# **Tips and Tricks**

#### **For Broadcast Engineers and Managers**



# Agenda



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making digital broadcasting work

#### Overview

- ✓ Tips and Tricks
  - For Engineers
  - For Managers



#### Your questions please?

(if you don't see the control panel, click on the orange arrow icon to expand it)

Please enter your questions in the text box of the webinar control panel (remember to press send)

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#### Tip #1 – Keep it Cool and Clean

#### **Calculate transmitter heat load:**

- TPO/efficiency = power consumed <sup>1</sup>
- Power consumed TPO = waste heat (in watts)
- Waste heat \* 3.413 = BTU/hr
- BTU/hr/12,000 = tons of AC required
- Eg: 10kW/0.72 = 13.889 kW of power consumption 13.889 – 10kW) = 3888.9 watts wasted as heat 3888.9 \* 3.413 = 13,273 BTU/hr 13,273/12,000 = 1.11 tons of air conditioning

1 - allow for modulation in AM transmitters... multiplying by 1.25 will be close





# Tip #2 – Label EVERYTHING!

- Label equipment by the name you commonly refer to it
- Label what plugs go where
- Label service dates
- Put program names on sat Rx
- Put call sign on remote gear
- Put serial numbers on front of equipment





#### Tip #3 – Keep it Well Grounded



Buss bar for AC grounds

\_Tied to station reference ground

\_All primary equipment connected

Bulkhead ground for coax cables

- \_Best done where cables enter building
- \_Connected to station reference ground

\_Keep ground leads as short as possible





#### Tip #4 – Regular meter readings

- For Management, this helps know that everything is as it should be
- For Engineers, can show a trend if something is aging, or drifting.







#### **Tip #5 – Check Connections**



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#### Tip #6 – EAS tests and procedure

• Written instructions on performing tests

• Document that tests have been performed



Photo credit www.sagealertingsystems.com



#### **Tip #7 – Critter Proof**







# **Tip #8 – Visual Inspections**

- Regularly, at transmitter sites
- ATU, guy wires, insulators
- Tower anchors, gates, locks
- Condition of grass/brush
  - Arrange to have cut if needed







#### Tip #9 – Use Ferrites

- Not a solution on their own
- In addition to good grounding and surge protection, they can make a difference.



Photo credit - KevinTrueblood, WGCU Public Media



## Tip #10 – Spare keys

• Full set, where easy to find

– They WILL be needed someday!





#### Tip #11 – Be Safe











# **Tip #12 – Transmitter Site Log**

- Log time in and out
  - Who is present
  - What was done

- Keep licenses here also
  - Store in plastic container







#### Tip #13 – Change Default Passwords!





#### Tip #14 – Spare Parts

- At a minimum, a spare tube or any "mission critical" components
- Ask your engineer what they could not do without in an emergency



https://www.radioworld.com/news-and-business/going-tubing-find-the-sweet-spot



#### Tip #15 – Use a VPN

Free or paid, will depend on requirement

– <u>https://www.techradar.com/vpn/best-free-vpn</u>

Paid versions tend to be fairly cost effective – 10.00/mo or less.

Offer a lot more features – more servers, better service, no data caps.





# Tip #16 – Survival Kit

- Paper Towels
- Cleaning wipes
- Drinking water
- First aid kit
- Bug repellant
- Toilet paper
- Garbage bags



photo credit: www.fivegallonideas.com



# Tip #17 – talk "manager"

- Cost of Ownership
  - Purchase Cost + Cost of Operation
- Cost of Operation includes:
  - Parts costs
  - Engineering Time/Costs
  - Power Bill
- Remember "non-cost" factors:
  - Learning curve
  - Pain of use

FM	Transmitte	er Cost Compar	ison		
Prepared By	Jeff Welton for	MTI2016	Date:	21-Jun-16	
Required Information	(complete the y	vellow shaded areas)	_		
	Existing tx:	BTA-5	Proposed tx:	NX5	
Day Power	5	kW	5	kW	anutal
for	24	hrs/day	24	and the second se	INDUCE
Overall Efficiency	40	percent	86	percent	
Base Electricity cost	11.5	cents/kWh	11.5	cents/kWh	
Parts Cost (incl. Labor)	\$3,000.00	per year	\$450.00	per year	
Calculated Power Consum	ption and Cos	sts	2		
Power Consumption (in kWh)	BTA-5	Cost	NX5	Cost	Cost Savings:
per month:	9,900	\$1,138.50	4,605	\$529.53	\$608.97
per year:	118,800	\$13,662.00	55,256	\$6,354.42	\$7,307.58
over 5 years:	594,000	\$68,310.00	276,279	\$31,772.09	\$36,537.91
over 10 years:	1,188,000	\$136,620.00	552,558	\$63,544.19	\$73,075.81
over 15 years	1,782,000	\$204,930.00	828,837	\$95,316.28	\$109,613.72
Parts cost per year:	\$3,000.00	_	\$450.00	11	\$2,550.00
5 yr cost:	\$15,000.00		\$2,250.00		\$12,750.00
10 yr cost:	\$30,000.00		\$4,500.00		\$25,500.00
15 yr cost:	\$45,000.00	_	\$6,750.00		\$38,250.00
		1000	(metre)		122   2011   228   25   160
Total Projected Cost of Op	eration:	BTA-5	NX5		Savings Realized:
Year 1		\$16,662.00	\$6,804.42		\$9,857.58
Year 2		\$33,324.00	\$13,608.84		\$19,715.16
Year 3		\$49,986.00	\$20,413.26		\$29,572.74
Year 4		\$66,648.00	\$27,217.67		\$39,430.33
Year 5		\$83,310.00	\$34,022.09		\$49,287.91
Year 6		\$99,972.00	\$40,826,51		\$59,145,49
Year 7		\$116 634 00	\$47,630,93		\$69.003.07
Year 8		\$133 296 00	\$54 435 35		\$78 860 65
Vear 0		\$140 058 00	\$61 230 77		\$88 718 23
Vear 10		\$188,830.00	\$60 044 10		\$08,575,94
real to		3100,020.00	\$00,044.18		\$50,575.01



#### Tip #18 – Clean Filters

• On air computers monthly

• Transmitter filters will depend on site conditions

• Generator, air and oil, per schedule



# Tip #19 – interface with others, Network



Radio Technology Forum





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# Tip #20 – More Cleaning...

- Keep a ShopVac<sup>™</sup> at the site
  - Clean floors
  - Clean equipment
- Electronics and dust do NOT get along!



photo credit: https://www.shopvac.com/



# Tip #21 – backup, backup, backup!

- Full backup at least monthly
  - Stored offsite
  - Provides restore point
- Incremental backup daily
  - Could be cloud based





# Tip #22 – Spare batteries

- Flashlights and batteries in each control room and studio, as well as other rooms
- Spare batteries
- Remember batteries have a shelf life, replace periodically
- Smoke detector batteries!





## **Tip #23 – Surge protectors**

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





# Tip #24 – Towers and Lights

- Inspect at night
- Check paint during day
- Notify officials if bulb out
- Log notification
- Air ambulance service





# Tip #25 – upconverters bad!

- Repeated sample rate conversions degrade audio
  - Especially upconverters
  - Generate artifacts
  - Degrade audio





## **Tip #26 – Performance Measurements**

- NRSC (occupied bandwidth) must be done every 14 months in U.S.
- Taking occasional bandwidth and audio tests is a good way to see if anything has changed.





#### Tip #27 – standardize on a level

- Through the entire facility
  - The actual level is not important
  - Standardized levels make troubleshooting easier
  - Makes installing new equipment simpler.





# Tip #28 – Spare Tools

- Keep a set in your vehicle
  - Include an air pump
  - Duct tape!





# Tip #29 – software updates!

 What we used to do with bags of parts, we now do with software updates.

 Pay attention to Release Notes!

# Latest Software

GV Series 4.4.1 Release Notes Software downloads (FTP)

NV Series 4.4 Release Notes Software downloads (FTP)

NV<sup>LT</sup> Series 4.6.1 Release Notes Software downloads (FTP)

VS Series 5.2





# Tip #30 – Engineering data

- Keep factory results, or consultant measurements, in a plastic folder at transmitter site
  - Provides a useful reference
- Put TPO on front of transmitter (label maker)



#### Tip #31 – site access



Photo credit - Alex Hartman, Optimized Media Group



## Tip #32 – Manuals

- Have a library for manuals for all equipment you own
- Can put on USB, also pdf files can be easier to search





#### Tip #33 – remote access

#### • Backup access

- What happens if primary link fails?
  - STL dies/backhoe fade
- Is there a redundant method of control?
  - Wired line
  - LTE data link
  - Wi-Fi bridge





#### Tip #34 – Capital budgets

- Plan to schedule replacements
  - Estimate costs
  - Estimate life cycles

• Work with engineer



#### Tip #35 – audio backup



• A way to chain multiple audio signals with auto return to main



# Tip #36 – Combination Locks

- No keys needed
- Some can have combination set – could use common #
- Put a piece of rubber (inner tube) over lock, secure with clip



photo credit: https://www.amazon.com/



# **Tip #37 – calculating breaker requirements**

- First, RTM! Current draw provided in pre-install manual
  - To verify...
    - TPO/efficiency in decimal (\* mod index for AM) = power consumption
  - Power Consumption/phase to phase voltage = single phase current draw... divide this by the square root of 3 for three phase
  - Add 25% safety margin
  - For 10kW @ 70% efficiency, with 240V 1-ph... 10,000/.7=14,285
  - 14,285/240 = 59.5A, or 75A with safety margin



## Tip #38 – Return for Repair

- Tape business card to item
- Use label maker to identify
- Use station bumper sticker
- Don't forget RMA#!



# Tip #39 – IP security

#### Limit user access

- control who can write what to

where

#### Break up domains

- fewer users with high level access in each

Keep an eye on Active Directory in Windows networks

- not everybody needs domain admin access



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#What happened to your files?	
al your files encrypted with RSA-2048 encryption, for more information search in Google "RSA Encryp #How to recover files?	stion"
ISA is a asymmetric cryptographic algorithm, You need one key for encryption and one key for decrypt So you need Private key to recover your files. It's not possible to recover your files without private key	-10R
#How to get private key?	
You can get your private key in 3 easy step:	
Step1: You must send us 1.7 BitCoin for each affected PC OR 12 BitCoins to receive ALL Private Keys :	for ALL affected PC's.
Step2: After you send us 1.7 BitCoin, Leave a comment on our Site with this detail: Just write Your '	"Host name" in your comment
Your Host name is: WPISERVER Step3: We will reply to your comment with a decryption software, You should run it on your affected F	PC and all encrypted files will be recovered
-Our Site Address: http://sqnhh67wiujb3q6x.onion/2termiinated11223344/	
*Our BitCoin Address:1JrLRBRE52SmUgywqdLUGdxx55dE4RQLqg	
(If you send us 12 BitCoins For all FC's, Leave a comment on our site with this detail: Just write "E (Also if you want pay for "all affected FC's" You can pay 6 Bitcoins to receive half of keys(randomly	For All Affected PC's" in your comment) y) and after you verify it send 2nd half to receive all
How To Access To Our Site	
For access to our site you must install Tor browser and enter our site URL in your tor browser. You can download tor browser from <u>https://www.torproject.org/download/download.html.en</u> For more information please search in Google "How to access onion sites"	
# Test Decryption #	
Check our site, You can upload 2 encrypted files and we will decrypt your files as demo. If you are worry that you don't get your keys after you paid, You can get Also you can get some single key and if all single BTC taht you paid reach Anyway be sure that you will get all your keys if you paid for them and we with buying the first key you will find that we are honest.	one key for free on you choise(except in hed to all keys price you will get all ke e don't want damage our reliability
#Where to buy Bitcoin	
We advice you to buy Bitcoin with Cash Deposit or WesternUnion From https://localbitcoins.com/ or http C Done Start USDCServee CCUDocuments and Se	ps://coin

Photo credit, KQED: https://www.kqed.org/futureofyou/how-to-make-it-harder-for-malware-to-shut-you-down

#### **Tip #40 – Take Your Engineer to Lunch!**

- Ask what they need to do their job better
- Buy them lunch and a tank of gas



# Tip #41 – site maintenance

- Fluid levels and changes
- Belts and filters
- Check for leaks
- Fuel conditioning/treatment
- Battery check



Photo credit: www.cat.com



#### Tip #42 – Check the Remote Van

- Test Drive
- Keep Service Record
- Inspect for damage
- Arrange for cleaning as needed
- Check any gear attached





# Tip #43 – shorting stubs

- Can help reduce stress during transients
- Not difficult to build
- Account for velocity factor





## Tip #44 – Inventory and store

- Keep track of play by play and remote equipment
- Pay attention to condition
- Put headphones in freezer bags
- Cables can be bagged also



#### **Tip #45 - PPE**

• ESR (EH in the U.S.) rated footwear can keep you alive if you come in contact with a live circuit.



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.





#### Tip #46 – More Safety

- Go with Engineer to site, especially on night calls
  - Hold the flashlight
  - Provide a hand if asked





# Tip #47 – Too much humidity bad!

 An oversized air conditioner may not remove enough humidity from the air

 Can cause condensation in equipment





#### Tip #48 – Stay on Top

- Participate in voluntary inspection programs (ABIP)
  - Helps keep staff aware of rules

- Summary of Changes (May, 2010)
- AM Broadcast Station Checklist
- FM Broadcast Station Checklist
- TV Broadcast Station Checklist (Sept. 2009)
- Class A TV Broadcast Station Checklist (Sept. 2009)
- FM Translator Checklist (June 2008)
- LPFM Checklist (June 2008)
- Low Power TV, TV Translator & TV Booster Checklist (May 2010)

Photo credit: <u>https://www.fcc.gov/general/broadcast-self-inspection-checklists</u>



#### Tip #49 – D connectors

- Slimline breakouts easier than soldering
- In U.S. available from Winford Engineering
- <u>www.winfordeng.com</u>





#### Tip #50 – Follow the Rules!

- Make sure everybody knows where the rules are kept
- When in doubt, contact your attorney
- Invest the money to stay legal



# Questions?



#### **Online Information**

• Nautel Waves Newsletter

http://www.nautel.com/newsletter/

• Webinars

http://www.nautel.com/webinars/

• YouTube

http://www.youtube.com/user/NautelLtd







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