



TELEFUNKEN
SenderSysteme Berlin



AM-TRANSMITTERS

TRAM - the modular AM transmitter system

Years of experience in the field of high power transmitters and the latest state-of-the-art transistor technology has paved the way for a future oriented solid state transmitter concept.

As opposed to conventional tubed transmitters the simple modular system of solid state Medium Wave transmitters from TELEFUNKEN offers a maximum of flexibility at supreme overall efficiency and unsurpassed audio quality.

All TRAM transmitters are prepared for future digital broadcast transmissions and fulfil the actual DRM-recommendations.

The layout in standard 19"-racks allows for easy and comfortable accessibility to all components and modules and yields an exceptional low space requirement for any of the available power classes.

The power amplifier stage offers modular redundancy by use of standardized 1 kW amplifier modules. Each individual module is equipped with an on-board PDM modulator, no quantization problems occur.

Designed with high power reserves capability, each module is providing full signal performance on its own.

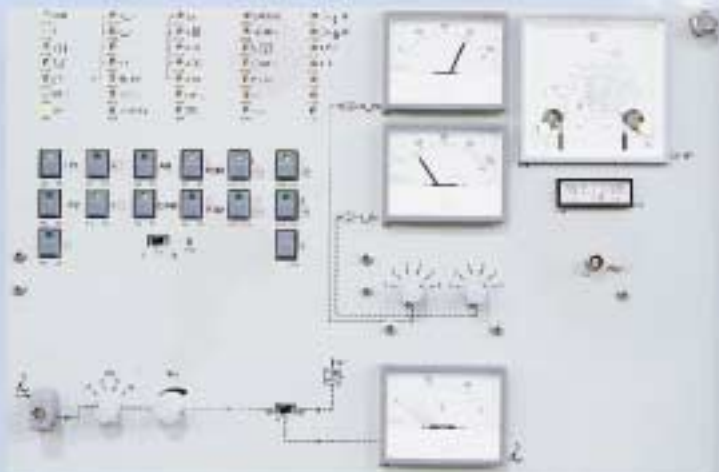
PU control unit



RF power module



Control panel of a TRAM 250 kW transmitter



TRAM – highlights

- High overall efficiency and excellent performance data.
- 125 % positive peak program capability.
- DAM operation mode for further energy saving (standard for all models).
- Compact and service-friendly design, extremely low space requirement.
- Modular design of the power amplifiers: Standard 1kW plug-in power module, broadband over the whole MF range, no tuning required, with integrated supervision- and protection circuits.
- All transmitters are exclusively air cooled, utilizing a unique internal airflow system. Recycling air cooling by means of internal air/water heat exchangers available.
- Factory fitted and tuned to determined operating frequency, frequency agile.
- Rugged construction with emphasis placed on high mechanical strength and stability.
- Combining of stand-alone transmitters by utilizing an innovative paralleling unit (PU). No need for high power reject load.
- TRAM transmitters also available as Long Wave Broadcast Transmitters (150 to 300 kHz) and Long Wave Communication Transmitters (40 to 148 kHz).
- VLF versions of TRAM transmitters on request.
- All TRAM transmitters are prepared for future conversion to digital modulation technique, e.g. DRM.

TRAM – essentials at a glance

LW communication transmitters:	40 kHz to 148 kHz
LW broadcast transmitters:	150 kHz to 300 kHz
MW broadcast transmitters:	525 kHz to 1,710 kHz
Output power range: stand-alone version	5 kW to 600 kW
combined up to	2,000 kW

500 kW LW transmitter TRAM/P 500 L



TELEFUNKEN AM transmitters – a secure investment into the future

TRAM 10



TRAM-transmitters, preferred models

Type		TRAM 5	TRAM 10	TRAM 25	TRAM 50	TRAM 100	TRAM 200	TRAM 300	TRAM 400	TRAM 500	TRAM 600
No. of 50 kW power blocks		-	-	-	1	2	4	6	8	10	12
No. of identical power modules		5	10	24	48	96	192	288	384	480	576
No. of driver modules		-	-	1	1	2	4	6	8	10	12
Output power (other power classes on request)		50 kW	10 kW	25 kW	50 kW	100 kW	200 kW	300 kW	400 kW	500 kW	600 kW
Frequency range	MW LW	525 kHz to 1,710 kHz 150 kHz to 300 kHz Factory fitted and tuned to the determined operating frequency Components for change to other frequencies on request									
Operation modes		AM (A3E) - AM reduced power P/4 - DAM (X3E), i.e. dynamic carrier control - AM stereo capability, prepared for DRM									
RF Output	Connector Load impedance VSWR	7/8" EIA	1 5/8" EIA	3 1/8" EIA		4 1/2" EIA		6 1/8" EIA			
Modulation system		50 Ω unbalanced VSWR < 1.3 tunable, automatic power reduction as a result of increasing VSWR during operation									
AF range		Pulse Duration Modulation (PDM) 30 Hz to 10 kHz Changeover between a maximum of 2 band limiting filters on request									
AF Frequency response		±0.5 dB, 30 Hz to 10 kHz, with band limiting filters switched off									
AF Harmonic Distortion (THD)		≤ 1% at m = 0.8									
Modulation capability		100% continuously, + 125% peak program capability									
Carrier shift (amplitude drop)		≤ 1% with voltage regulation									
RF harmonics and spurious emissions		Standard: according to CCIR 329-6 or better (≤ 50 mW), FCC requirements on request									
Signal to noise ratio		≥ 60 dB referred to 100% modulation									
Frequency stability		Deviation ≤ 5 Hz, external synchronisation of synthesizer possible									
AF Input		600 Ω balanced (can be changed inside the unit by jumper to > 2,000 Ω) Adjustable from -10 dBm to +10 dBm referred to 100% modulation, switched coarse increments (5 dB), fine adjustment by potentiometer									
Power supply	Voltage Frequency Voltage variations Power factor	Standard mains configuration: 3 N 400 V; TN-S or TN-C, other voltages on request, TRAM 200 or higher MV supply preferred 50 Hz (60 Hz on request) ≤ ± 5% with full performance; ≤ ± 10% with minor performance degradation ≥ 0.95									
Power consumption	m = 0 m = 1	≤ 6.7 kW ≤ 10 kW	≤ 12.5 kW ≤ 18.8 kW	≤ 30.5 kW ≤ 45.7 kW	≤ 60 kW ≤ 90 kW	≤ 119 kW ≤ 179 kW	≤ 238 kW ≤ 357 kW	≤ 357 kW ≤ 536 kW	≤ 476 kW ≤ 714 kW	≤ 595 kW ≤ 893 kW	≤ 715 kW ≤ 1,072 kW
Overall efficiency		> 75%	> 80%	> 82%						> 84%	
Control	Local Remote	OFF/ON, full power/on, reduced power(P/n) - AM/DAM - Selection local/remote Changeover between 2 AF band limiting filters - various status indications by LED Command input by floating contacts, same commands as for local control, indications by floating contacts RS 232 or BITBUS optional									
Environmental conditions	Temperature Relative humidity Installation altitude	Standard: -10 °C to + 45 °C, other temperatures on request maximum 95%, non-condensing Standard: maximum 2,000 m, higher altitudes on request									
Cooling system		Air cooling (intake air from the room, exhaust air to the room, air duct system with blowers on request)									
Dimensions [mm]	Width	600	600	1,200	1,800	3,000	4,800	6,600	9,600	10,800	12,000
(LW TXs require more filter racks)	Depth	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000	1,000
	Height	2,000	2,000	2,000	2,000	2,500	2,500	2,500	2,500	2,500	2,500

Not binding for delivery.

TRAM 50



TRAM 100



TRAM 400





TELEFUNKEN
SenderSysteme Berlin

TELEFUNKEN SenderSysteme Berlin AG
Mertensstrasse 63
13587 Berlin
Germany

fon: +49-30-33978-0
fax: +49-30-33978-599
internet: www.telefunken-sendersysteme.com
e-mail: info@telefunken-sendersysteme.com

Contact
Gerd Barthel
fon: +49-30-33978-101
fax: +49-30-33978-199
e-mail: g.barthel@telefunken-sendersysteme.com

