AUDIOARTS

AIR4

LPFM
LOW POWER FM EQUIPMENT GUIDE

AUDIOARTS ENGINEERING

Radio Mixing Console

AIR 1

Wheatstone
BROADCAST AUDIO PERFECTIONISTS®

LPFM

low power FM equipment guide

One of the challenges in launching a new LPFM station is assembling a package of equipment that provides the reliability and ease of use required for broadcast use and also meets your budget requirements. Wheatstone Corporation has been providing equipment for broadcasters large and small for over 35 years, and we have put together this guide to assist you in choosing the right gear for your new venture!

Studio Equipment

1. **Microphone** – choose a directional (cardioid) mic. This will provide better rejection of background noise. A mic without an On/Off switch will help you avoid having a mic accidentally switched off. Your audio board should handle the mic On/Off Function

2. **Microphone boom arm** - for mounting your mic as in the photo on facing page.

3. **Microphone processor** - a mic processor conditions your mic audio by giving it a consistent output, reducing unwanted background noise, improving intelligibility, and creating the most sonically pleasing on air sound for your talent.

4. **Audio Source Equipment** - CD Players, Turntables, MP3 Players, Tape Machines. These will be determined by the various media types you intend to use for audio playback.

5. **PC** - a PC may be used for audio playback of individual files. It may also be used in conjunction with automation software for playback of multiple audio files controlled by a schedule (playlist).

6. **Monitor Speakers** - a good set of stereo speakers will work for this, though you may want to look into speakers specifically designed for this task. They are usually listed as "Studio Monitors"'

7. **Headphones** - look for the "closed ear" variety. This eliminates bleed into open microphones. Also look for headphones with 1/4" plugs - your audio board should have a 1/4" headphone output.

8. **Audio Board (Console)** -the most critical piece of gear in your studio. The console mixes all your sources (mic, CD Players, PC, etc.)

to create the program output that is sent to your on air processing and transmitter. A real broadcast board will offer speaker muting that mutes your monitor speakers when your mic is on, eliminating the possibility of feedback. It will provide a means of controlling an On Air Tally (light) to alert others that you are currently on air with a live mic. The console should not have numerous knobs and controls for unneeded functions, typical of many music store mixers. These provide many opportunities to do harm to your program! The console is also the most heavily used piece of equipment you will own, so reliability and build quality are of utmost importance.

9. **EAS decoder** - you will be required to rebroadcast emergency alerts that you receive from the Emergency Alert System (EAS). The EAS decoder will receive these alerts for rebroadcast.

10. **Phone Hybrid** - a phone hybrid separates incoming audio (the caller) from outgoing audio (the in studio talent). When these signals are separate you can insure that caller audio is not sent back to the caller. Broadcast audio consoles can create the return signal (called mix-minus, ie: the program mix, minus the caller audio).

11. **FM Receiver / Modulation Monitor** - the Mod Monitor helps you make sure you are not modulating above FCC limits. Most Mod Monitors also have an audio output that can be used as your off air audio monitor. Your transmitter may have a deviation meter. If so it may be adequate for mod monitor use, in which case you'll need an FM tuner for off air monitoring. PLL varieties that stay locked on frequency are best.
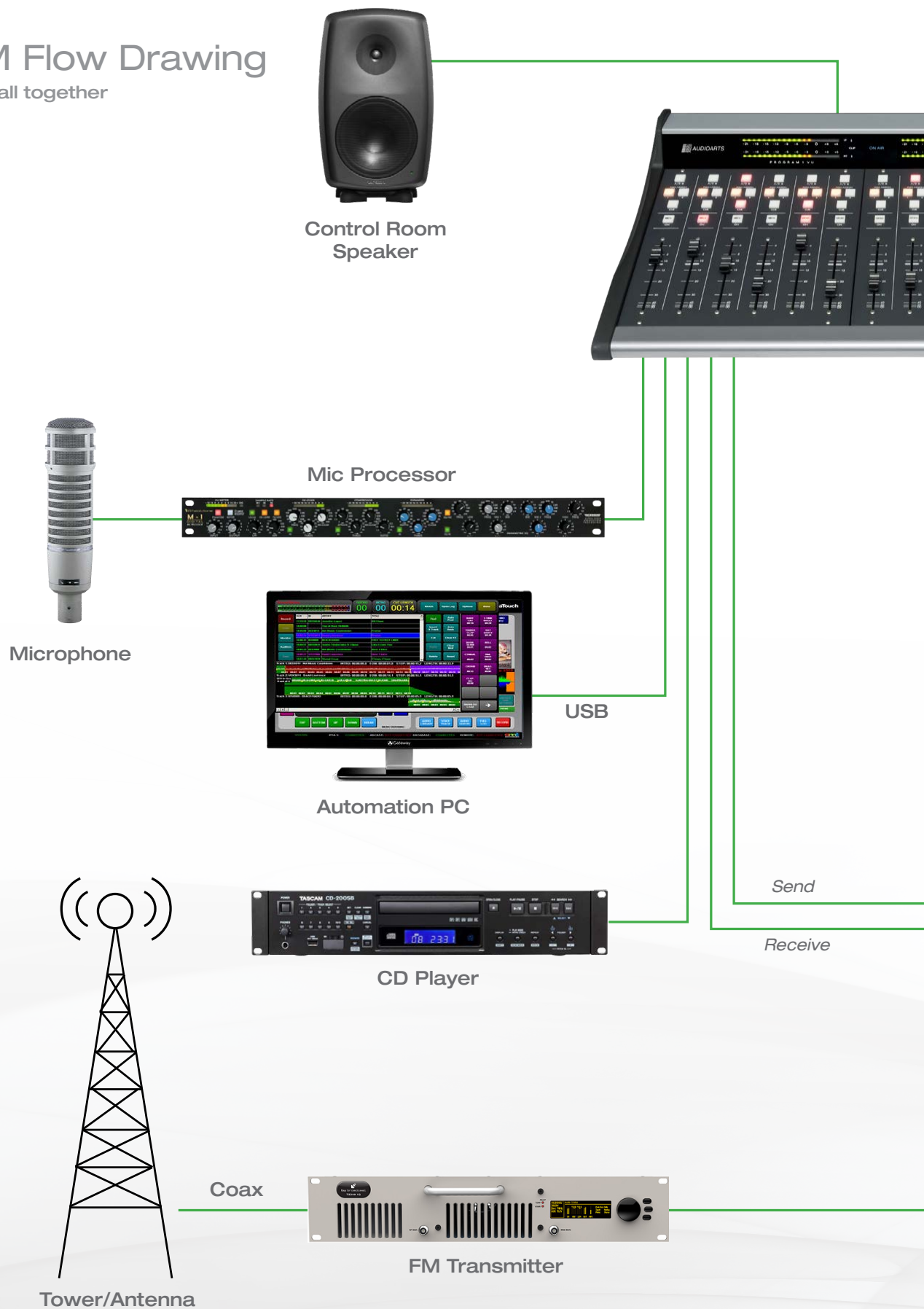
Transmission Equipment

1. **On Air Processor** - your on-air processor conditions your final program output before it is sent to the transmitter. It determines your overall station sound and allows you to broadcast the loudest, cleanest signal without overmodulating. It also contains a stereo generator to produce the composite signal required by your transmitter for FM Stereo broadcast.

2. **Transmitter** - depending on your antenna type and Height above average terrain (HAAT) you'll typically need a 100 to 200 watt transmitter.

3. **Antenna** - your dealer for RF equipment can help you choose a suitable antenna. Polarization and the number of bays are variables in this decision.

4. **Tower or mast** - various options here include leasing space on an existing tower, mounting your antenna on an existing structure such as a church steeple, or building your own dedicated tower. Your RF dealer can advise you here as well.

5. **Studio to Transmitter Link (STL)** - If your transmitter is in the same building as your studio or in near proximity you can use a balanced audio connection. For longer distances you can look at microwave links, unlicensed wireless Internet radios, or streaming over public Internet.

6. **Cables and Connectors** - in addition to the audio cabling required you will need good low attenuation coax cable to connect your transmitter to the antenna

LPFM Flow Drawing

putting it all together

Control Room
Speaker

Mic Processor

Microphone

USB

Automation PC

Send

Receive

CD Player

Coax

FM Transmitter

Tower/Antenna

**Control Room
Speaker**

Audio Console

**Program
Output**

EAS Unit

External Monitor In

Headphones

Modulation Monitor

**Phone Hybrid and
Handset**

On Air Processor

low power FM
Let us help with your system!

Wheatstone's Audioarts consoles are the finest analog consoles available AND represent the greatest value.

Audioarts AIR-1 Audio Console

The Air-1 has everything you need for on-air, production, news applications, and podcasting at a fraction of the cost of larger consoles. The Air-1 accepts two mono microphone inputs and six stereo inputs that can be routed to one or both of the console's stereo outputs, along with a comprehensive metering and monitoring section usually found in larger designs. Bottom-mounted dipswitches are included for easy programming. A USB audio port provides access for a computer or automation system to send and receive console audio

Audioarts AIR-4 Audio Console

The Air-4 has four microphone preamps built in, which allows the use of a host microphone and three guest microphones without the use of any external mic preamps. It gives you 12 input faders (with A-B source select), a thirteenth fader with talkback and auto mix-minus for call-ins, external machine control, two program busses, built-in CUE speaker and Control Room, headphone and studio monitoring control.

With basic features like machine control, cue, talkback, and mix-minus included, it's perfect for smaller stations looking to upgrade as well as for larger facilities in need of an auxiliary studio or newsroom console. Add patchable USB connectivity for PC news, production workstations or streaming audio, and the Air-4 is perfect for local radio stations and Internet broadcasts.

Audioarts Lightning Audio Console

Lightning is designed for studios that have mostly microphone or analog source inputs, and where a lot of studio routing isn't required. It doesn't have the extensive A/D, D/A conversions of a typical digital board, yet you have access to editing software, Skype or other external sources through USB and Bluetooth.

USB and Bluetooth onboard connectivity is useful for playing audio directly from a PC or to output audio to edit in VoxPro or other recording software, as well as receive and record calls from Bluetooth enabled cellphones or play cuts from MP3 players.

The console also contains a patchable AES input for connecting a digital source to any fader, and built-in A/D conversion for the main program output so operators can access the Program Air feed as balanced analog, AES3 digital, or both simultaneously.

While it looks and feels like its Wheatstone cousins, this digitally-enabled analog console operates as a full standalone board.

low power FM

Let us help with your system!

Processing is an integral part of your broadcast. It keeps levels in check, makes you sound your best, and can really make you stand out.

MP-532 FM/AM/HD/STREAM Multi-Processor

Wheatstone's new MP-532 audio processor is an affordable single-space rack unit that can handle any and all your broadcast processing applications – FM, AM, FM HD, AM HD, HD-only, or Streaming. It's priced so you can use multiple boxes where and how you need them without having to commit to a large expensive box with bells and whistles you may not need. It's the best way to install exactly what you need without spending a penny more than your budget.

The MP-532 offers tools that can provide the most clarity and articulation of any processor on the market. Breathtakingly airy and silky highs with detail that you get from the finest hifi audio gear, mids that never overstep their thresholds insuring mud-free warmth and presence, and deep powerful lows that are sculpted to be richly detailed and free from the muck that bogs them down in nearly every other processor.

All that comes without having to give up volume - indeed, just the opposite. MP-532 gives you "loudness-ability" courtesy new distortion canceling algorithms and precision look-ahead limiters to provide pristinely clean audio AND dial-dominating loudness.

There's full FM RDS capability so that $500 RBDS/RDS encoder you were going to have to buy to generate song, title and album data won't be needed. MP-532 has a built-in RBDS/RDS encoder.

A multiplex power controller is included, saving yet another costly unit to meet the ITU-R BS.412-7 modulation requirements for reducing adjacent channel interference.

Unique to Wheatstone processors, the MP-532 includes our intelligent five-band AGC technology — or iAGC — coupled to a five-band limiter and stereo generator. The combination provides automatic and superior real-time program density control for a consistent, spectrally-balanced sound regardless of density variations in incoming source material.

MP-532 is part of the WheatNet-IP audio network, with a full-blown interface, so you can set up and trigger presets remotely now and add on to your WheatNet-IP ecosystem later. It also includes 192kHz digital MPX connectivity to the transmitter for end-to-end native IP audio quality. It is equipped with two analog composite outputs, two SCA inputs, balanced analog Left/Right outputs and an AES digital output which may be switched to deliver either discrete Left/Right or baseband192 digital multiplex signal. Input audio may be delivered via analog, AES or WheatNet-IP.

For local and/or remote control, there's a full graphic user interface that allows you to tailor every function of the MP-532, so tweaking and making changes is both intuitive and accessible.

M-1 Voice Processor

The features on the M-1 include a four band parametric EQ, hi and lo pass filters, de-esser, expander, and our proprietary Vorsis dynamics processing. The unit comes loaded with factory designed presets, and designing your own is easy thanks to the Quick Save and Quick Compare functions. A simple graphic user interface allows quick recall of different presets so each talent can have customized settings perfect for them.

M-4IP USB Voice Processor

The M4IP-USB is a four-channel DSP-based BLADE-3 voice processor with four completely independent channels of high-quality, low-noise, high-dynamic range and accurate transient response voice processing in an IP networked rack unit.

The M4IP-USB combines four high-quality microphone preamps, four channels of Vorsis embedded microphone processing, and a WheatNet-IP BLADE interface, allowing you to place four microphone inputs anywhere in your WheatNet-IP Intelligent Network (although it also works just fine as a standalone processor). The preamps and processors are accessed and controlled from any point on the network via its Windows-based GUI.

Four independent USB ports are built in to facilitate the individual use of each processor output by separate computers.

The M4IP-USB is a great way to maximize your investment in on-air talent by combining four mic processors into a single rack space, accessible from anywhere.

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