

Tips N Tricks

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Making Digital Broadcasting **Work.**

Agenda:

- You asked for it!
- We thought of it.
- What did we miss?



Maintenance:

- Air Filters
- Hardware
- Air Handling
- Ground System
- Housekeeping



Air Filters:

Air Filters should be changed on a schedule, based on site conditions.

Metal mesh filters can be washed – make sure they are dry before reinstalling!



Air Filters:

AMPFET 1-10: metal mesh. Ask for the base filter, without the paint and mounting holes drilled... it's about ¼ the price!

AMPFET 25/50 and first gen **ND5/10**: metal screens. These can be replaced with foam filter media with plastic guards (HAS47) but need longer screws.

ND1-10 (including **ND5/10** second gen): foam filter media can be purchased in sheets online and cut to size – ask Support for media specification.

ND25/50, FM and **V** series – metal mesh.

Later **NV**, all **NX**, **GV** and **NVLT** series – pleated paper filters, many available through online sources. Most are MERV8, but verify specs against OEM filter.



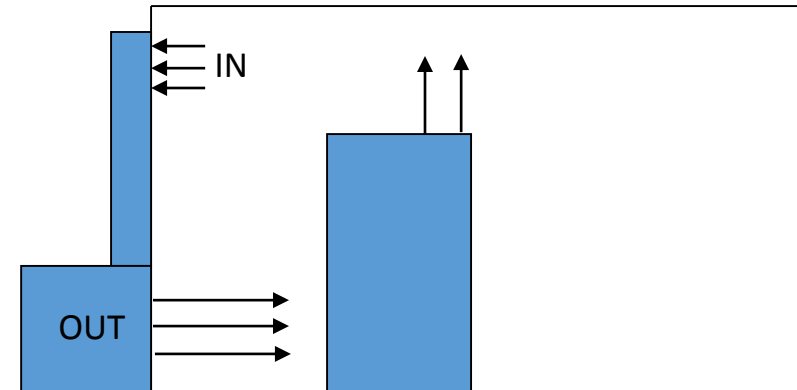
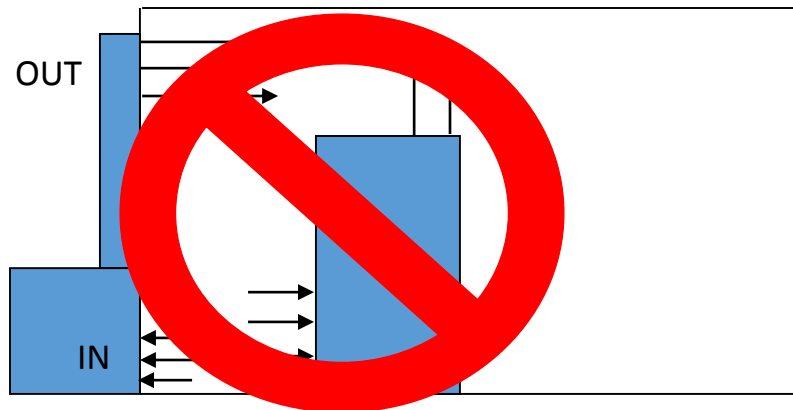
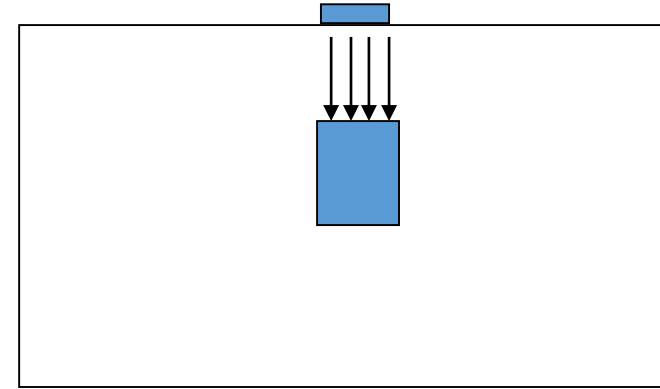
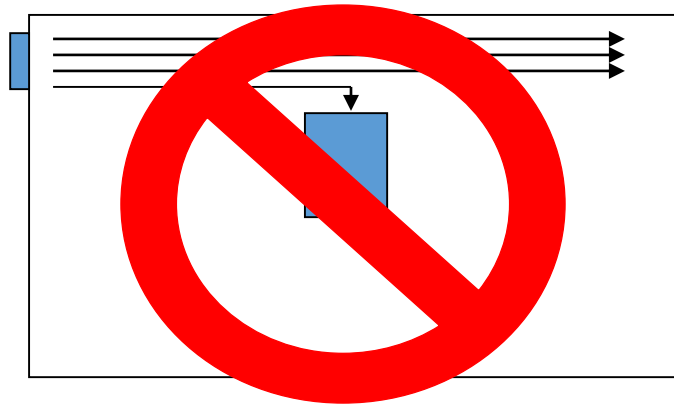
Hardware:

- Compression connections (such as AC entry points and circuit breaker connections) can loosen over time, as wires compress.
- Filter connections and grounds should also be checked (fan/blower vibration and heating/cooling cycles can also cause these to loosen)



Air Handling:

AIRFLOW DIRECTION IS CRITICAL!!!



Groundskeeping:

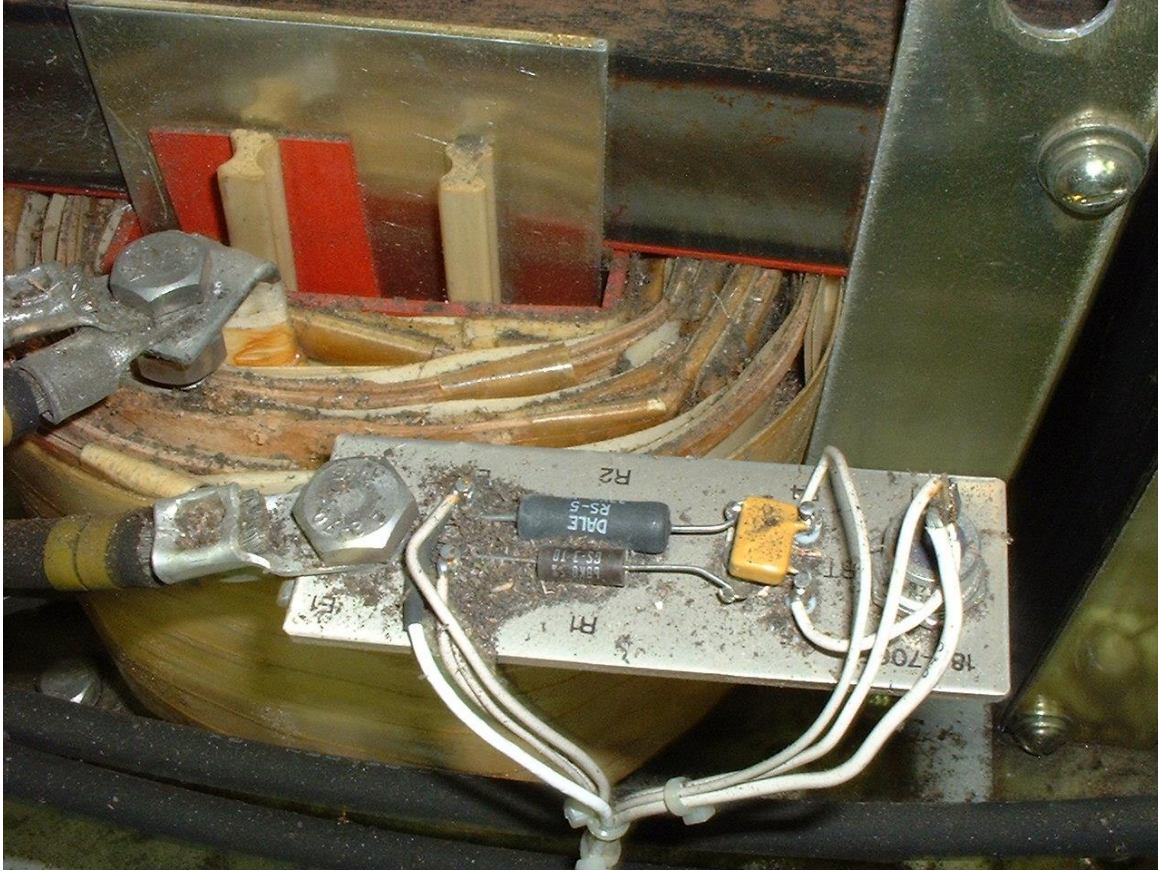
Make sure ground is grounded!



Remove unused cables



Housekeeping:

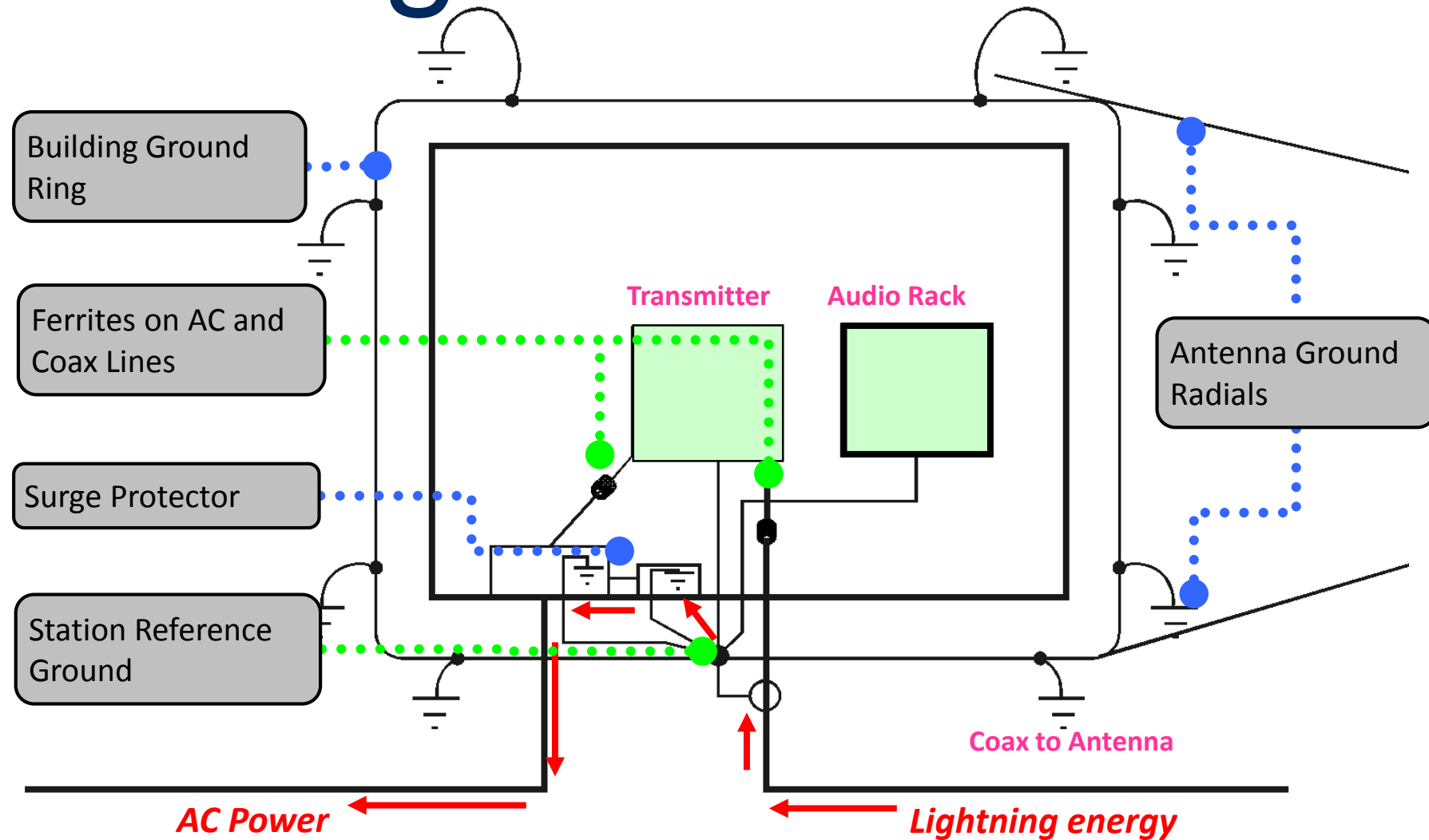


Grounding:

- Single Point
- Bonded connections
- Surge Protector
- Use ferrite
- Look for ground loops



Grounding:



Single Point:

Bulkhead ground for coax cables

- Best done where cables enter building
- Connected to station reference ground
- Keep ground leads as short as possible



Bonding:

- All connections should be soldered, brazed or CAD welded.
- Compression connections are not ideal, they can loosen over time, or become less effective as materials oxidize.



Bonding:

Make certain your ground
IS really a ground!



Surge Protector:

AC Power line protectors are a must – and they **MUST** be connected to your station reference ground.



Ferrites:

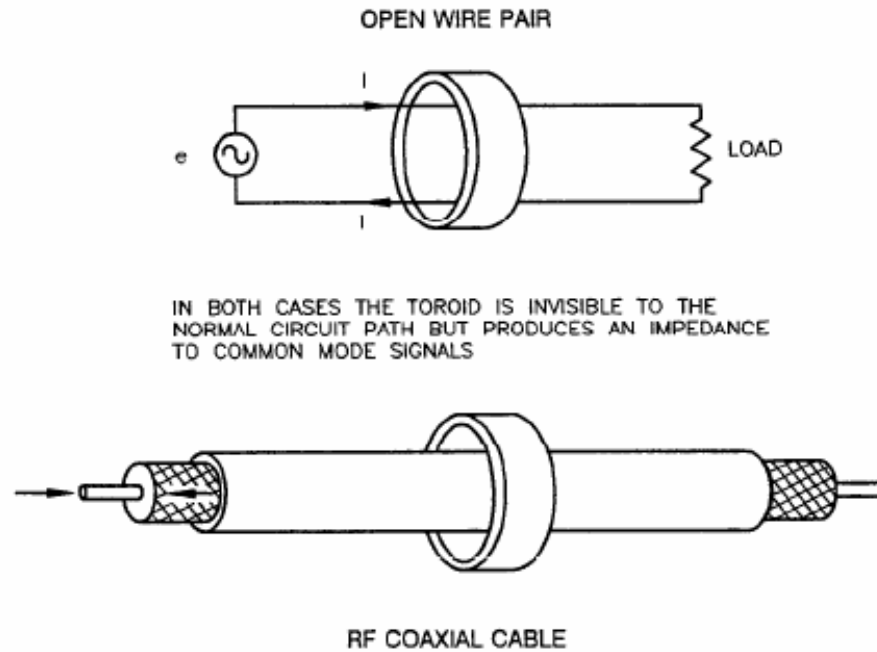


Figure F-4 Use of Toroids to Impede Common Mode Signals

Ferrites are good for reducing common mode signals

- Lightning surges

- Induced RF (especially at co-located AM and FM sites)

- Power line and power supply noise

Ferrites:

- ON the coax near the transmitter
- ON the coax near the input to the antenna tuning unit (ATU)
- ON audio cables near their termination point
 - only twisted pair, shielded cables should be used
- ON the AC to the transmitter
 - all AC phases and AC ground go through the same ferrite
- ON the remote control cables
 - only twisted pair, shielded cables should be used
- ON AC cables to any external equipment



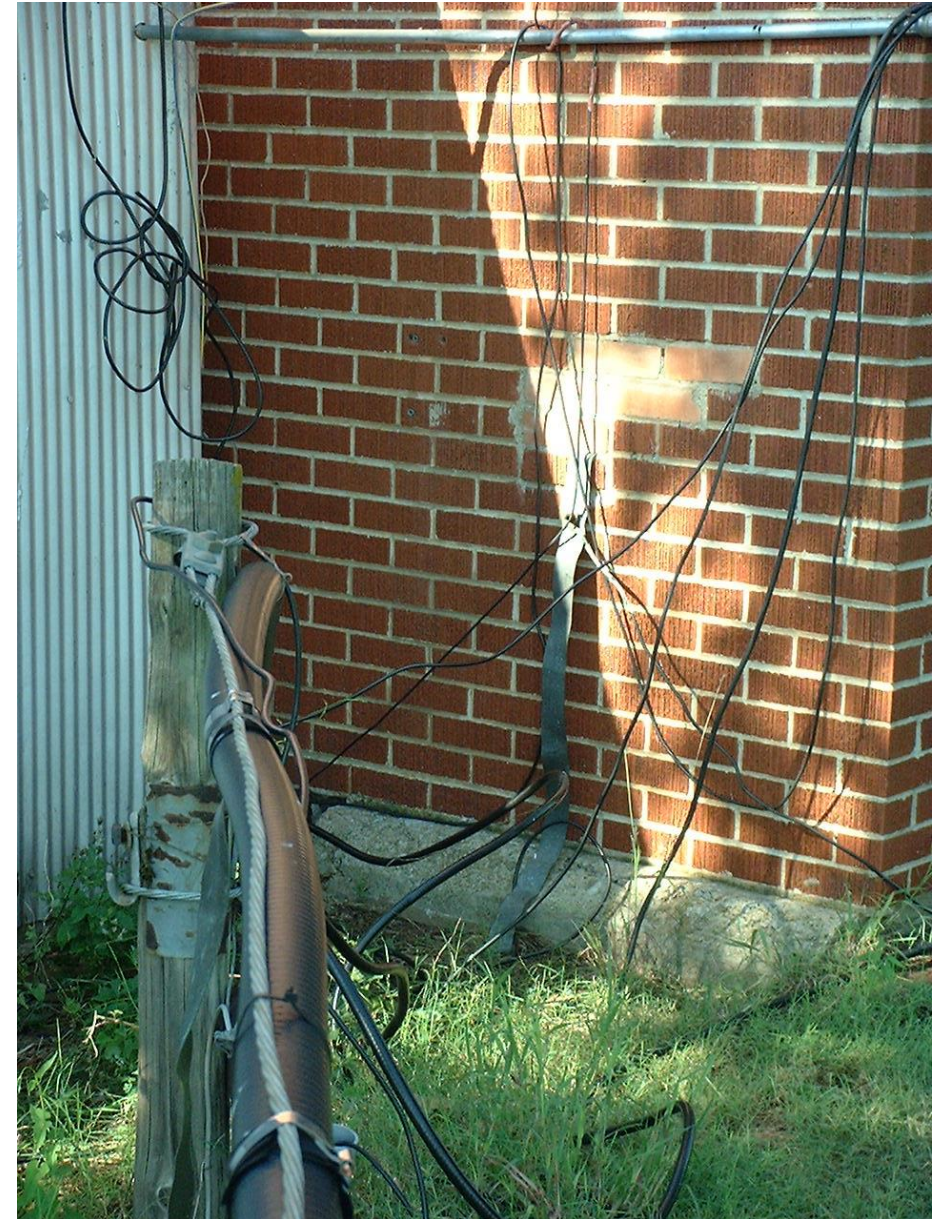
Ground Loops:

Clean up excess wiring

- previous installs
- broken connections that were replaced.

Keep ground connections to a minimum

- one per piece of equipment



Streaming/AoIP:

AoIP:

- Sample rate must be 48 kHz or lower.
- Bit rates have only been tested to 384 kbps.
- Audio must be 16 bit stereo, MP3 or WAV (WAV must contain RIF header)

Streaming/AoIP:

Shoutcast/Icecast:

- Sample rate must be 48kHz or lower.
- Bit rates have only been tested to 384 kbps.
- Audio must be 16 bit stereo, MP3
- Server must be public

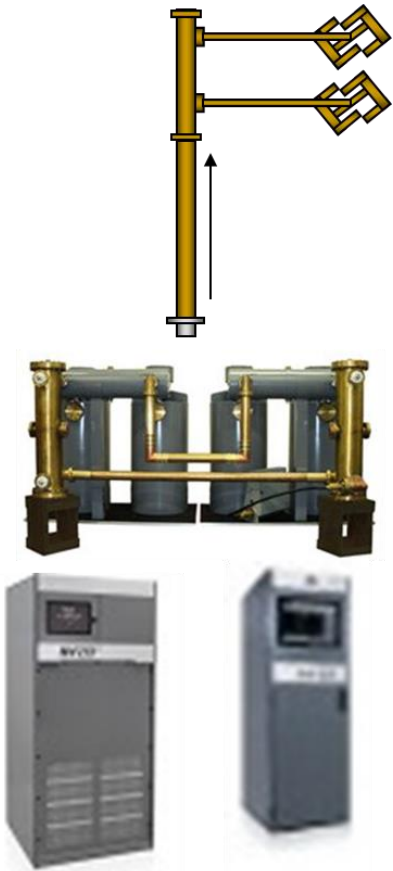


HD Radio/DRM:

- Combining methods
- Points to consider
 - STL
 - Processing
 - Injection Level



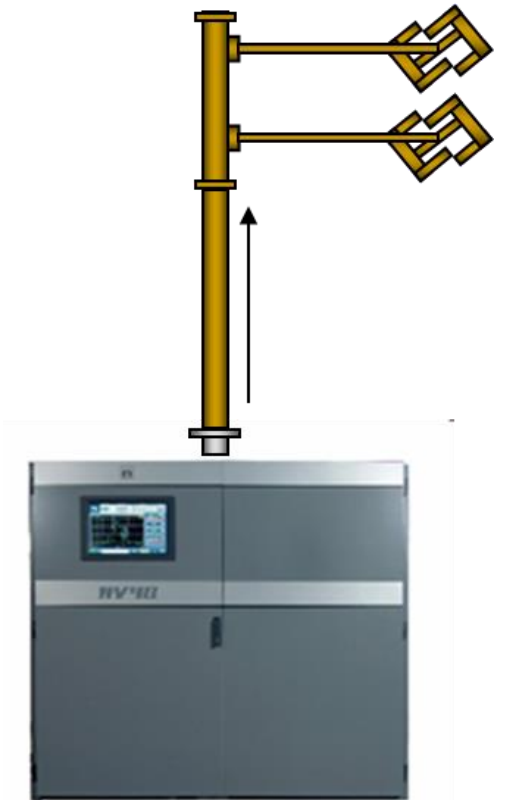
Combining Methods:



High Level - Injection



High Level – Separate Antenna



Low Level - Hybrid

- Show analog and HD audio, as well as RF chain
- Don't forget data vs. audio and include telemetry



Points to Consider:

- Infrastructure** (getting either analog plus HD data or three analog channels from studio to site, as well as any RDS/PAD).
- PAD** may require additional equipment/software
- Peak voltages** – remember to allow 6dB margin for the digital power
 - E.g.- a 10kW analog TPO, at -10dBc injection, requires components capable of 14kW...
$$10\text{kW} + (1\text{kW} * 4)$$



Points to Consider:

- STL**... must handle bitrates. Must be stable with respect to dither.
- IP conflicts** – use QoS routing when possible. Note IP addresses and port assignments.
- PAD** data – requires generator, ports are manufacturer specific.

Points to Consider:

- Sample rate conversions**... down is okay, up is bad. Avoid as much as possible.
- Audio levels** can be set in board, processor, some STLs, Exporter and Exciter. Especially when using AES/EBU, keep the reference level the same throughout the chain – it helps to make troubleshooting easier.
- Audio delay** can be set in the Processor, Exporter or some Exciters... determine if you want your analog running through the Exporter.

RDS:

- Gotchas
- Software
 - Configuration
 - Current Settings vs. Preset
 - Network stuff

Gotchas

- Software version
- Putting the right info, in the right places
- Active Preset
- Port 7005 & network
- Front end set-up



Software: Can I do that?

Transmitter	Software Version	Static/Dynamic
VS	4.2.5*	Yes/Yes*
NVLT	4.3.5	Yes/Yes
GV	4.3.3	Yes/Yes
NV	4.2.8	Yes/No

General	Main Audio	SCA	RDS	Other Settings
RDS		On		
RDS Local Echo	Off			
Data Source	Internal			
Injection Level	10.0 %			
Phase	0.0 °			
Baud Rate	19200bps			
PI Code (hex)	0x0000			
PS Name	PS NAME			
Scrolling Enable/Speed	Fast			
Scrolling PS Name	The Scrolling name of the PS			
Scrolling Type	Word			
Radio Text				
PTY	1: NEWS/NEWS			
PTYN	Hello !?			
Music/Speech	Speech			
Traffic Info	None			
Alt. Frequencies	None			
Artificial Head	Off			
Compression Flag	Off			
Dynamic	Static			
Stereo	Mono			

Configuration

Injection Level: 0-10%, typically 5%

- If 0%, no RDS 😊

PI (Programme Identification) Code: 4 digit hex

- Format 0x____ ex. WNUG = 0x790A

PS (Programme Service): Static station identification max 8 characters

- Hint – a space is a character ex. NUG 2016

Scrolling PS Name (if enabled): up to 64 characters

Scrolling Type: Word or Character

Radio Text: 1 – 64 characters that will display on some receivers.

- Not to be confused with Scrolling PS Name



Preset VS Current Settings

Current Settings

- See the * notation
- Changes take effect immediately

The image displays two screenshots of the Nautel web interface. The top screenshot shows the 'Current Settings' page, which includes a 'Date & Time' section (Tue Apr 7 2015, 12:36:44), a 'Transmitter' section (0 W, FM, 98.10 MHz, Reflected 0 W, Set Point 15.0 W, Preset: *10Watts), and an 'Active Exciter' section (FM Modulation, 0%). The bottom screenshot shows the 'Preset' page, which includes a 'Date & Time' section (Tue Apr 7 2015, 12:40:02), a 'Transmitter' section (0 W, FM, 98.10 MHz, Reflected 0 W, Set Point 15.0 W, Preset: *10Watts), and an 'Active Exciter' section (FM Modulation, 0%). The 'Preset' page also features a 'Presets : 10Watts' section with a 'Load' button and a 'Save New' button. The 'Main Audio' section includes a 'Digital Level' of -4.0 dBFS, 'Audio Mode' of Stereo, '15kHz Lowpass' of Off, 'Preemphasis' of 0us, and 'Audio Mod Adjustment' of 0.00 dB.

Preset

- Changes the main preset
- Must activate changed preset for changes to go on-air

Port 7005 & Front End Set Up

ASCII over IP, open port 7005

- Is it open? Use port checker
- Hung up in your network? Is it the transmitter or is the signal stuck somewhere?

Front End Set Up

- Proper configuration
- How often are you sending information to the transmitter?

For more network Tips&Tricks see 2015 NUG presentation

<http://www.nautel.com/resources/presentations/>



Making Digital Broadcasting **Work.**

We Thought of It

- Time of Day switching
- Safety
- Security

How do I configure my VS transmitter to turn RF ON/OFF automatically at different times of the day?

Created by Charles Andrews on Mar 02, 2015

DRAFT

Purpose

Some customers want to broadcast at different times. This "How To" article will help you accomplish this using the "Scheduler."

Step-by-Step Guide

1. Create your main operating (On Air) preset.
2. Create another preset (Off Air) and configure the "Audio Loss Time Out" function to turn RF off if an UNUSED audio source is low.
Explanation: While enabled, this preset will keep your transmitter off air. When an unused audio source is chosen for the "Audio Loss Time Out" setting the transmitter will always take the selected action (RF Off) when set to this preset.
3. Configure the "Scheduler" to change to the "Off Air" preset at the desired time to stop broadcasting.
4. Configure the "Scheduler" to change to the desired "On Air" preset at the time broadcasting is to resume.
5. Set to desired preset and press "RF ON."

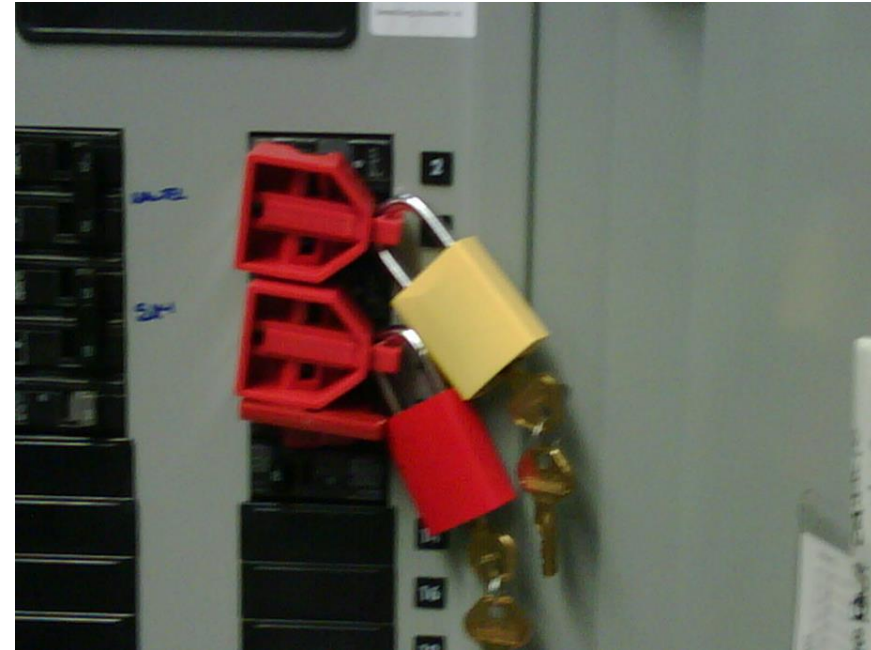


Safety:



Electric Shock Resistant Boot / Electric Shock Resistant Footwear (ESR)

Boots labeled "ESR" are manufactured to protect you from electric shock when working near electrical hazards. Testing concluded the leakage current did not exceed 1 mill ampere when applying an 18,000 volt / 60HZ electrical discharge to ground for one continuous minute.



Safety:

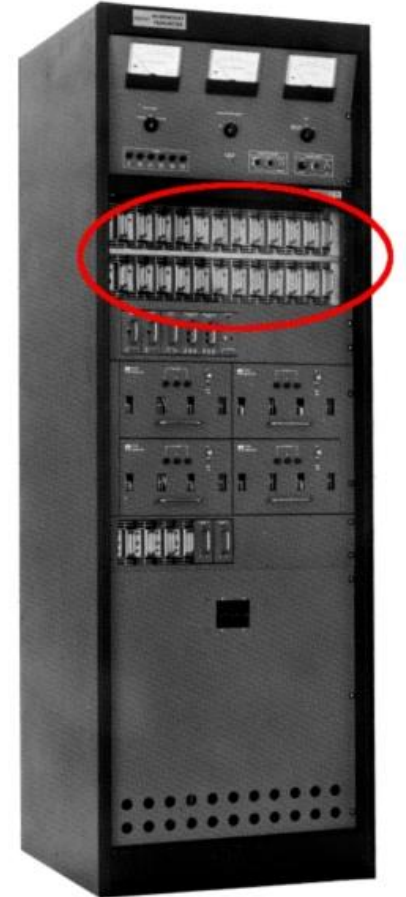
- If a transmitter has a cover panel, **LEAVE IT IN PLACE!**
 - Safety
 - Airflow
 - Circulating currents

Unless there is a note specifying it's to be removed!

NV20/NV15 INSTALLATION MANUAL

UNPACKING AND POSITIONING

8. Remove the grey, plastic power supply shipping panel in the lower, front compartment of the transmitter cabinet (covers the module power supplies). The panel is secured using M4 hardware.



Security:

A very brief search found well over 5000 broadcast related devices open on the internet.

Many of these identified the station by call sign.

TOP COUNTRIES



United States	994
Canada	175
France	51
Brazil	47
Norway	38

TOP SERVICES

HTTP	747
HTTP (8080)	657
HTTPS	296
Insteon Hub	5
Qconn	5

TOP ORGANIZATIONS

Comcast Business Communica...	89
Comcast Cable	75
Charter Communications	43
AT&T U-verse	38
Frontier Communications	20

TOP OPERATING SYSTEMS

Linux 3.x	21
Linux 2.6.x	15

Total results: 1,726

Preparing to load the Tieline G5 Toolbox

Cj-cablenet

Added on 2016-04-11 20:12:37 GMT

🇰🇷 Korea, Republic of, Seoul

[Details](#)

HTTP/1.1 200 OK

Content-Type: text/html

Accept-Ranges: bytes

ETag: "197186316"

Last-Modified: Mon, 21 Apr 2014 05:16:09 GMT

Content-Length: 870

Date: Sun, 10 Apr 2016 20:12:32 GMT

Server: **Tieline**

Preparing to load the Tieline G5 Toolbox

Bell Canada

Added on 2016-04-11 19:57:02 GMT

🇨🇦 Canada, Barrie

[Details](#)

HTTP/1.1 200 OK

Content-Type: text/html

Accept-Ranges: bytes

ETag: "152882926"

Last-Modified: Fri, 07 Mar 2014 15:44:58 GMT

Content-Length: 870

Date: Thu, 14 Apr 2016 20:07:11 GMT

Server: **Tieline**

Preparing to load the Tieline G5 Toolbox

Telstra Internet

Added on 2016-04-11 19:47:40 GMT

🇦🇺 Australia, Brisbane

[Details](#)

HTTP/1.1 200 OK

Content-Type: text/html

Accept-Ranges: bytes

ETag: "-2052981890"

Last-Modified: Tue, 02 Jul 2013 03:32:49 GMT

Content-Length: 870

Date: Mon, 11 Apr 2016 19:46:08 GMT

Server: **Tieline**



Security:

Our AUI is not identified by brand name, but NX-Link is and Burk Arc-Connect identifies what equipment it is controlling

TOP COUNTRIES



United States	11
Spain	2
Philippines	1
Canada	1

TOP SERVICES

SNMP	12
Telnet	3

TOP ORGANIZATIONS

Telefonica de Espana	2
CenturyLink	2
Vista Broadband Networks	1
Verizon Wireless	1
Verizon Business	1

Total results: 15

Telefonica de Espana

Added on 2016-04-10 04:28:12 GMT


 Spain

[Details](#)

Nautel Next-Generation Transmitter

Bell Aliant

Added on 2016-04-09 23:28:15 GMT


 Canada

[Details](#)

Nautel NxLink Remote Monitoring and Control Device

CenturyLink

Added on 2016-04-09 05:00:25 GMT


 United States, Des Moines

[Details](#)

Nautel NxLink Remote Monitoring and Control Device

Mid-Rivers Telephone Cooperative

Added on 2016-04-06 09:27:34 GMT


 United States, Glendive

[Details](#)

Nautel NxLink Remote Monitoring and Control Device

Two-Way Radio Service

Added on 2016-04-05 04:44:03 GMT


 United States, Cumberland

[Details](#)

Nautel NxLink Remote Monitoring and Control Device

AT&T Internet Services

Added on 2016-04-04 04:57:40 GMT

 United States, Los Banos

[Details](#)

Nautel NxLink Remote Monitoring and Control Device



Making Digital Broadcasting **Work.**

Security:

At the very least, use a router for a firewall. Assign different ports and port forward through the router.

Ideally, tunnel in through VPN.

Do NOT use default usernames and passwords – these should be deleted (or at least change the password to something complex).

PW= “12345” is not complex.



What Did We Miss?

Round Table Time:

- questions?
- comments?
- suggestions?



And Remember....

Good maintenance
and regular updates
leave time for what's
really important!



Thank You!

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