Transmission Systems
Innovation, advanced technology and premium quality systems
Ampegon is the leading designer, manufacturer and integrator of radio transmission systems worldwide. More than one out of every two high power radio broadcast transmitters comes from Ampegon. Our trademarks are innovation, advanced technology and premium quality systems combined with highest reliability and the best performance over the equipment lifetime.

Innovation and advanced technology | Our transmission systems are deployed all over the globe, where they make an important contribution to local, national and international communication

**Mission**
Seeking to exceed what the market asks for, Ampegon is intent to supply environmentally sound broadcast solutions that support cost-efficient media implementation. In the past years Ampegon has focused its efforts on developing advanced solutions to meet environmental and technological developments.

Global warming, soaring energy prices, scarcity of renewable energy, rapidly developing digital media platforms, advances in compression technology and quickly changing life styles have reshaped the broadcast platform and transformed high power broadcast needs.

Technology is both the challenge and the key to retaining a global position. Radio broadcast technology has undergone many innovations in the course of its existence, many of which have come from the house of Ampegon. Innovations from Ampegon extended the reach, make operation more efficient and convenient, reduce investment and operating costs and optimize the quality of reception. With an eye to the future, Ampegon offers most advanced, efficient and flexible solutions.

### Shortwave Broadcast Transmitters
Shortwave broadcasting is the most reliable, cheapest and easiest way to reach innumerable listeners simultaneously from a single transmission site. This outstanding technology gives broadcasters complete independence from gatekeepers and third-party infrastructure like satellite and cable. No other mass communication medium offers such fascinating coverage possibilities as the AM bands – and especially shortwave in combination with the new state of quality and advanced services offered by DRM. Ampegon shortwave transmitters lead the market for more than 30 years. Hundreds of satisfied customers testify to the superior design, performance and maintainability of the Ampegon transmitter product lines.

### Mediumwave Broadcast Transmitters
Mediumwave broadcasting is a cost-efficient alternative for local, regional or even national coverage. Recent surveys show that around 1000 LW/MW transmitters have been installed worldwide over the past 25 years. This newly installed power base of more than 200 megawatts testifies to the importance of the role played by these bands in today’s media platform. Ampegon cooperates with TRANSRADIO for long- and mediumwave transmitters in order to provide complete system solutions including antennas.

Equipped with the advanced technology and intrinsic flexibility needed for the complex modulation schemes of digital modulation techniques, Long- and mediumwave transmitters have been proven in DRM field trials worldwide and allow broadcasters to profit directly from the wide range of advantages offered by the new digital AM technology.
Behind every great signal-on-air is a well-designed antenna. Ampegon offers the most advanced and efficient antenna systems on the market today and is the only supplier in the world for rotatable curtain antennas (RCA). With more than 61 years of continuous activity and experience in the antenna field, Ampegon antenna systems set standards worldwide and are deployed by satisfied customers on all 5 continents. Whether shortwave, mediumwave or longwave, Ampegon can help you to get the most out of your antenna system.

Digital AM, known under the brand DRM (digital radio mondiale) is an important platform within the transition to digital media and is a perfect complement to other standards like DAB, DMB, DRM+ in FM etc. Besides offering basic high quality sound broadcast, DRM also provides the possibility to transmit added-value services for use in parallel to the pure audio and/ or video programs.

DRM uses the same frequency, spectrum and channeling as analog AM and in combination with shortwave, is the most cost-efficient, reliable and independent means to reach millions of listeners with near FM audio and reception quality using only a few transmitters and frequencies. Ampegon pioneered the development of the new DRM technology and offers a complete end-to-end DRM product line for digital AM solutions.

From local monitoring to worldwide networking, the Ampegon «Master Series II» broadcast control systems are designed to monitor, supervise and control the complex processes involved in putting and keeping programs on air. Master Series II systems manage any task, from the simple monitoring of one or more transmitters to the complex job of coordinating and controlling entire broadcast networks.

Radio broadcast customers expect to receive reliable, state of the art technology, tailored to meet their specific needs. Ampegon is specialized to fulfill such demands. More than 60 % of our permanent staff consists of specialized, graduated engineers. Our teams have vast expertise in all fields of broadcast-related technologies from signal processing to advanced antenna design. Shaping the industry with technological milestones, our solutions are always one step ahead.

The ability to predict, quickly identify and solve problems in a station infrastructure is the cornerstone to safeguarding reliable operation. Our support centers use the latest connectivity tools to give on-line assistance, offer remote monitoring and trouble-shooting services and make regular checks of key parameters. Thanks to the strong global presence of the Ampegon worldwide service and sales network, your next Ampegon office is never more than a stone’s throw away.
Shortwave Transmitters: TSW Line

Field-Proven, Cutting-Edge Technology | Tailored to meet demands for reliable, cost-effective, high-efficiency solutions, Ampegon shortwave transmitters lead the market since more than 75 years and are the best choice for long-term, flexible and highly reliable operation.

Ampegon high power shortwave transmitter portfolio extends from 50 kW to 500 kW. An invaluable asset for any high power broadcast site, the Ampegon TSW-Line incorporates leading technology tailored to meet demands for reliable, cost-effective, high-efficiency solutions.

The TSW-Line fits a wide range of customer specific equipment and sub-systems, especially designed and engineered by Ampegon to make day-to-day operation smoother and more efficient. All models feature interfaces for remote and automated operation and are ready for digital transmission with DRM. Ampegon shortwave transmitters come equipped with fast VSWR protection and an interface for a special analysis tool to monitor environmental incidents like lightning, mains, etc.

Craftwork and Quality
Ampegon shortwave transmitters are hand-crafted in our factory in Turgi, Switzerland to meet the highest quality and industrial design standards. Satisfied customers around the world testify to the superior design, performance and maintainability of Ampegon shortwave transmitters.

Ampegon Solid State Modulator PSM
At the heart of every Ampegon high power shortwave transmitter is a powerful Ampegon patented solid-state pulse step modulator (PSM) developed by Ampegon in the 1980’s. Now in its ninth generation, the latest PSM (PSM9) is the top of the line.

Incorporating the most advanced pulse step modulator technology, the PSM is renowned for superior qualities, high overall efficiency, sophisticated remote control facilities and rugged, day-to-day reliability.

Ampegon PSM modulators enhance broadcasting performance via their outstanding distortion and signal-to-noise specifications. With a high efficiency of better than 97 %, and high power factor, the PSM enables a considerable reduction of energy and operating costs.

Optimized for DRM, PSM9 is not only an enhancement for latest generation transmitters, but is also the most cost-efficient way to upgrade older GTO type PSM modulators for DRM operation.

«Our shortwave transmitters are the result of profound knowledge in almost every engineering discipline. Ideas, visions and concepts have been realized in these products and we are honored that they will be employed worldwide.»

Carmen Hillbrunner, Product Manager Shortwave Transmitters
New Generation Transmitter Control System UCS
The new transmitter control system UCS (unified control system) sets new standards for shortwave transmitters. The embedded control system is based on latest embedded PC and FPGA technology. The interaction with the various subsystems is based on a network distributed Middleware solution and a sophisticated HMI represents the link to the operator. In order to fulfill the various monitoring, control and processing purposes, a modular concept is used which consists of dedicated subsystems.

An online connection enables performance of remote diagnostics and system updates. Additionally, the UCS system easily integrates with our Master Series broadcast control system for complete system management capabilities from simple monitoring of a single transmitter to the coordination and supervision of an entire network.

Radio Frequency Stages
The RF source is integrated in the UCS control system and serves the solid state wide band amplifier. The 300/500 kW transmitters are fitted with a small triode in grounded grid configuration as driver stage for the final stage tetrode, whereas the 50/100 kW transmitters are only equipped with a single-tube final stage. The RF chain is capable to handle both analog and digital transmission modes.

Automatic Tuning System
Designed to support the latest developments in control technology, the Ampegon automatic tuning system offers a large number of preset values to enable quick and reliable coarse positioning as well as a redesigned, industry-leading, fine-positioning algorithm for the utmost in tuning control that matches changing VSWR conditions while assuring full power on air.

Key Features
- High guaranteed overall efficiency
- Integrated DRM modulator for automatic operation
- Fully automatic tuning system
- User-friendly control system with touch screen
- Full remote control facilities and interfaces providing optional remote diagnostics system
- Energy-saving operation options e.g. AMC, DCC and DRM
- Compact, high quality design with full accessibility for maintenance
- ISO 9001 system design
- IEC standards and ITU recommendations applicable
Many years of experience in the field of high power transmitters in conjunction with the latest state of the art transistor technology has paved the way for a future oriented and meanwhile well established solid-state transmitter concept. As opposed to conventional transmitters the simple modular system of solid-state medium- and longwave transmitters from TRANSRADIO offers a maximum of flexibility and excellent audio quality. Moreover, the TRAM premium line secures optimized DRM parameters exceeding the DRM recommendations while achieving an outstanding overall efficiency in all operation modes.

The layout in standard 19” racks allows for easy and comfortable access to all components and modules and results in exceptionally low space requirement for the respective power class. The power amplifier stage offers true modular redundancy through the use of standardized 1 kW amplifier modules. Each individual module is equipped with an on-board PDM modulator and no quantization problems occur. Designed with a high power reserve capability, each module provides full signal quality on its own. The TRAM premium LCD displays all relevant transmitter parameters on a user friendly 15,6” touch screen. Transmitter functions can be supervised and monitored by the control interface whereas safety functions of the transmitter are still implemented on hardware level by using fast CMOS logic to reliably protect the system.

Thanks to this concept, even in the unlikely event that the whole computer system would fail, the operation of the transmitter is secured as all basic functions can be still controlled via local push buttons.

For remote control, the TRAM premium LCD is available with a choice of interfaces such as Ethernet with integrated HTML web server (standard), Ethernet with SNMP, RS 232 or floating dry contacts (options).

Paralleling Unit

The paralleling unit (PU) serves to combine two single transmitters to double the output power. Furthermore, it provides an active redundancy system to avoid a loss of transmission during maintenance schedules. The PU equipment contains a central control unit, a combining network and a compact balancing resistor.

The load and phase regulation of the central control unit ensures that both transmitters are automatically levelled to equal RF output power, thus only a minimum of power is lost in the balancing resistor. In the unlikely event of failure of one of the transmitters, a motorised RF switch automatically switches the unaffected transmitter directly to the antenna and the faulty transmitter to the dummy load. The transmission continues and the faulty transmitter can be repaired whilst connected to the dummy load.

Riding the Longwave

Longwave is well known for excellent ground wave coverage, hence offering a stable reception. DRM on longwave combines the advantages of digital transmission with very good longwave propagation. On the other hand, narrow band longwave antennas with low mismatch within the transmission bandwidth are posing a big challenge to the broadcast industry.

TRANSRADIO has accepted this challenge and successfully modernized several longwave transmission stations with its DRM solution. With regard to out-of-band emissions, the DRM installations completely fulfill the requirements of ETSI EN 302 245-1 and ITU SM.1541.

If antenna bandwidth is an issue, Ampegon implements a so-called Extension Network (ENW) between transmitter and antenna to eliminate the disadvantages of asymmetrical antenna impedance and to reduce mismatch, resulting in a sufficient DRM mask reserve.
Overview of the TRAM Premium Line

Medium- and Longwave Transmitters: TRAM Premium LCD Line

Single Frequency Network
The introduction of digital MW on DRM opens the door to exciting new coverage options. One example is single frequency network (SFN), one of the most cost effective and spectrum efficient methods of extending transmission coverage. SFN offers broadcasters faced with limited frequency allocation a way to avoid the use of multiple frequencies.

Today, with constantly growing coverage needs and quickly shrinking spectrum availability, SFN provides an ideal solution for extended regional coverage. The simple definition of SFN is two or more transmitters operating on the same frequency carrying the same information at exactly the same time to receivers in a given area.

The time synchronization between the transmitting sites is realized on the basis of a specific network protocol introduced by DRM, the so-called multiplex distribution interface. The DRM system enables mediumwave broadcasters to profit from SFN in crystal clear sound quality.

Simulcast Service Option with DRM
Simulcast allows the broadcast of analog and digital transmissions from the same transmitter. Simulcast allows the broadcast of analog and digital transmissions from the same transmitter.

Overview of the DRM Product Line

As a leading force for digital broadcasting since the beginning, our DRM-compatible equipment meets highest standards and customer requirements. Designed to provide end-to-end DRM solutions for broadcasters and network operators, the DRM product line allows:

- to facilitate data import, preparation, encoding and broadcast with DRM content server
- to broadcast a modulated DRM signal with UCS-SW or DMOD3
- to analyze a DRM signal with professional monitoring receiver

A perfect fit for all Ampegon transmitters, DRM products are also open for use with any AM system.

DRM Content Server
The Ampegon DRM content server is a reliable and robust system, designed to meet all the demands of DRM multiplex generation and content management. The system provides broadcasters with all DRM functions and interfaces needed for a smooth integration into existing broadcast environments. In addition to Data Processing & Management, and DRM Text Messages, the DRM content server also provides Journaline, the data application that offers pure textual information in a hierarchical menu structure. With a multimedia receiver it is now also possible to receive small-scale video services (Divesmo) over DRM on a color display. This feature is one example of the substantial advantages made possible by digital radio systems. A real extra benefit to the DRM listener, this service works at minimum bit rates, is easily integrated into existing news syndication environments and requires minimum effort for receiver implementation.

UCS-SW
The UCS-SW is the new versatile DRM modulator/RF exciter/control system which has been designed to feed any AM broadcasting transmitter or linear high power amplifying system. It is the preferred solution to replace former Ampegon RF exciters/modulators and is used in all Ampegon new generation shortwave transmitters. UCS-SW is capable to generate RF signals with high stability and to achieve fast direct sampling of RF measurements without using any additional auxiliary components. Moreover, it offers the whole range of modulation schemes for analog (A3E, DCC, AMC) as well as digital (DRM) modulation thanks to the embedded DRM modulator. In addition, it is capable to process a high variety of audio/data feeds (analog, AES/EBU, MIDI). Dedicated RF measuring channels are provided in order to fulfill monitoring or demodulation purposes. UCS-SW is ready to be used in a redundant configuration which is an important step for an enhanced overall availability of the transmitter. The complete control and supervision runs on a dedicated built-in embedded industrial PC. There, also the appropriate HMI is integrated. Thanks to TCP/IP Ethernet external computers can be connected for remote control.

Overview of the DRM Product Line

Type Carrier Output Power Digital Mean Output Power (MER > 30dB) Number of PA Modules TX Floor Space (MF Model)

TRAM 5
5 kW
4.0 kW
5
0.6 m²

TRAM 10
10 kW
8.0 kW
10
0.6 m²

TRAM 25
25 kW
20 kW
24
1.2 m²

TRAM 50
50 kW
40 kW
48
1.8 m²

TRAM 100
100 kW
80 kW
96
3.0 m²

TRAM 200
200 kW
160 kW
192
4.8 m²

TRAM 300
300 kW
240 kW
288
6.0 m²

TRAM 400
400 kW
320 kW
384
9.6 m²

TRAM 500
500 kW
400 kW
480
10.8 m²

TRAM 600
600 kW
480 kW
576
12.0 m²

End-to-End DRM Solutions
Providing end-to-end DRM solutions, the Ampegon DRM product line offers a one-stop-shop for integrated, proven DRM solutions.

Product LW/MW SW Linear TX SFN

DRM Content Management and Multiplex Generation

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<tr>
<th>DRM Content Server</th>
<th>TXW 5128D</th>
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DRM Modulator and RF Exciter

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<tr>
<th>UCS-SW</th>
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<td>DMOD3</td>
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DRM Measurement and Professional Monitoring Receiver

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<th>DT 790</th>
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<td>RF-SE7</td>
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<td>RF-SE12</td>
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DRM FM Re-Broadcast

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<th>DRM FM</th>
<th>TFM3-30</th>
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As a leading force for digital broadcasting since the beginning, our DRM-compatible equipment meets highest standards and customer requirements. Designed to provide end-to-end DRM solutions for broadcasters and network operators, the DRM product line allows:

- to facilitate data import, preparation, encoding and broadcast with DRM content server
- to broadcast a modulated DRM signal with UCS-SW or DMOD3
- to analyze a DRM signal with professional monitoring receiver

A perfect fit for all Ampegon transmitters, DRM products are also open for use with any AM system.
Ampegon together with leading market players defined the world standard Digital Radio Mondiale. Whenever I listen to DRM, it makes me proud to know that we have revolutionized the radio market.

Matthias Stoll, Director Marketing

Key Features

- Most comprehensive DRM product portfolio from studio to receiver
- Web-interface for remote operation
- DRM modulators with analog and digital interfaces for different transmitter types
- Providing audio and data services
- Content redundancy features, automatic fallback solutions
- Capable of single-frequency network operation (SFN), multi-frequency network operation (MFN) and synchronized multi-frequency network operation (SMFN)

DMOD3

The DMOD3 is currently used worldwide for the vast majority of DRM systems in operational use. The advanced precorrection features of the DMOD3 are essential to allow broadcasters to secure DRM transmissions at highest output power with best MER and non-disturbing the analog and digital neighbor channels. The automatic equalizer adjustments guarantees standard compliant DRM transmissions. Thus, using the DMOD3 enlarges your coverage area and listership.

The DRM DMOD3 is designed for mounting in standard 19" requiring 4U space but has equipment pods also to be operated on a table. Low power consumption, reduced operating temperature and a higher MTBF have been achieved by implementing mobile technology components and a hard disk-free design. To provide excellent ergonomics, the DRM DMOD3 has a comfortable display size of 8.4" which provides a wide viewing angle and a high resolution of 800 x 600 pixels for easy reading. Moreover it is convenient to operate with the integrated keys and toggle wheel.

DT 700

The professional DRM monitoring receiver is perfectly suited for DRM reception and transmitter monitoring. Designed for stand-alone operation, DT 700 features a high performance front-end based on the latest direct sampling reception technology. Together with a 12-band fix-tuned pre-selector filter bank, the DTM 700 guarantees an outstanding reception performance and is easy to use due to its comfortable LCD menus.

RF-SE

The RF-SE is a professional digital radio monitoring and measurement receiver, which is available in different models depending on the desired application. The outstanding reception characteristics are based on a high-performance frontend with preselector filter banks and a digital direct-down conversion system approach. After the well-proven digital bas-band decoder various modular blocks like RSCI capability, audio and multimedia decoder, alarm feature, web-interface, RF-monitoring connector are available to suit the specific needs of the desired application.

DRM FM

The DRM FM system (TFM3-30) with one 10 kHz DRM signal containing two audio services in the DRM stream, could re-transmit the two audio programs on a FM band. The system is available as indoor or outdoor system with additional cooling, UPS and also solar power connection for independent operation. Radio New Zealand International services Pacific Islands operates since 2006 re-broadcast of a DRM shortwave signal. This coverage option is lower in cost and more reliable than the use of satellite links.

New Applications with DRM

The multiple program structure of DRM opens the door to an exciting world of new applications for radio broadcasting. A few examples:

- Re-broadcast of long distance shortwave DRM signals for local services (FM and/or MW) DRM FM system
- Distance learning programs with Diveemo
- Transmission of data and pictures (with Diveemo)
- More effective use of spectrum with SFN, MFN and SMFN options

Re-Broadcasting

Radio New Zealand International services Pacific Islands with re-broadcasting of a DRM shortwave signal.
Master Series II | From local monitoring to worldwide networking, the Master Series II line manages practically anything from a single transmitter site to a global network.

Ampegon Master Series II line merges long experience with latest technologies in a powerful application suite designed to make day-to-day broadcasting more efficient and reliable. Based on a modular, hierarchical design principle, Master Series II systems avoid a single point of failure and guarantee practically 100% availability of your broadcast system. The systems incorporate a multi-layer redundancy approach including a hot swapable RAID system and can be configured to provide different levels of functionality for specific demands. Master Series II is based on an open-end design and can easily be scaled to match evolving requirements. In addition to controlling all kinds of station equipment and infrastructure, Master Series II can also take charge of frequency and programming supervision. A built-in GPS system provides for transmission synchronization. From simple monitoring of one or more transmitters to the complex job of coordinating and controlling entire broadcast networks, Master Series II can virtually control any number of tasks from anywhere in the world.

Uncompromising GUI Design
The GUI (graphical user interface) is the prime point of contact between the operator and the Master Series II system. The HMI quality has a high impact on whether or not operators will react correctly to a problem indicated by the system. Therefore Ampegon has designed the GUI on the basis of well-known international ergonomic standards.

Proven Reliability
The first priority in the context of control systems is reliability and availability. Many broadcast stations are running unmanned or with a minimized staff of engineers and operators who intervene only when irregularities occur.

Depending on the level of automation, the control system will either support the operators (e.g. by enabling them to control the entire site from one central point), or carry out all the repetitive tasks and even automatically replace faulty equipment in its predefined schedule.

Global Networks | Net Master coordinates and optimizes the coverage of a specific region. All you need is a reliable broadband connection, and Net Master can take over all kinds of tasks from real-time monitoring to broadcast account management.

«Each of our systems is unique and scaled to meet specific requirements. First step is listening to what the customer tells us about his station, then we develop ideas how to configure the system to meet these particular demands.»

Martin Hottinger, Control Systems Product Line Manager
Broadcast Control Systems

Flexible Access
An attractive feature of the Master Series II is its remote control functionality. The SNMP (simple network management protocol) can be accessed over the Internet via a built-in web interface. We recently installed a system on a Pacific Island, says Martin Hottinger, head of the Control Systems team. «Special emphasis was put on the remote control functionality and external alarm mechanisms. In case of an emergency at the station, the system just contacts the operator by voice mail. It can also send SMS and email messages to anywhere in the world.»

Content Scheduling for Global Networks
With the trend to keep investments and operating costs low, broadcasters look for new, more cost-efficient solutions to distribute programs while making effective use of existing infrastructure. Modern technology has made it possible to bridge distances easier and faster than ever before, using reliable networks to control and synchronize different components in different locations simultaneously. If your infrastructure includes more than one broadcast site, then the Ampegon «Net Master» is an effective technological solution to streamline your operation. Net Master simplifies and optimizes content scheduling while reducing costs and increasing availability.

Centralized Control Center
Whereas individual stations are programmed to fulfill station-specific transmission schedules, a control center, which is equipped with Net Master, has a «master» schedule. Net Master monitors, coordinates, synchronizes and supervises the individual schedules, displays the status and gives you at a glance an overview of the events at all connected stations.

Optimized Facility Management
The SWAP function allows Net Master to re-route programs from one station to another, thus ensuring practically 100 % availability and optimized utilization of transmission equipment. «Net Master» operates on the principle of priority and highest availability. Priority options can be a specific program, a specific coverage area or in general the most cost-effective coverage of any particular area. Net Master calculates the required transmitter output power and locates the station, transmitter and antenna which best fit these requirements.

If a transmitter or antenna fails, Net Master knows which alternative equipment best covers the specific target region and can automatically «re-route» a program to that location. When the replaced equipment is ready to go back on air, Net Master can switch everything back to the original configuration.

Environmental Awareness
A special «eco-mode» function provides a highly cost-efficient as well as environmentally sound broadcast solution. Net Master analyzes time of day, sun spot activity and distance to coverage area and dynamically adjusts transmitter power accordingly. With the broadcast optimizer function, all schedules from the individual site will be rescheduled and allocated to one of the stations with focus on least overall costs.

Key Features
- Modular, hierarchical, open-end system
- Remote control via SNMP/web-interface
- Flexible access from anywhere in the world
- Improves inventory and process control
- Reduces overall system life-cycle costs
- Increases operational efficiency
- Simplifies operator interaction
- Reduces overall system life-cycle costs
- Simplifies operator interaction
- Improves inventory and process control
- Multiple watchdog and hot-restart layers
- Flexible access from anywhere in the world
- Remote control via SNMP/web-interface
- Modular, hierarchical, open-end system
- Customer-specific, user-friendly graphical interface

Ampegon distinguishes itself from all other competitors through its wide-based engineering capabilities. Well-trained and widely experienced teams work close together to design the best broadcast systems on the market today. Transmitters and antennas are highly complex entities consisting of a large number of components which are united within an overall, highly complex process. Ampegon engineering teams have their roots in a variety of disciplines, such as physics, high frequency radio and electrical engineering and software design.

Working in small teams which profit from these in-house synergies, our specialists concentrate on all aspects of radio broadcast engineering, producing systems which are installed and performing well in leading facilities all over the world.

Tailored Technology
Customers esteem Ampegon for its ability to tailor technology to fit specific needs, especially considering that off-the-shelf solutions can be disappointing in terms of performance and value-for-money. Ampegon advises and consults partners during all phases of project execution: beginning with the planning phase and continuing through design, production, installation and after-sales support throughout the lifetime of a system.

From feasibility studies and site engineering to turnkey capability, our teams apply their vast technical expertise to guarantee that our partners get the best value-for-money available today.

Energy-Saving Techniques
Looking at the efficiency of an overall broadcast system, we see that it can range anywhere from 30 % to 75 %, depending on how much of the energy taken from the mains is lost before reaching the specified target area. A high overall efficiency of the complete transmission chain can bring savings of literally millions of dollars over the component life cycle of 20 or more years. Ampegon has focused its efforts on developing advanced solutions based on newest energy-savings technology and has made a name for itself as a leading system optimizer.

An Ampegon transmitter DRM transmitter consumes only around a third of the power of an analog transmitter to cover the same area in even better quality. Ampegon systems perform with maximized efficiency thanks to minimized interface friction. Ampegon transmitter and antenna engineers work close together to find the best and most cost-efficient solution for your transmitter site.

Key Features
- Systems based on tolerance design engineering
- Custom specific solutions incorporating field proven technologies
- Complete in-house engineering facilities from design through services
- CAD (computer enhanced design) tools
- RF and mechanical simulation programs
- Propagation prediction software
- Site surveys
- Rentality studies
- System efficiency calculations
- EMC (electro-magnetic compatibility) studies
- Software evaluation and documentation of RF measurements
- Civil engineering including heating and cooling systems
-Turkey expertise
- 1st class references from leading broadcasters all over the globe

Electronic Design of PCB’s
E-CAD tools allow the design of impedance controlled multi-layer PCB’s. Using modern CAD tools, the team produces scheme and mechanical construction drawings.

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Engineering and Design

Simulation Techniques
Even today, with the amazing variety of available technological innovations at our disposal, it is still a real challenge to transform new RF component concepts into reality. The road from vision to reality is a long one and starts with computer-aided design and engineering programs and ends with the testing of the practical application. Such technologies save both time and money. Ampegon uses state-of-the-art simulation software with such good results that the desired performance of a system is normally reached with only very minor component modifications to the simulated prototypes.

Electronic Design
Transmitters are highly complex systems consisting of a large number of components which are united within an overall, highly complex process. The generation of an optimal product calls for comprehensive technical expertise and careful planning. Tasks of the Ampegon electronic design team include:

- Printed circuit board (PCB) layouts
- Design of control cabinets for transmitters, RF amplifiers, high voltage power supplies and antenna control systems
- Design of sub-racks
- Drawing of electronic and site schema

Working with most modern E-CAD tools, the team produces highly complex high density and high speed PCB’s for power electronics. The schema and construction drawings reduce failure quota during fabrication and guarantee traceability of data.

Mechanical Design
The mechanical design team distinguishes itself through the core competence of RF design and long-year experience in innovative equipment and plant engineering. The team designs 3D system models using latest CAD software. These models include all electrical and mechanical components and are the basis for the assembly and fabrication process in the factory.

Tolerance Design
To assure adequate dimensioning of components and auxiliary equipment, we base all our systems on tolerance design. That is why Ampegon equipment withstands the wear and tear of day-to-day, around-the-clock operation and pays off in terms of low, long-term maintenance costs. Equipment is dimensioned to assure lowest possible stress on all components. Protection and RF power regulation are guaranteed under all kinds of VSWR conditions.

The result is smooth and long-lasting performance. One example of engineering based on tolerance design is the use of thermal imaging cameras to determine the thermal behavior of critical components over time. Thermographic cameras detect radiation in the infrared range, making visible variations in temperature.

Propagation Analysis
Example of a propagation analysis for shortwave coverage of national area and surrounding borders using a single frequency (6.095 MHz).

Thermal Imaging
Snap shot of the transmitter power transformer and power rectifier of the TMW 2010D during power tests in the laboratory in Switzerland. The photo allows fast detection of thermal hot spots.

«With a strong spirit of innovation, Ampegon plays a pioneering role in the market. The technological milestones have greatly shaped the industry and set high standards for state of the art design.»

Marcel Frei, Head of R&D
Technology is our chance and our challenge. No area of broadcasting is more affected by technological evolutions than that of service and maintenance. Interconnectivity changes daily routines. Reliability and availability are key words, and every minute of downtime means displeased listeners and potential loss of income.

Supporting your teams and your infrastructure, Ampegon is a reliable and experienced partner and offers a wide range of packages from trouble-shooting and spare parts management to customized service line agreements, assisting you with customized solutions.

Services, Solutions and Support
The Ampegon broadcasting customer support team delivers complete solutions and pro-active support to safeguard the availability and quality of your equipment throughout its lifetime. Backed by the Ampegon global sales and services organization, we provide support throughout the operational lifetime of your equipment:

- On site installation, commissioning and training programs
- Field services/site surveys/inspections and expertise
- Spares and emergency kits
- Hardware exchange support
- Modernisation and upgrade programs
- Maintenance contracts & assistance
- Hotline support service
- Repair center
- Training

Scope of Services
Ampegon offers various SLA levels to meet specific needs. An SLA can include for instance following services:

- Initial site survey (spare documentation, reporting schedules, logging tools, checklists)
- Reporting/analysis of data, statistics, maintenance, trends, performance analysis
- Support, Hot line (via phone, e-mail and real time on-line support active in 30 minutes)
- Pro-active services: on-line transmitter operation, training, fault analysis based on findings, repair possible
- Remote diagnosis (remote access and monitoring to equipment)
- Service request (on site within 12/72 hours)
- Repair / exchange (RMA issued after notification)
- Spares, updates, training (swift reaction on any request, proactive updates, upgrades)

Key Operational Points and Advantages
Regular, preventive maintenance extends the lifetime of your equipment and assures high availability and include regular replacement of wearable parts (e.g. fuses, pump seals, fans) and quality of service verification with KPI tracking (key performance indicator).

Remote monitoring enables regular checks of key parameters via remote link (e.g. dedicated line, internet) and prediction of possible failures, and is a highly useful and proactive support of operators. Advanced simulator tools allow us to carry out on-line fault analysis.

Long-term component life support is based on our guaranteed repair capacity for 10 – 20 years lifetime. An SLA may include free software upgrades. Spare part management assures the high availability of key components. Our teams work with electronic catalogues and professional spare parts management tools to enable quickest service.

With extended warranty contract, we offer free repairs for extended years. We also offer modular training concepts and development programs for professional training of your operators and to build up the knowledge base and expertise of your key people.

Complete Offerings around the Clock
From customized service level agreements to on-line trouble-shooting, our team is never further away than the touch of a button.

Key Features
- Site surveys and reports
- Upgrades throughout product lifetime
- Preventive maintenance programs
- Customized workshops
- Symposia
- On-line help centers
- Remote diagnosis and trouble-shooting
- Customized service level agreements (SLA)
- Customized training programs, on and off site
- Solutions for spares logistics
- Substitutes for obsolete parts
- Backed by global Ampegon network
The purchase of an Ampegon transmitter or antenna system opens the door to a whole world of highest-quality, hand-crafted professional broadcast auxiliary systems and components. Our auxiliaries are a cornerstone of our A to Z professional solutions and are especially designed and engineered to enhance performance and lifetime of AM/DRM broadcast stations.

All auxiliaries are the product of highest quality craftsmanship backed by more than half a generation of experience in the trade. The choice of Ampegon professional components for your radio broadcasting system is your guarantee for quality, long lifetime and best performance.

**Test Loads**
Ampegon test loads are designed for the continuous dissipation of RF power in the long-, medium- and shortwave bands. The frequency response is well above 30 MHz for broadcast applications and 300 MHz for scientific applications. Offering full radiation screening and robust design, this equipment is an indispensable tool for adjustment, testing and maintenance of transmitters and RF power amplifiers at fully modulated carrier power. Disturbance to other transmitters or the reception of nearby services is avoided.

Other benefits include a fast responding soda water temperature controller and a remote display option. Integration in a station control system is possible. Available with an appropriate secondary cooling circuit, the test loads are designed for three versions:
- Soda-water/air heat-exchanger
- Soda-water/glycol-water/air heat-exchanger
- Soda-water/water heat-exchanger.

Upon request, Ampegon delivers mobile test loads, completely assembled and mounted inside a robust, movable container.

**Antenna Selector Switch**
Ampegon symmetrical antenna selector switch (100 to 500 kW) is designed for use in cross-bar switching systems of shortwave transmitting centers. Sturdy and reliable, the Ampegon shortwave selector switch is the perfect asset for any shortwave broadcasting station with more than one transmitter and antenna. Benefits of the Ampegon selector switch include
- Excellent accessibility of all parts for efficient maintenance
- Successful elimination of cross-talk problems by efficient shielding of individual units
- Low standing-wave ratio thanks to careful design
- Manual or motor drive versions

The time required for a motorized switch-over is approximately 2 seconds.

**Aviation Obstructions Lights**
The Ampegon obstruction lights guarantee safe working under severe conditions and feature high efficiency and low failure-rate. The lights are fully protected against lightning strikes and can be seen from great distance. Full EMC (electro-magnetic compatibility) with surroundings is guaranteed.
Coaxial Feederlines and Accessories
Ampegon offers various types of 50 ohm EIA 6 1/8 "respectively EIA 9" coaxial feederlines and accessories to fit a variety of specific needs. The feeder lines consist of two concentric conductors, insulated from each other by air or gas. The outer conductor is made of aluminum, while the inner one is of copper.

Bandpass Filter
A classic of the AM radio broadcasting technology, the bandpass filter was traditionally designed for use with radio receivers and high power tube transmitters. Hand in hand with the digitalization of the AM bands, this field proven circuit is re-instating its popularity as an elegant solution for balancing highly asymmetrical impedances in the near band area. The Ampegon bandpass filter is a highly useful, all-in-one solution for a wide range of various situations, as:

- Excellent compensation of non-linear impedance and phase characteristics for DRM applications
- Galvanic isolation between transmitter and antenna with high voltage stand-off capability between both circuits
- Excellent lightning protection for solid-state transmitters
- Outstanding damping of other frequencies

Coaxial Federline Standard line type ALCU-ST.

Bandpass Filter | Bird’s eye view of the matching elements.

Outdoor Balanced Switching System | This high power switching system handles beam slewing and pattern configuration for shortwave curtain antennas.

Outdoor Balanced Slewing Switch | This 5 position slewing switch for a shortwave curtain antenna facilitates an azimuthal move of the main beam direction up to +/- 300°.
Radio broadcasting is one of the oldest and most successful communication mediums in the world. After more than a hundred years, it is still the only media to reach out around the globe and inform and entertain people anywhere using a single, independent infrastructure from the own home territory. Our teams are fully committed to the future of our activities and work hard to provide our customers with the best, most innovative and most cost-efficient equipment available today.