744
- Digital base-band linear and non linear pre-corrector,
- Low noise synthesizer with internal 10 MHz OCXO reference
- IF to RF up-conversion
- Upgradable to DVB-H
- Supports hierarchical re-modulation (Option)
- Adaptive precorrector (Option)
- Web browser and SNMP remote control (Option)

And in case of a re-modulator :

- Down converter and demodulator
- Highly sensitive and selective tuner
- Prepared for local re-multiplexing
- Monitoring of received signal quality (MER&BER)



Block diagram of a (re-) modulator

The Modulator is fully compliant to the DVBT standards and can support SFN (Single Frequency Network) mode, using an external reference clock (10 MHz & 1pps external source or optional external GPS receiver).

“Hierarchical mode”, and “Cell-ID insertion” are options available on request.

2.1.2 POWER AMPLIFIERS :

- **DTH/DRH range : 300 W to 2 kW**

The RF power amplification is achieved with several coupled UHF power amplifiers, based on a common 300W LDMOS amplifier : UD 250..

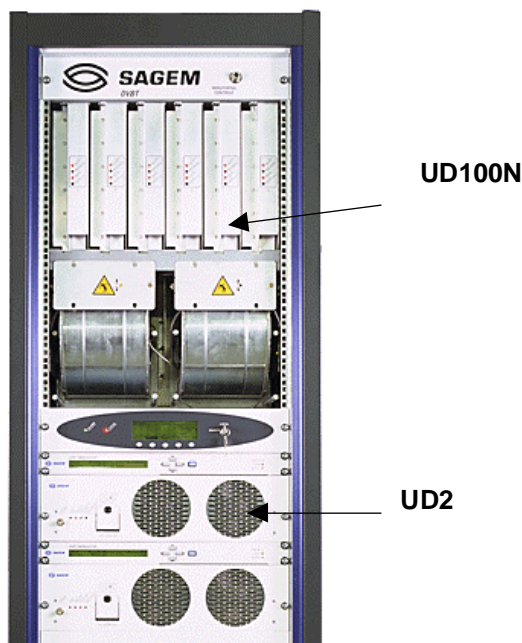
Each amplifier is fitted in a 3U horizontal rack having its self-internal fan. The amplifier is protected against overdrive, over-temperature and excessive VSWR.

- **DTX/DRX range: 300 W to 1.2 kW**

The RF power amplification is achieved with several coupled UHF power amplifiers, based on LDMOS technology.

The same amplifier module is used in all configurations to minimize the number of spare parts (UD 100 N from 1Kwatt to 300 Watt,). Amplifiers are vertically mounted in a 7u rack.

A preamplifier (UD 2) is used to drive the power amplifier and is connected at the output of DVB-T modulator as final stage of the Exciter.



LDMOS power amplifier

Thanks to internal thermal detectors, UD100 N are protected against excessive heat.

High isolation “GYSEL” type couplers are used to combine amplifiers.

- **DTC/DRC/DPC range : up to 120 W**

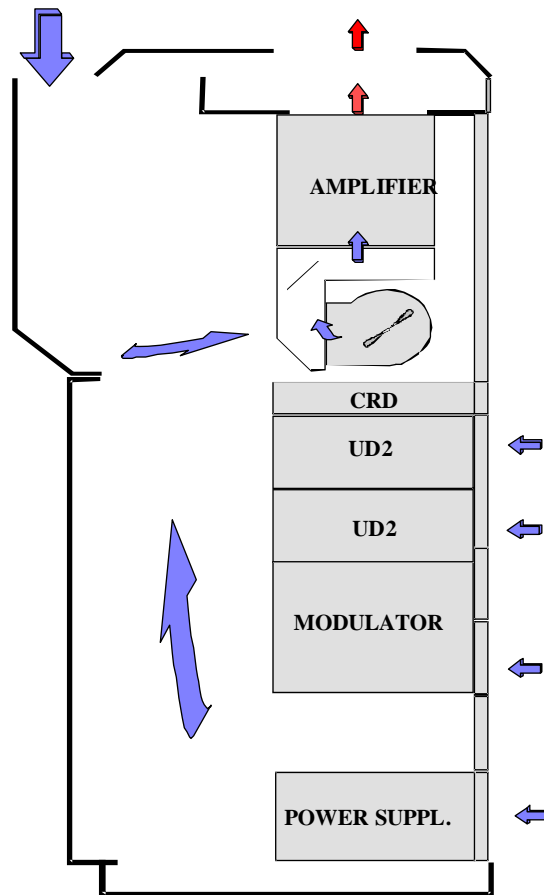
The RF power amplification consists of a 3U module:., UD 100, UD 50, UD35, UD 20.

Each amplifier is fitted in a 3U horizontal rack having its self-internal fan and power supply. The amplifier is protected against overdrive, over-temperature and excessive VSWR.

2.1.3 AIR COOLING SYSTEM

Forced air cooling is used to cool the power amplifiers.

DTX/DRX range : Two powerful air blowers are located under the amplifiers. They blow together in a common air box, the output of which is blowing on the amplifiers. So, in case of failure of one blower, the second one is efficient enough to cool all the amplifiers without broadcasting interruption.



The output of hot air is at the top of the cabinet. Each blower activity is monitored by a detector.

No cleaning of the blowers is necessary in normal conditions. Warranted life-time of a blower is 50.000 hours.

In case of total failure, each power amplifier has a temperature detector to protect itself against excessive temperature.

Fans are part of the power supply rack for cooling power supply modules. These fans are easy removable for preventive maintenance operation, without moving power supply rack.

DTH/DRH and DTC/DRC range : Modulators, Re-modulator, and Amplifier modules (UD25, UD100 ,UD 50, UD 35 , UD20) have their own fans for cooling.

	Configuration	Nb of rack (19"/42U)	Air cooling
DTXDRX 250 P	1+1	1	500 m3 / Hour
DTX/DRX 500 D	Double Drive	1	1000 m3 / Hour
DTX/DRX 1000 D	Double Drive	2	2000 m3 / Hour

	Configuration	Nb of rack (19"/42U)	Air cooling
DTH/DRH 250 P	1+1	1	500 m3 / Hour
DTH/DRH 500 D	Double Drive	1	1000 m3 / Hour
DTH/DRH 500 P	1+1	1	1000 m3 / Hour
DTH/DRH 800 D	Double Drive	1	2000 m3 / Hour
DTH/DRH 1250 D	Double Drive	1	3000 m3 / Hour
DTH/DRH 1700 D	Double Drive	2	4000 m3 / Hour

2.1.4 POWER SUPPLY

In case of medium power transmitter, AC/DC converters delivering 32 VDC are independent from the RF power amplifiers to reduce weight of each module and to assume the safety of technicians.

Each module delivers an useful power of 700 Watt. Each module is dedicated to one Power amplifier or one Preamplifier. Each power supply rack can house up to 8 modules. The power supply is protected against over voltage. Each power supply module owns a switch ON/OFF button, an operation LED, two fuses (P+N) and a pull-to handle.

Exciters (Modulators + Preamplifiers) , Control Rack (CRD) and blowers are directly powered from mains (Single Phase). UPS mains is preferred for Modulators and CRD for quick recovery in case of Mains shut down.

2.1.5 COUPLERS:

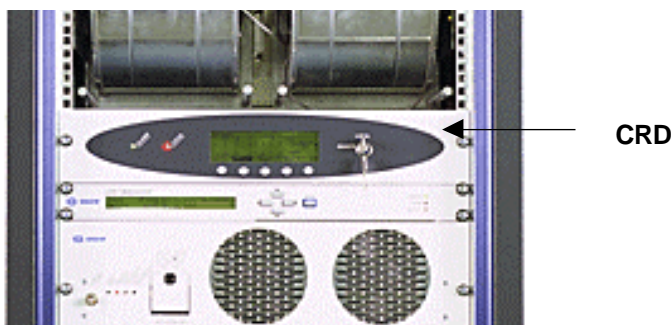
A three ports coupler is installed in the cabinet at the output of the transmitter. Two coupled signals are sent to the CRD for control of output power and antenna ROS. The third one is available on front panel for maintenance operation.

For each DD or 1+1 PR transmitter system a two ports coupler at the output of the transmitter in serial with antenna feeder can be proposed on request for control and monitoring. One of these two coupled access is usually connected to a demodulator..

2.1.6 USER FRIENDLY

The design of these transmitters insures outstanding service availability and easy operating and maintenance. A 19" cabinet house is proposed all the equipment. RF output probes and detectors are available for control and maintenance operation.

A Controller Rack for Digital Transmitters (CRD) with a microprocessor based controller, a keyboard and a LCD panel is used for management of equipment. This rack is connected to all main active sub assemblies as exciter(s), power amplifiers, power supplies and to output RF probes. This unit assumes the local and remote management of the transmitter and the control of the switching for dual-drive or 1+1 configuration.



As an option, CRD provides SNMP interface for network monitoring system (NMS).

2.2 RELIABILITY

A high degree of integration, a low power consumption (efficiency better than 10%), combined with an excellent blower efficiency, guarantee the exceptional reliability of SAGEM transmitters

2.3 REDUNDANCY

Redundancy configurations can be offered, like dual-drive and 1+1 passive reserve.

These configurations allow easy operation of transmitters and insure broadcasting reliability without major maintenance constrains.



DTX 600 P : 2 transmitters

2.3.1 DUAL DRIVE

With the dual drive configuration, the RF power amplification is achieved with several coupled amplifiers allowing lower losses on transmission performances in case of failure of one of the element. Each transmitter includes:

- Two DVBT modulators
- Two preamplifiers (medium power (re-) transmitter only)
- Switching system for DD configuration
- Several input and output coupled amplifiers
- High redundancy level
- A Controller Rack (CRD)
- Output probes and detectors
- Two air blowers, for cooling
- A 19" cabinet which houses all the equipment (medium power (re-)transmitter only)

2.3.2 1+1 PASSIVE RESERVE:

Two separate transmitters are working in a 1+1 passive reserve configuration. A common management control rack is used.

Switching control

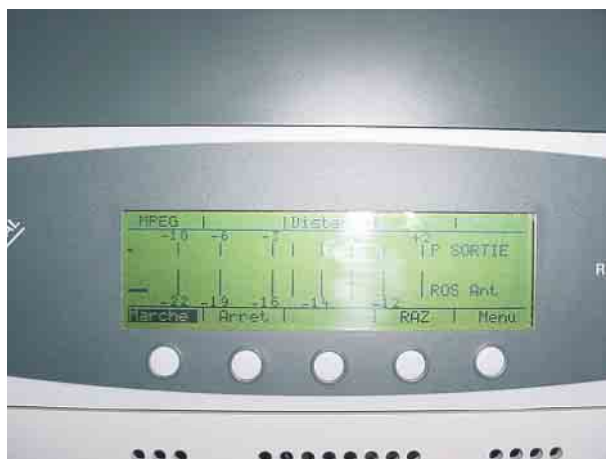
The control rack (CRD) receives status from Exciter(s), amplifiers, AC/DC converters and output power detector (forward and reverse power). In case of failure, it automatically switches to the standby drive (double drive configuration) or standby transmitter (1+1 passive reserve configuration).

Manual switching is also possible locally from the front panel of the CRD, or remotely.

The front panel of the control rack indicates all the status of the transmitter(s) and of the switching.

3 MANAGEMENT

3.1 CONTROL RACK FOR DIGITAL TV TRANSMITTER



CRD

The MANAGEMENT control rack (CRD) is able to interface with a local and distant operator for all management information. This unit is a 19" , 2 u height rack.

The CRD has to be directly connected to single phase AC. Protected mains is preferred in case of redundancy configuration.

User access is composed of : 8 lines - 40 characters LCD, a keyboard (5 buttons), a Local/Remote key, 2 LED's (Alarm, Local).

In local mode, the CRD can display all management information and receive operator's commands.

Most of monitoring information about transmitters are available with the CRD:

- Exciter alarm status,
- RF output,
- ROS level,
- DC current in power transistors,...

The CRD delivers remote indications (TS) and remote control (TC) access on rear panel (dry relay).

A secure loop is available to shutdown automatically the transmitter when activated . This command is mainly used, linked to the output switching system for technician's safety purpose.

A reset button of the CRD is available on rear panel.

3.2 REMOTE INDICATIONS AND COMMANDS

The control rack provides all parallel interface with dry contact relays (Physical interface : parallel, dry contacts with a common point in accordance with CEI 864-1 standard).

List of management information :

Remote indications (TS):

- Output power to antenna failure
- Elementary amplifier default
- Exciter failure
- Excessive RF output VSWR
- Amplifier temperature alarm
- AC/DC converter failure
- Blower failure
- Mains failure
- Input signal default
- Transmitter on /off
- Transmitter A or B to antenna
- Local control / distance control
-

Remote control (TC)

- Transmitter on/off
- Transmitter A or B to antenna
- Exciter failure
- Alarm reset
- Automatic switching
-

3.3 SNMP MANAGEMENT

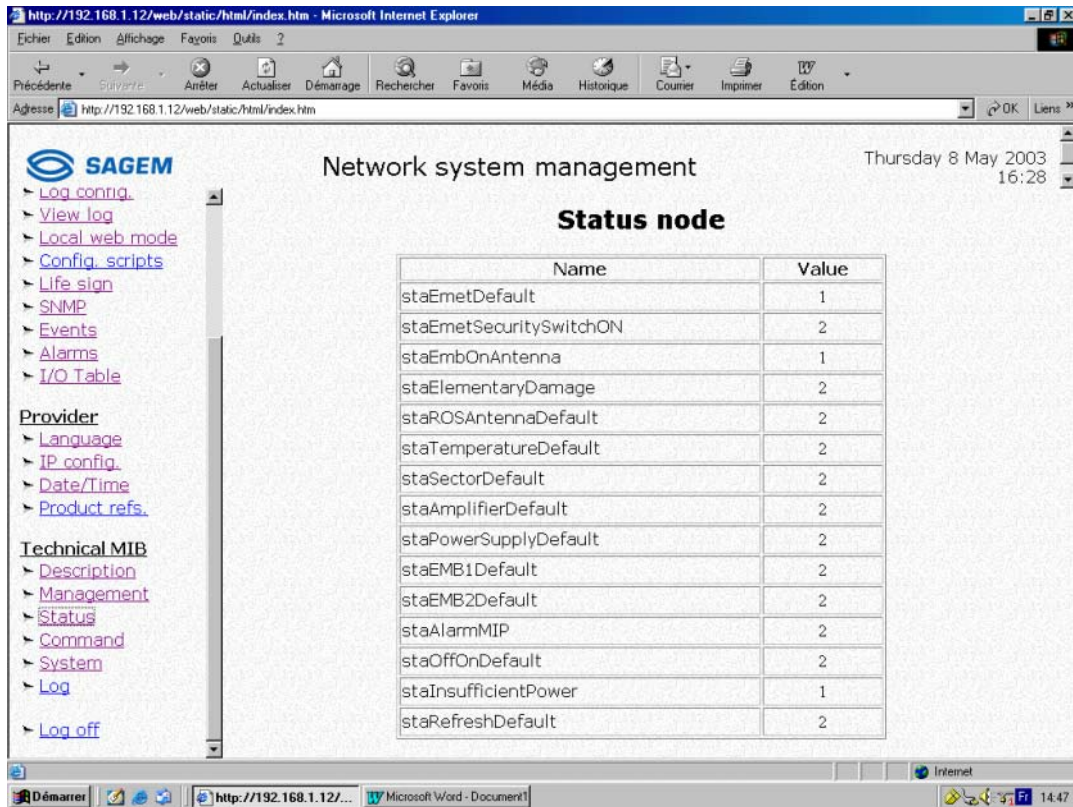
On request the CRD provides a SNMP interface for Network Management System. The SNMP remote control includes also a web server :

Some pages of the webserver are presented hereafter.

The screenshot shows a web browser window with the URL <http://192.168.1.12/web/static/html/index.htm>. The page content includes the Sagem logo, the title 'Network system management', and the date 'Thursday 8 May 2003 16:22'. The main heading is 'View log file'. A table of log entries is displayed, with the following data:

Description	Type	Severity	Date	Hour	IP Address	Program	Status	Action	Equ typ
Equipement ON	Equipment	Undefined	08/05/03	16:14:16	192.168.1.12	AGENT SNMP - WDS1401	Alarm info.	Log	1
Equipement ON	Equipment	Undefined	08/05/03	16:14:16	192.168.1.12	AGENT SNMP - WDS1401	Alarm info.	Log	1
Equipement ON	Equipment	Undefined	06/05/03	05:00:28	192.168.1.12	AGENT SNMP - WDS1401	Alarm info.	Log	1
Equipement ON	Equipment	Undefined	05/05/03	22:23:16	192.168.1.12	AGENT SNMP - WDS1401	Alarm info.	Log	1
Mode_local	Proxy error	Undefined	05/05/03	21:38:43	192.168.1.12	AGENT SNMP - WDS1401	Alarm on	Trap and log	C
Mode_local	Proxy error	Undefined	05/05/03	21:31:27	192.168.1.12	AGENT SNMP - WDS1401	Alarm off	Trap and log	C
Mode_local	Proxy error	Undefined	05/05/03	21:30:27	192.168.1.12	AGENT SNMP - WDS1401	Alarm on	Trap and log	C

The left sidebar contains a navigation menu with sections: System MIB (General, Version, Upgrade, Configuration, Trap, E-mail, Log config, View log, Local web mode, Config. scripts, Life sign, SNMP, Events, Alarms, I/O Table), Provider (Language, IP config, Date/Time, Product refs.), and Technical MIB (Description).

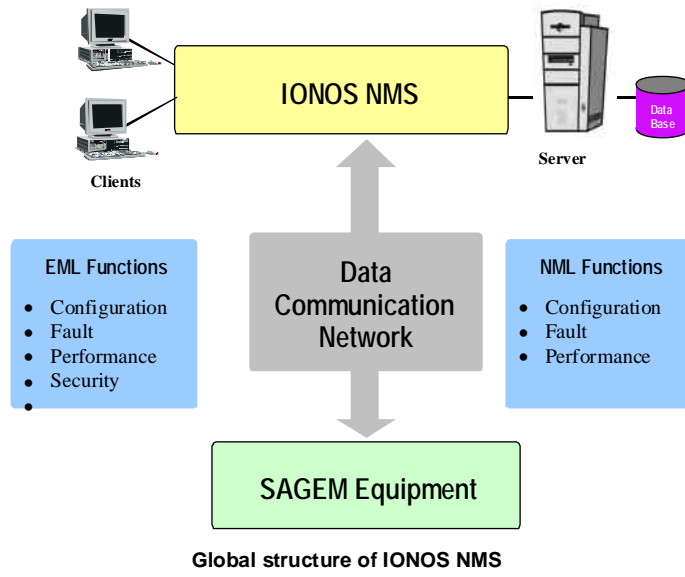


3.4 IONOS NMS

IONOS NMS is the Network Management Platform designed by SAGEM SA to provide Network Element configuration, real time alarm monitoring, centralized access to all troubleshooting and Network Management functions for all SAGEM new products.

It has been designed such as:

- to offer to the customers, carriers and private companies the best service level with automated supervision
- to reduce the required skills of the operator personal by improving the management of network services
- to follow the next expansion of the customer's network with a scalable architecture using truly distributed , client-server technology
- to facilitate the integration into the customer's own management platform by integrating open interfaces



4 OPERATION AND MAINTENANCE

4.1 FREQUENCY TUNING OF THE TRANSMITTER

All RF passive components and the power amplifiers cover the complete IV-V band , except for UHF power combiners which is dual sub-bands dependent The DVBT exciter is frequency agile over the whole VHF-UHF band

4.2 CONFIGURATION OF MODULATION PARAMETERS

Locally and manually via the LCD panel keys of the exciter, or remotely via SNMP Management system.

4.3 LINEARITY AND NON LINEARITY PRE-CORRECTION TUNING

The linear and non linear precorrector is tuned in factory. It is not necessary to tune it on site, even after the replacement of a power amplifier.

However, if necessary, it can be done via a RS232 interface of the exciter.

4.4 OPERATING CONDITIONS

AC power interruption:

The transmitter automatically resumes operation following an AC power interruption, without any manual action.

Restart-up time is maximum 20 seconds.

VSWR protection:

Transmitter supports any value of the RF output VSWR degradation without damage thanks to the LDMOS Technology In case of excessive VSWR, an alarm is generated then the output power is automatically reduced by 3dB. If the 3 dB threshold is reached again in reduced power mode, the transmitter will cut off and try to restart 3 times before switching off definitely

Safety of operating people :

AC/DC converters are separated from the power amplifiers. So, dangerous voltages are only present at the input of the converters. All wires and connecting points at those inputs are protected. No dangerous voltages are present in any other module of the transmitter, specially in the power amplifiers which can be changed with maximum safety.

More over, each Mains input has a circuit breaker used for complete out of order of the transmitter.

Checking transmitters on site :

All major parameters can be checked using CRD. Additional measurements can be done through available control ports.

Several test ports, are available on the front panel. One or two (1+1PR) related to output of transmitters and two more, when the UD2 pre amplifier is used, for Exciter output control.

The complete Reserve Transmitter (1+1PR configuration), manually switched on the available power load, can be easily checked during maintenance operation.

Easy replacement of faulty modules :

Power amplifiers can be replaced from the front face of the transmitter after disconnecting cables at the rear side.

The weight of the heaviest module is only 8.5 kg (Power amplifier).

It is possible to extract / plug-in any RF power amplifier or any AC/DC converter without transmitter interruption and without damage to the amplifier or the converter.

Periodic maintenance :

There is no periodic maintenance to achieve on the transmitter except for fans and blowers. Specified Life time of blower is 50 000 hours.

4.5 FAILURE INCIDENCE ON BROADCASTING / DUAL DRIVE CONFIGURATION

In any case, a failure will not cut the broadcasting:

Failure of an exciter:

As there is two exciters, the failure of one of them has no effect on transmission performances.

Failure of a power amplifier:

As there is several amplifiers coupled, the failure of one of them makes only a loss on the output power. For example, if there is 6 amplifiers coupled, the loss is only 1.6 dB ($20\log(n/n-1)$).

Moreover, each amplifier uses generally 4 transistors coupled inside. This means that the total number of transistors coupled is $6 \times 4 = 24$. So, the failure of one transistor makes a power loss of only 0.4 dB (case of 500 Watt).

Failure of a AC/DC converter:

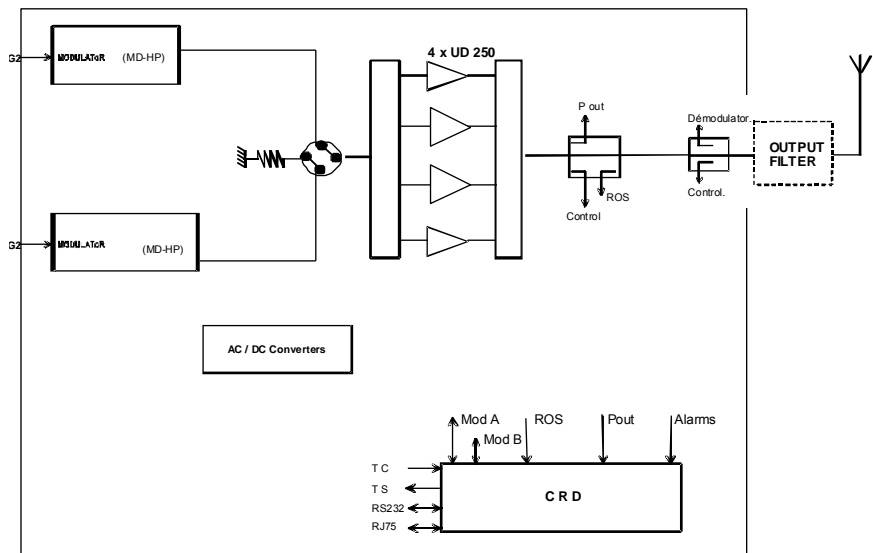
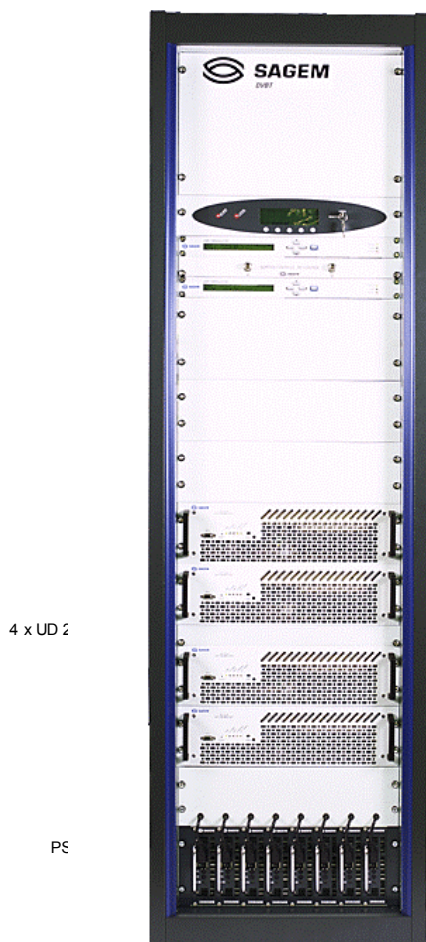
As several converters are used in a N+1 configuration (Dual Drive), the failure of one of them has no effect on broadcasting.

More over, if the number of available power supply modules became insufficient (Two failures for DD configuration or one failure in each 1+1 PR transmitter), output voltage will decrease to allow reduced power operation mode.

In case of failure of any module, alarm will be sent to the CRD for Management System Information.

5 EXAMPLES OF CONFIGURATIONS

5.1 DTH 1000 D : DUAL DRIVE CONFIGURATION – 1000 W

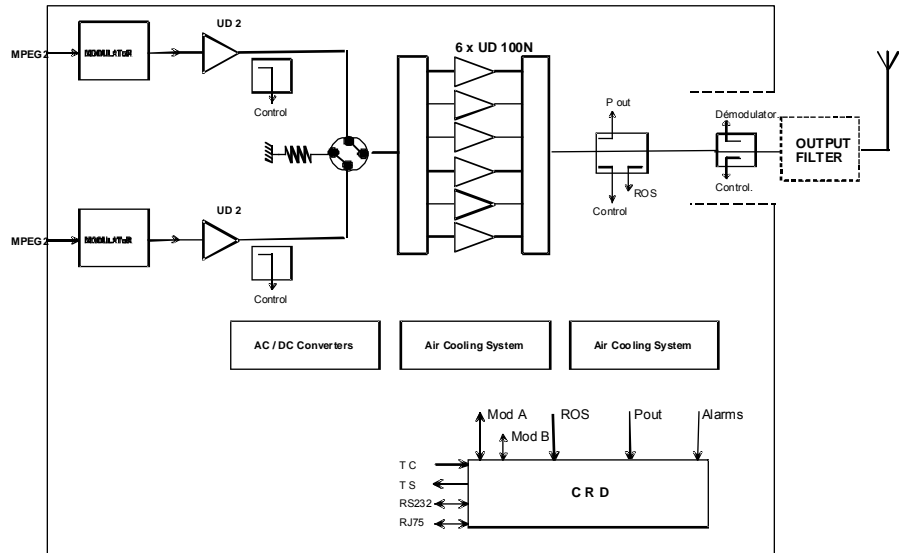
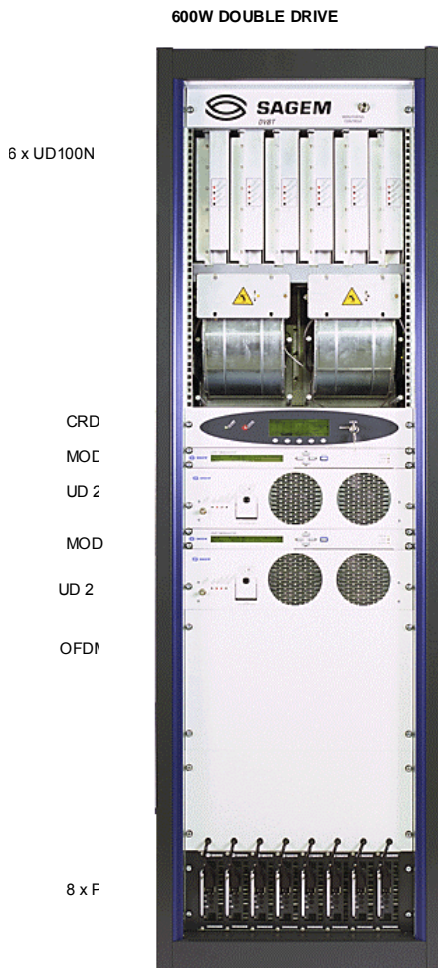


The redundancy of power amplifiers and of AC/DC converters assures to the transmitter an outstanding service availability.

Two DVBT exciters are switched before the power amplifiers in case of failure of the exciter (modulator / re-modulator) or lack of input signal alarm.

The exciter in standby is connected to a load. It can be started-on and tested without stopping the active transmitter, so without stopping broadcasting

5.2 DTX 0600 D : DUAL DRIVE CONFIGURATION – 600 W



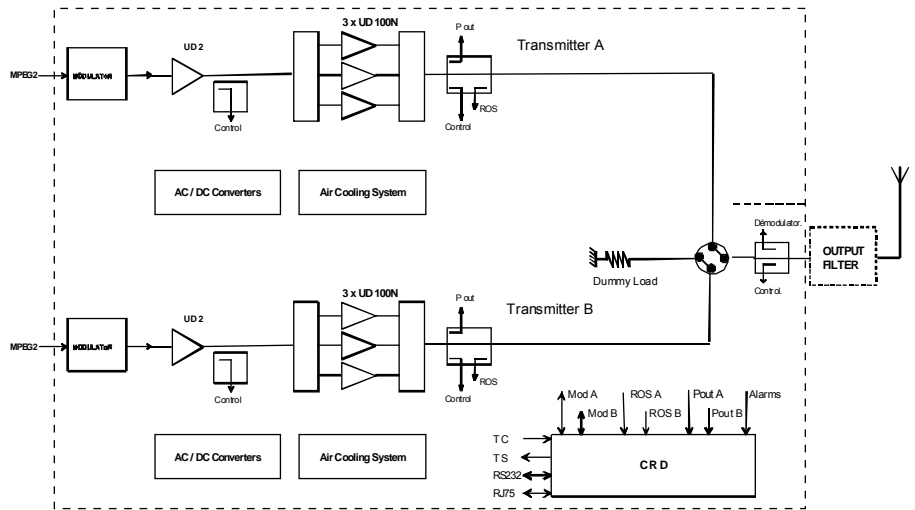
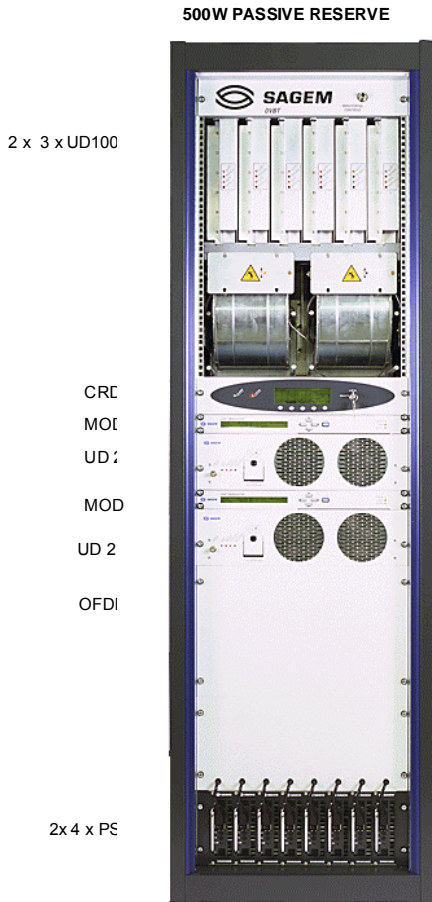
The redundancy of power amplifiers and of AC/DC converters assures to the transmitter an outstanding service availability.

Two DVBT exciters are switched before the power amplifiers. The UD2 pre-amplifier as final stage of Exciter is secured.

The switching condition is a failure of the exciter (modulator and pre-amplifier) or input signal alarm.

The exciter in standby is connected to a load. It can be started-on and tested without stopping the active transmitter, so without stopping broadcasting

5.3 DTX 0300 P : PASSIVE RESERVE CONFIGURATION – 300 W



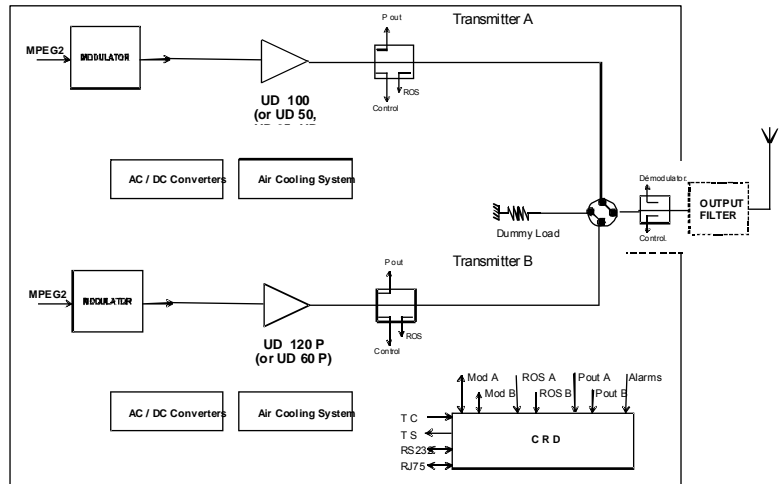
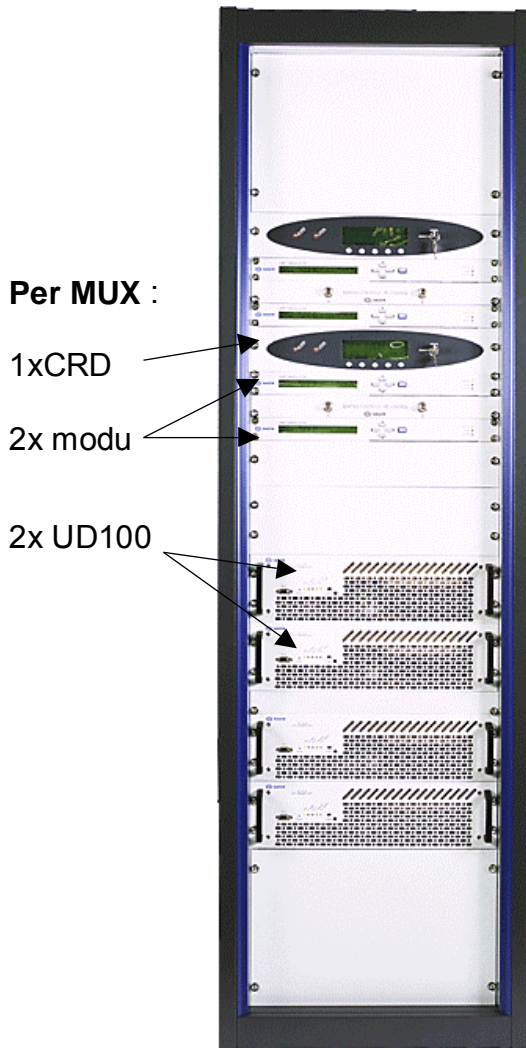
Two complete transmitters are switched to the antenna with a coaxial RF switch. One transmitter is active, the other is in “cold” standby.

Reserve transmitter is not powered, except the Exciter in order to reduce the switching delay.

The switching condition is an output power level reduction by 3 dB, a modulator alarm or input signal alarm.

The RF switch, monitored by CRD, achieves connection to antenna via appropriate feeder. The transmitter in standby mode is connected to a load. It can be started-on and tested without stopping the active transmitter, so without stopping broadcasting.

5.4 DTC 0120 P : PASSIVE RESERVE CONFIGURATION – 30, 60 OR 120 W



Up to 3 passive reserve (re-) transmitter in one 42U rack cabinet

Example : 2 MUX 120 W

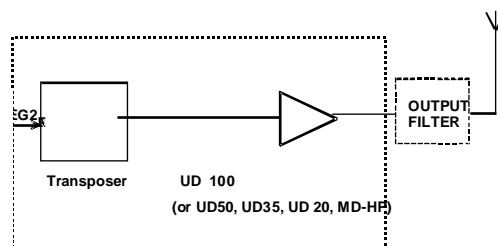


For Low power transmitters with only one power amplifier stage (300 ,120 ,60 ,30 and 15Watt transmitters), 3 (re-) transmitters in 1+1 PR configuration can be installed in a single 42 u cabinet.

For all type of configuration (DD or 1+1 PR), MPEG-TS signal is provided to the transmitter using two separates cables. Lack of signal on one of the cables or non compliance of Input signal are switching criteria according to the CRD set up.

5.5 DPC 0060 S : TRANSPOSER – UP TO 120 W

Low power transposer



Transposer is used in major case as a cheaper solution of re-broadcasting without regenerating signal. It is used to extend the area coverage of a transmitter network .

Two applications are possible:

- SFN UHF Gap filler
- MFN VHF and UHF Transposer.

Transposer is housed in a extremely compact 1U 19" cabinet and is associated to a low power amplifier. The signal is received through a highly sensitive and professional tuner (30-945MHz), then converted in IF to be processing. An efficient IF precorrector compensates the non-linearities of power amplifier and filter. Then an upconverter using double conversion technique ensures full frequency agility output (30-1000 MHz) without filter need.

Main characteristics of Transposer are:

- Frequency agility (30-1000 MHz)
- Non linear and Linear Pre-correction facilities
- Optional Echo canceling system (gap filler application)
- Optional MER and BER monitor function
- Housed in a 1U 19 inch cabinet

6 SPECIFICATIONS

6.1 GENERAL

DVBT standards		EN 300 744
SFN		TS 101 191
Measuring according to		ETR 290
E.M.C according to		ETS 301 489_1 ETS 301 489_14
Safety and EMC		R&TTE 1999/5/EC
Environmental conditions		ETS 300 019 CLASS 3.1 E Ground fixed
Temperature range	Warranted specifications Transmitter operational Storage :	+5/+45°C 0/+ 50° C - 20/+ 60° C
Relative Humidity :		≤ 90% @ 20°C
Power supply		
DTC/DRC version : 15W to 120W	Single phase 3 conductors	230 V – 50 Hz – nominal P+ N + Ground
DTX/DRX version : 300W to 1200 W	Three-phase 5 conductors	230/400 V – 50 Hz – nominal 3P+N+Ground
DTH/DRH version : 300W to 2000 W	Three-phase 5 conductors except for 300W version (single phase) Variations	230/400 V – 50 Hz – nominal 3P+N+Ground +/- 15% , 47 to 55 Hz
Starting time (from Cold)	Transmitter operational (+/-1 dB) Warranted specifications	1mn 30 mn
Acoustic noise		< 65 dBa at 1.5m from transmitter and at 1.5m from ground
Altitude :		3000m maximum

6.2 RF INPUT CHARACTERISTICS

6.2.1 TRANSMITTERS

MPEG-2 input	Interface	TS-ASI
	Packet length	188 or 204 bytes
	Connector	BNC 75Ohms
	Number	4
Reference Input	Number	4
	2 x 10 MHz Connector	BNC 50Ohms
	2 x1PPS Connector	BNC 50Ohms

6.2.2 RE-TRANSMITTERS , TRANSPOSERS/GAP FILLERS

RF receiving input	Frequency range	30-945 MHz
	Connector	N 50Ohms
	Return Loss	> 10dB
	Sensitivity for QEF reception (BER=2 ^{E-4})	20 dBμV - 120 dB dBμV
Reference Input (Re-transmitters Only)	Number	4
2 x 10 MHz	Connector	BNC 50Ohms
2 x1PPS	Connector	BNC 50Ohms

6.3 RF OUTPUT CHARACTERISTICS

Modulation	IFFT mode	according to EN 300 744
	symbol period	2k or 8k
	modulation	224us (2k) or 896us (8k)
	guard interval	QPSK, 16QAM or 64QAM
		1/4, 1/8, 1/16, or 1/32
		of symbol period
	inner code rate	1/2, 2/3, 3/4, 5/6 or 7/8
	hierarchical coding	option
Delay correction		1000 ms maxi
RF output :	band	IV – V
	channel band with	7 MHz or 8 MHz
	nominal power	12.5 W to 1000W
	Warranted Power	Nominal Power + 0.8 dB
	power stability	+/- 0.5 dB
	Gain adjustment	0/-3 dB
	shoulder levels	< -36dB @ +/- 4.25 MHz
	M.E.R.	> 33 dB

	B.E.R.	$\leq 1.10^{-5}$ before Viterbi decoding
Synthesizer :	A/F response	$\leq \pm 0.5$ dB in ± 3.8 MHz
	Group delay	≤ 120 ns in ± 3.8 MHz
	Return Loss	≤ -15 dB in ± 3.8 MHz
	Step	1 Hz
	Stability (Internal TCXO)	$\pm 1.10^{-6}$ per year ($\pm 5/45^{\circ}\text{C}$)
Minimum default delay before switching		1 s
Switching time	Dual drive or 1+1 PR	10 s

6.4 POWER CONSUMPTION

2000 W (DTH/DRH)	Three Phase	13 kVA
1500 W (DTH/DRH)	Three Phase	9,8 kVA
1200 W (DTX/DRX)	Three Phase	12 kVA
1000 W (DTH/DRH)	Three Phase	6,6 kVA
600 W (DTH/DRH)	Three Phase	3,4 kVA
600 W (DTX/DRX)	Three Phase	5,5 kVA
300 W (DTX/DRX)	Three Phase	3 kVA
300 W (DTH/DRH)	Three Phase	1,8 kVA
120 W (DTC/DRC)	Single Phase	1,2 kVA
60 W (DTC/DRC)	Single Phase	0.5 kVA
30 W (DTC/DRC)	Single Phase	0.3 kVA
15 W (DTC/DRC)	Single Phase	0.2 kVA

Measurement conditions:

Nominal 230 Volts 50 Hz AC supply

Nominal Output Power

In case of 1+1 configuration, reserve Transmitter (amplifiers) OFF, reserve Exciter ON

6.5 MECHANICAL SPECIFICATION

Transmitters are housed in 19 " cabinets		
DTH/DRH	width depth Height	600 mm 1200 mm 42 u (1u=44.45 mm) + 45 u with RF switch for medium
DTX/DRX	width depth Height	600 mm 800 mm + 150 mm with rear air input 42 u (1u=44.45 mm) + 45 u with RF switch for medium
DTC/DRC	width depth Height	600 mm 800 mm + 150 mm with rear air input 42 u (for 3 TX DD , PR or 4 TX SD in one rack) 13 u (only for 1 TX DD , SD or PR in one rack)
Cable access	Signals Mains	Cabinet roof At Floor level

<u>Power (W)</u>	<u>Configuration</u>	<u>Number and type of cabinets</u>
DTH/DRH		
2000	Dual Drive	1 MUX in 2 x 42 u
1500	Dual Drive	1 MUX in 1 x 42 u
1000	Dual Drive	1 MUX in 1 x 42 u
600	1 + 1 Passive Reserve	1 MUX in 1 x 42 u
600	Dual Drive	2 MUX in 1 x 42 u
300	1 + 1 Passive Reserve	2 MUX in 1 x 42 u
DTX/DRX		
1000	Dual Drive	1 MUX in 2 x 42 u
600	Dual Drive	1 MUX in 1 x 42 u
300	1 + 1 Passive Reserve	1 MUX in 1 x 42 u
300	Dual Drive	1 MUX in 1 x 42 u
DTC/DRC		
120 , 60 , 30 , 15	1 + 1 Passive Reserve	3 MUX in 1 x 42 u
120 , 60 , 30 , 15	Single Drive	4 MUX in 1 x 42 u
120 , 60 , 30 , 15	Single Drive or Passive reserve	1 MUX in 1 x 13 u
Weight	Power amplifier / Pre-amplifier	8,5 kg for UD100N , UD 2 30 Kg for UDxxP
	AC/DC converter	3 kg
	Exciter	4 kg
	Cabinet	200 to 250 kg

6.6 INTERFACES

Connectors	MPEG2-TS (4 inputs)	BNC-75 ohms
	RF OUTPUT:	
	15 W to 300W	EIA 7/8 "
	600 and 1.2 kW	EIA 1"5/8
	External reference	BNC type

6.7 AUXILIARY AND MANAGEMENT INTERFACES (WITH CRD)

Transmitter Output test port	50 Ohms	N-type
Exciter Output test port	50Ohms	BNC
Remote Indications	Dry relay	Sub D 37 points
Remote commands	Dry relay	Sub D 15 points
External standby		Binder type
Reset button	Trough hole	
Exciter monitoring	Control serial link	Sub-D 9 pts
SNMP Management	SNMP port	RJ 45

6.8 MTBF

Sub assemblies	MTBF (h)
Exciter	120 000
UD100 amplifier	300 000
UD100 N amplifier	300 000
UD 50 amplifier	400 000
Pre amplifier UD 2	360 000
Power supply 700 W block	250 000
CRD	600 000
Transmitters (typical)	
DTH 2000 D	9 800
DTH 1500 D	10 200
DTH 1000 D or P	12 000
DTH 0600 D or P	15 800
DTX 1200 D	11 500
DTX 600 D or P	15 000
DTX 300 D or P	19 500
DTC 120 P	39 000
DTC 60 P	40 000

Note : These figures, are not related with transmission availability according to high level of redundancy. MTBF point out probability of maintenance operation need in case of failure of one sub assembly but without emergency procedure.

6.9 MAINTENANCE

Maintenance Units		
Amplifiers	UD 100 N	DTX/DRX
	UD 250	DTH/DRH 300 W
	UD 100	DTC/DRC/DPC 120 W
	UD 50	DTC/DRC/DPC 60 W
	UD 35	DTC/DRC/DPC 30 W
	UD 20	DTC/DRC/DPC 15 W
	MD-HP	DTH/DRH
	UD 2	DTX/DRX
Modulator	MD-DVBT : DVB-T Modulator	MD-DVB
	RD-DVBT : DVB-T Re-Modulator	RD-DVB
	TP-DVBT : Transposer / Gap Filler	TP-DVB
Other	Control Rack (CRD)	CRD
	32 V 700 Watt Power Supply module	

7 ANNEXES

7.1 COMMERCIAL REFERENCE

D-XY- ZZZZ –C-VW, where

X=T : Transmitter

X=R : Re-Transmitter

X=P : Transposer / Gap-filler

Y=X : Medium Power

Y=C : Low Power

ZZZZ : Output Power : 2000, 1500, 1200, 1000, 600, 0300, 0120, 0060, 0030, 0001 W

C=S : Single Drive

C=R : Single drive with redundant amplifier

C=D : Dual Drive

C=P : Passive Reserve

V= U : UHF frequency band (band IV/V)

V= V : VHF frequency band (band III)

Z= 6, 7 or 8 : Bandwidth (MHz)

<u>DTH/DRH range</u>		DT(or R)H 2000 D	DT(or R)H 1500 D	DT(or R)H 1000 D	DT(or R)H 0600 P	DT(or R)H 0600 D	MT(or R)H 0600 D	DT(or R)H 0300 P	MT(or R)H 0300 P
UD250	Amplifier module	8	6	4	4	2	2	2	2
MD-DVBT or RD-DVBT	Modulator or Re-modulator	2	2	2	2	2	2	2	2
MD-HP	100 mW amplifier module	2	2	2	2	2	2	2	2
CRD		1	1	1	1	1	1	1	1
SNMP		Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt
3 ports coupler		1	1	1	2	1	1	2	2
42 U Cabinet		2	1	1	1	1	1	1	1
Output coupler		Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt
Output filter		Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt
Air extraction (Hood)		Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt

<u>DTX/DRX range</u>	DT(or R)X 1200 D	DT(or R)X 1200 S	DT(or R)X 600 P	DT(or R)X 600 D	DT(or R)X 600 S	DT(or R)X 300 P	DT(or R)X 300 D	DT(or R)X 300 S
UD100N	12	12	12	6	6	6	3	3
MD-DVBT or RD-DVBT	2	1	2	2	1	2	2	1
UD2	2	1	2	2	1	2	2	1
CRD	1	1	1	1	1	1	1	1
SNMP	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt
3 ports coupler	1	1	2	1	1	2	1	1
42 U Cabinet	2	2	2	1	1	1	1	1
Output coupler	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt
Output filter	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt
Air extraction (Hood)	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt

<u>DTC/DRC range</u>	DT(or R)C 120 P								DT(or R)C 240 R			
	DT(or R)C 120 S	DT(or R)C 60 P	DT(or R)C 60 S	DT(or R)C 30 P	DT(or R)C 30 S	DT(or R)C 15 P	DT(or R)C 15 S	DT(or R)C 120 R	DT(or R)C 60 R	DT(or R)C 30 R		
UD 100	2	1						2				
UD 50			2	1					2			
UD 35					2	1			2			
UD 20							2	1		2		
MD-DVBT or RD-DVBT	2	1	2	1	2	1	2	1	1	1		
CRD	1	Opt	1	Opt	1	Opt	1	Opt	Opt	Opt		
SNMP	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt		
3 ports coupler	2	1	2	1	2	1	2	1	1	1		
42 U or 13 U Cabinet	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt		
Output coupler	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt		
Output filter	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt		
Air extraction (Hood)	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt		

<u>DPC range</u>	DPC 120 P	DPC 120 S	DPC 60 P	DPC 60 S	DPC 30 P	DPC 30 S	DPC 15 P	DPC 15 S	DPC 0001 P	DPC 0001 S
UD 100		1								
UD 50	2			1						
UD 35			2			1				
UD 20					2		1	1		
MD-HP									2	1
TP-DVBT	1	1	1	1	1	1	1	1	1	1
CRD	1	Opt	1	Opt	1	Opt	1	Opt	1	Opt
SNMP	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt
3 ports coupler	2	1	2	1	2	1	2	1	2	1
42 U or 13 U Cabinet	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt
Output coupler	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt
Output filter	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt
Air extraction (Hood)	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt	Opt

ACCESSORIES (options)	
	Manual RF switch and associated Load (for DD configuration)
	Air collector
	Two ports Output coupler
	Output filter

8 GLOSSARY OF ABBREVIATIONS

A/F	Amplitude/ Frequency
AC/DC	Alternative Current/ Direct Current
ASI	Asynchronous Serial Interface
BER	Bit Error Rate
CRD	Control Rack for Digital Transmitter
CTC	Commun des Telecommandes (French) Common point for Remote Commands
CTS	Commun des Telesignalisations (French) Common point for Remote Indications
DD	Dual drive
DTC	Technical-commercial document (French)
DVB-T	Digital Video Broadcasting - Terrestrial
ETSI	European Telecommunications Standards Institute
IFFT	Inverse Fourier Function Transformation
GPS	Global Positioning System
LCD	Liquid Crystal Display
LDMOS	Lateral Depletion Metal Oxide Semiconductor
LED	Light-emitting diode
MER	Modulation Error Ratio
MIP	Megaframe Initialization Packet
MPEG2-TS	MPEG2 – Transport Stream
MTBF	Mean Time Between Failure
OCXO	Oven Control Xtal Oscillator
OFDM	Orthogonal Frequency Division Multiplex
PR	Passive reserve
QAM	Quadrature Amplitude Modulation
QPSK	Quadrature Phase Shift Keying
RF	Radio Frequency
ROS	Rapport d'Ondes Stationnaires (French) (see VSWR)
SFN	Single Frequency Network
SNMP	Standard Network Management Protocol
TC	TeleCommande (French) Remote Command
TS	Telesignalisation (French) Remote indication
TxA	Transmitter A
TxB	Transmitter B
UHF	Ultra High Frequency
UPS	Uninterrupted Power Supply
VHF	Very High Frequency
VSWR	Voltage Standing Wave Ratio

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