Boulder Amateur Television Club
TV Repeater's REPEATER

January, 2023
2ed edition, issue #120

BATVC web site: www.kh6htv.com

ATN web site: www.atn-tv.com

Jim Andrews, KH6HTV, editor - kh6htv@arrl.net www.kh6htv.com

SPECIAL ISSUE ON DARA-ATV

The Dayton, Ohio Amateur Radio Assoc. (DARA) has got to be one of the more successful ham clubs around. If for no other reason, than their sponsorship of the biggest ham radio convention every year simply known world-wide to hams as "DAYTON !" Obviously, the income from the ham-vention has allowed them to do things, impossible for most ham clubs.

How many ham clubs have their own club house along with a 150 ft. tower ? Here is a photo of the DARA club house in Huber Heights, Ohio. In the early 70s, an old AT&T microwave relay station in Huber Heights was being decommissioned and put up for sale. DARA won the bid at the auction. It is now the home of DARA's "modest ?" W8BI ham shack. They presently have four main antenna towers a multitude of antennas for bands from 80 meters up to 23 cm band.

This is their main HF antenna. It is a Monster Step IR for 40 thru 10 meters at 120 ft. Must be nice to have a well funded club house and antennas ! ! !
Now when you hear the call sign W8BI on HF, you know what is radiating it !
They also have a FreightLiner Truck as a "too die for" mobile communications van, complete with a 65" outdoor TV monitor (obviously to demo ATV !)

W8BI ATV REPEATER: The DARA, W8BI repeater is a dual-band, dual-mode, ATV repeater. The 23cm receiver and transmitter at the repeater site allows for a 23cm/70cm cross band link, both forward and reverse. In other words, if you transmit a 1280 MHz FM video signal to the repeater, it will cross-band repeat into both the analog AM (A5) and Digital DVB-T (D2) 70cm transmitter links at the site, so you or others can see the incoming 23cm FM video on the outgoing 70cm outputs. Alternately, any 70cm DVB-T signal (QPSK @ 2 MHz bandwidth, video PID 641, and audio PID 642) that the site receives will be outputted into the 1258 MHz, FM ATV transmitter at the site, allowing you or others to see the 70cm A5 and 70cm D2 on the 1258 FM ATV output. Note that the 23cm FM ATV repeater at the site does not have an in-band repeat function on 23cm. In-band repeating only occurs on the A5 and D2 70cm links.

DVB:T Although DVB-T is not used commercially in the United States, this standard has been adopted by ATVers in the United States primarily because inexpensive commercial gear has been readily available for amateur use. Also, the commercial transmitters' bandwidth can be set to transmit and receive 2 MHz bandwidth QPSK signals and this has allowed for more efficient spectrum use along with increased realized gain performance when compared to a 6 MHz-wide digital ATV signal. Lastly, the 2 MHz QPSK DVB-T parameters have been adopted as the configuration for simplex use by Ohio/Kentucky regional hams for DX contact attempts, and it stands to reason to keep the W8BI ATV repeater with this same DVB-T configuration. If you are familiar with analog ATV signals, if you are able to see a snowy P-2 picture on the analog link, the DVB-T signal will be received, and will be "closed circuit" P5 quality.

The photo on the left shows the top of the main 150 ft. tower. It supports the DARA ATV repeater antennas for 430 MHz and 1.2 GHz along with their 2 meter FM, 146.94 repeater and D-Star repeater. The photo on the right shows an assortment of other HF, VHF/UHF antennas. It includes their "back-up" HF 40-10m Force 12 beam. Whow, for most folks this would not be considered a "back-up" !

W8BI ATV REPEATER TECHNICAL DATA SUMMARY

Location: Tower at Bellfountaine Rd Huber Heights, Ohio DARA Club site
Coordinates: 39.8479° N, 84.0992° W Grid Square: EM79wu
Elevation: 886 feet above sea level, 150 foot tower.
Transmitters: 421.250 MHz AM modulation, horizontal polarization 1258 MHz FM modulation, vertical polarization 428.000 MHz DVB-T Modulation QPSK @ 2 MHz BW, Video PID 641, Audio PID 642 (HV310E) (DCI Interdigital filters in output lines of 421.25 MHz and 428 MHz ATV Transmitters)
Output Power - 421.250 MHz: (AM) 40 watts average 80 watts sync tip 428.000 MHz (DVB-T) 18 Watts 1258 MHz: 40 watts continuous
Transmit antennas: 421.250 MHz and 428 MHz - Dual slot horiz. polarized 7 dBd gain (Analog and digital ATV transmissions simulcast on the same antenna) 1258 MHz - Diamond F-1230A2 vertically polarized antenna 9 dBd gain
Receivers: 144.340 MHz for F1 audio input control of touch tones 1280 MHz FM for video input 439.250 A5 Receiver (PC Electronics ATVR-4) 439.000 D2 Receiver (HiDes HV110)

Receive antennas: 144.340 MHz - Vert. polar. Hi Gain 12 dBd dual band 439.000/439.250 MHz - Horizontally polarized rib-cage antenna 1280 MHz - Diamond F-1230A2 vertically polarized antenna 9 dBd gain

DATV Beacon: You will be able to receive the SD "closed circuit quality" video ID that is on-air all of the time. W8BI has a continuous loop full motion video DVB-T ID when no other signals are being received. If ATVers were on the air during your viewing, the video ID changes to whatever video signal is being received by the voter-controller. Incoming videos may be on the 1280 MHz FM analog receiver link, the 439.250 analog (A5) receiver link, or the 439.000 MHz DVB-T receiver link. all of these receiver inputs are being fed into the DVB-T transmitter at the site

Coverage Area: Depending upon your antenna configuration (usually a single 70cm yagi) and operating power, (usually 40 watts average power on A5), paths to the repeater are possible at 20-40 miles. Keep in mind that the longer distances will require an optimized antenna height and an amplifier since commercially manufactured A5 transmitters usually only provide about 8 watts average RF power and as with any UHF installation, higher antennas will help provide better line of sight. When there are band enhancements due to tropospheric ducting, much greater distances are possible for ATV-DX. There are times throughout the year where distances up to 230 miles between the repeater site and the DX station have occurred. In a practical sense, the W8BI repeater has been serving as a "DX-Window" and distant stations have been using the repeater as an indicator of 70cm ATV band openings

This article was written by the editor, KH6HTV, from material on the DARA web site: **www.w8bi.org** The following block diagram drawings of the W8BI-ATV repeater were supplied by Bruce, K8FIX. For more info on their ATV repeater and activities, contact Dave, AH2AR.

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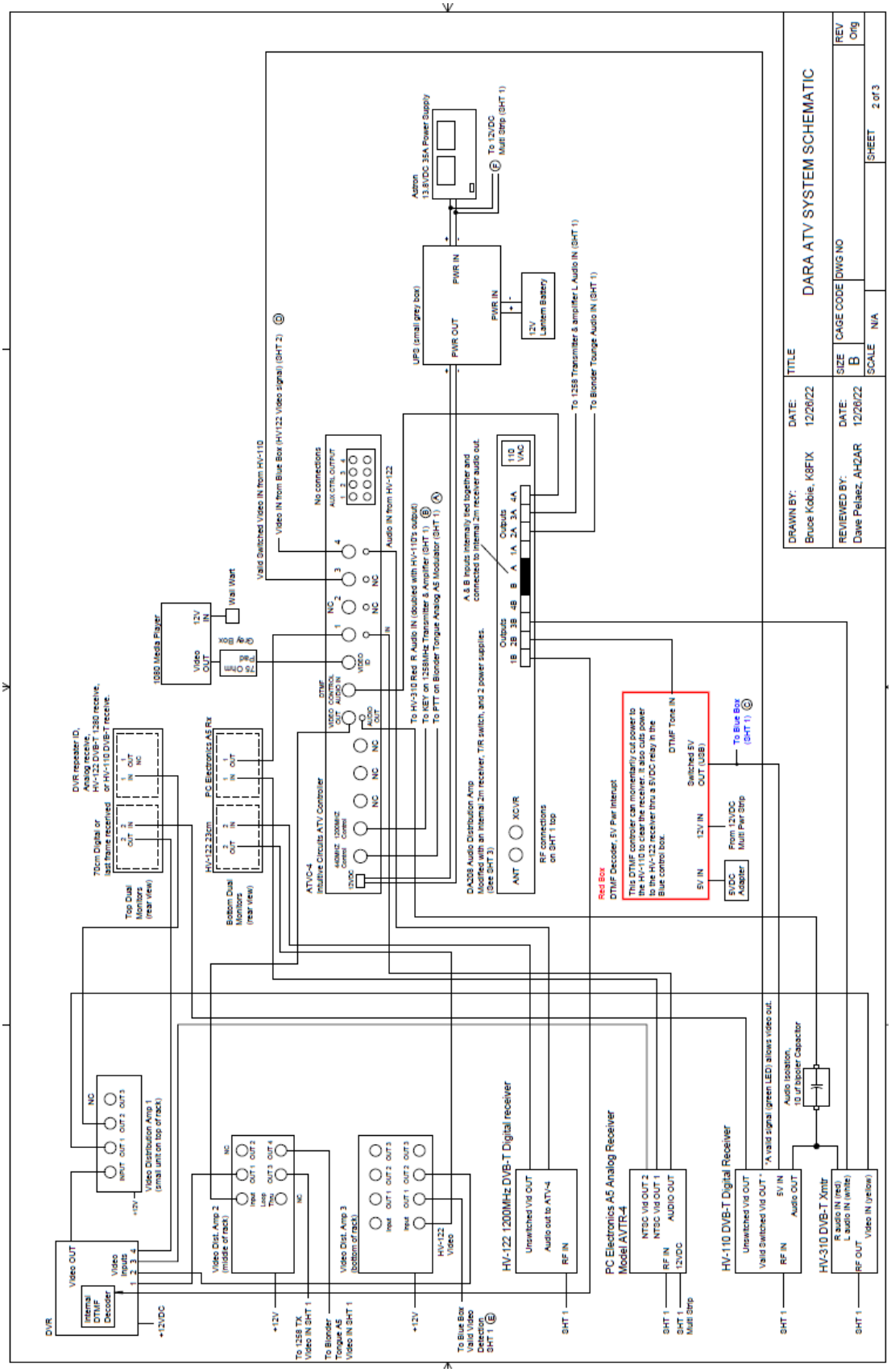
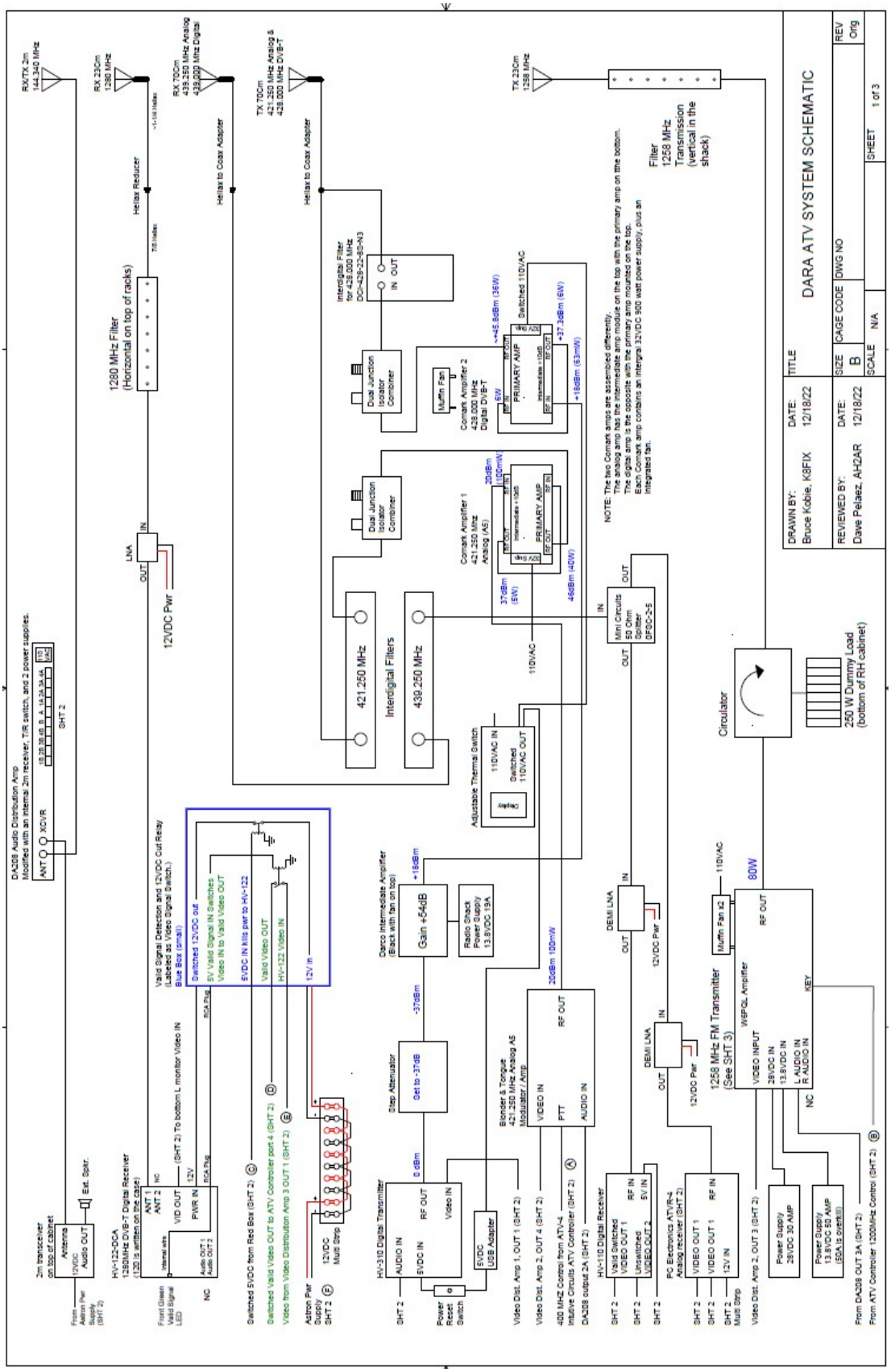
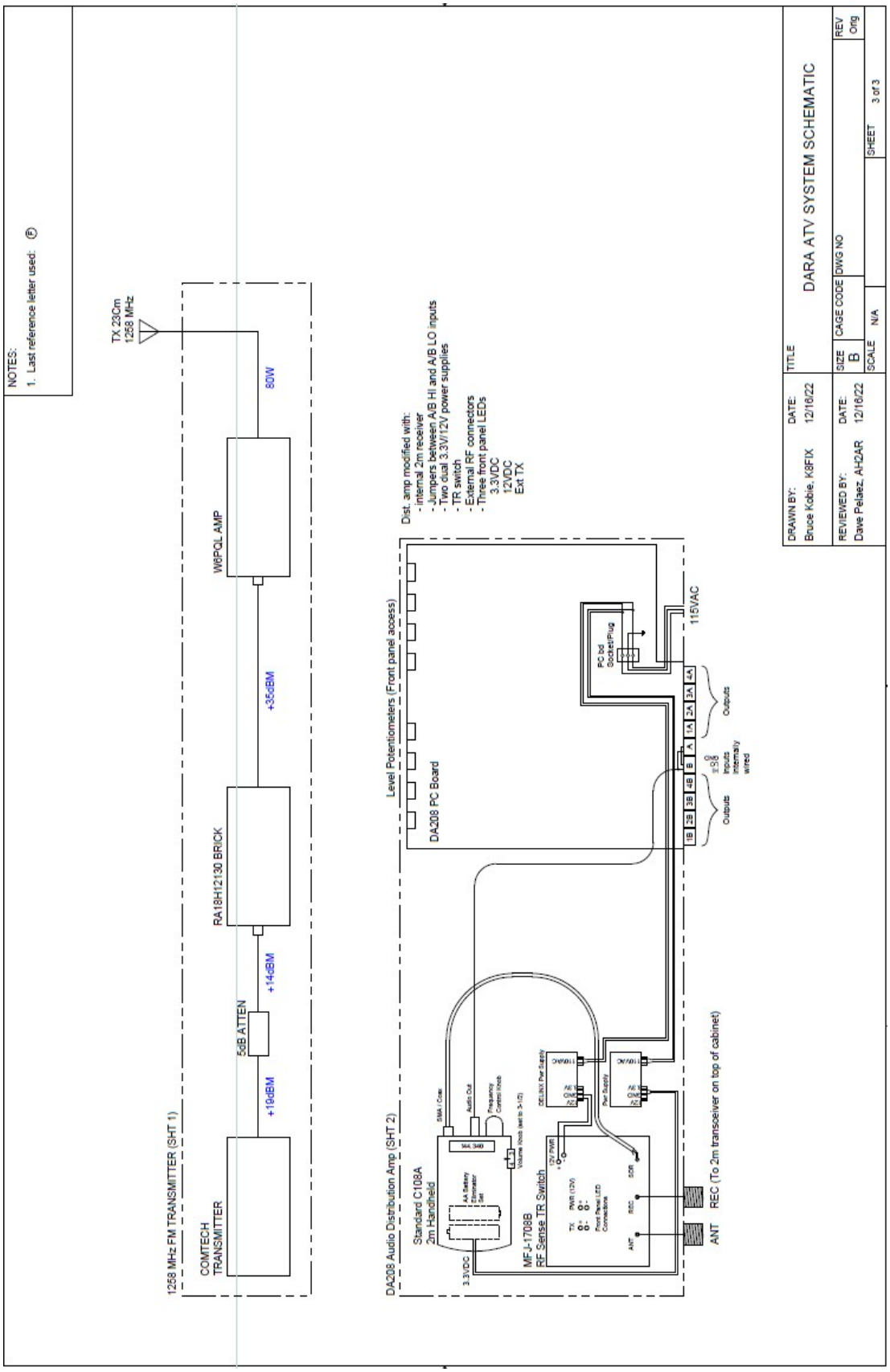
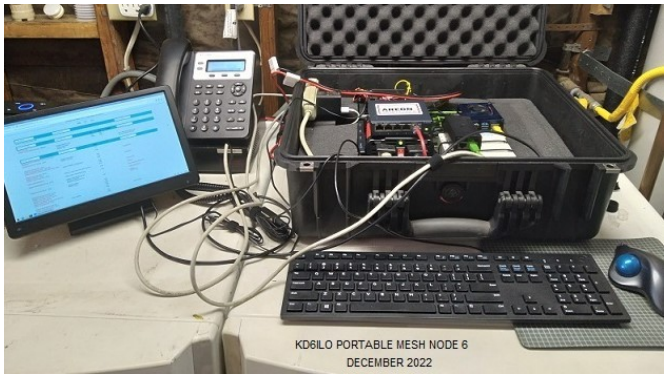

DARA ATV SYSTEM SCHEMATIC
DRAWN BY: Bruce Kobie, KØFIX
DATE: 12/26/22
REVIEWED BY: Dave Pelasz, AH2AR
DATE: 12/26/22
SIZE B
CAGE CODE N/A
DWG NO
SCALE
SHEET 2 of 3
REV Orig
DVR
Video OUT
Internal DTMF Decoder
Video Inputs
+12VDC
Video Distribution Amp 1 (small unit on top of rack)
Video Dist. Amp 2 (middle of rack)
Video Dist. Amp 3 (bottom of rack)
HV-122 1200MHz DVB-T Digital receiver
Unswitched Vid OUT
Audio out to ATV-4
RF IN
PC Electronics A5 Analog Receiver Model AVTR-4
NTSC Vid OUT 2
NTSC Vid OUT 1
AUDIO OUT
12VDC
HV-110 DVB-T Digital Receiver
Valid Switched Vid OUT *
5V IN
Audio OUT
*A valid signal (green LED) allows video out.
Audio Isolation, 10 uF Blocker Capacitor
HV-310 DVB-T Xmtr
R audio IN (red)
L audio IN (white)
Video IN (yellow)
RF OUT
ATV-4 Intuitive Circuits ATV Controller
video control audio control
12VDC
ANT
XCVR
RF connections on SHT 1 top
DA308 Audio Distribution Amp Modified with an internal 2m receiver, T/R switch, and 2 power supplies. (See SHT 3)
A & B inputs internally tied together and connected to internal 2m receiver audio out.
Outputs 1B 2B 3B 4B
Outputs A 1A 2A 3A 4A
110 VAC
Red Box
DTMF Decoder, 5V Pwr Interupt
This DTMF controler can momentarily cut power to the HV-110 to clear the receiver. It also cuts power to the HV-122 receiver thru a 5VDC relay in the Blue control box.
DTMF Tone IN
Switched 5V OUT (UGB)
5V IN
12V IN
From 12VDC Multi Pwr Strip
5VDC Adapter
To Blue Box (SHT 1) C
Valid Switched Video IN from HV-110
Video IN from Blue Box (HV122 Video signal) (SHT 2) G
No connections
Aux cntrl output
Audio IN from HV-122
To HV-310 Red R Audio IN (doubled with HV-110's output) B
To KEY on 1258MHz Transmitter & Amplifier (SHT 1) B
To PTT on Blonder Tongue Analog A5 Modulator (SHT 1) A
UPS (small grey box)
PWR IN
PWR OUT
Astron 13.8VDC 35A Power Supply
To 12VDC Multi Strip (SHT 1) F
12V Lantern Battery
To 1258 Transmitter & amplifier L Audio IN (SHT 1)
To Blonder Tounge Audio IN (SHT 1)
1080 Media Player
Video OUT
12V IN
Wall Wart
Grey Box
70cm Digital or last frame received
DVR repeater ID, Analog receive, HV-122 DVB-T 1280 receive, or HV-110 DVB-T receive.
Top Dual Monitors (rear view)
HV-122 23cm
PC Electronics A5 Rx
Bottom Dual Monitors (rear view)
To 1258 TX Video IN SHT 1
To Blonder Tongue A5 Video IN SHT 1
To Blue Box Valid Video Detection SHT 1 E
SHT 1
SHT 1 Multi Strip


DARA ATV SYSTEM SCHEMATIC
DRAWN BY: Bruce Kobie, K8FIX
DATE: 12/18/22
REVIEWED BY: Dave Pelaez, AH2AR
DATE: 12/18/22
SIZE B
CAGE CODE
DWG NO
REV Orig
SCALE N/A
SHEET 1 of 3
1280 MHz Filter (Horizontal on top of racks)
Interdigital Filters
421.250 MHz
439.250 MHz
Circulator
250 W Dummy Load (bottom of RH cabinet)
1258 MHz FM Transmitter (See SHT 3)
Filter 1258 MHz Transmission (vertical in the shack)
Helax Reducer
Helax to Coax Adapter
LNA
12VDC Pwr
Comark Amplifier 1 421.250 Mhz Analog (A5)
Comark Amplifier 2 438.000 MHz Digital DVB-T
Dual Junction Isolator Combiner
Interdigital Filter for 428.000 MHz DOI-428-23-8S-N3
Adjustable Thermal Switch
Darco Intermediate Amplifier (Black with fan on top)
Gain +54dB
Radio Shack Power Supply 13.8VDC 19A
Step Attenuator
Set to -37dB
Blonder & Tongue 421.250 Mhz Analog A5 Modulator / Amp
DEMI LNA
Valid Signal Detection and 12VDC Out Relay (Labeled as Video Signal Switch.) Blue Box (small)
HV-122-DCA 1280MHz DVB-T Digital Receiver (120 is written on the case)
HV-310 Digital Transmitter
HV-110 Digital Receiver
PC Electronics ATV/R-4 Analog receiver (SHT 2)
DA208 Audio Distribution Amp Modified with an internal 2m receiver, T/R switch, and 2 power supplies.
2m transceiver on top of cabinet
Ext. Spkr.
From ATV Controller 1200MHz Control (SHT 2)
From DA208 OUT 3A (SHT 2)
Switched 12VDC from Red Box (SHT 2)
Switched Valid Video OUT to ATV Controller port 4 (SHT 2)
Video from Video Distribution Amp 3 OUT 1 (SHT 2)
Astron Pwr Supply SHT 2
Switched 110VAC
Mini Circuits 50 Ohm SMA Splitter ZFSC-2-5
Muffin Fan
Muffin Fan #2
W5PGL Amplifier
80W
RF OUT
VIDEO INPUT
28VDC IN
13.8VDC IN
L AUDIO IN
R AUDIO IN
KEY
Power Supply 28VDC 30 AMP
Power Supply 13.8VDC 50 AMP (50A is overkill)
Video Dist. Amp 1, OUT 1 (SHT 2)
Video Dist. Amp 2, OUT 4 (SHT 2)
Video Dist. Amp 2, OUT 3 (SHT 2)
400 MHz Control from ATV-3 Intuitive Circuits ATV Controller (SHT 2)
DA208 output 2A (SHT 2)
Valid Switched VIDEO OUT 1
Unswitched VIDEO OUT 2
VIDEO OUT 1
12V IN
Multi Strip
Power Reset Switch
5VDC USB Adapter
AUDIO IN
5VDC IN
RF OUT
Video IN
PTT
NOTE: The two Comark amps are assembled differently: The analog amp is the intermediate amp mounted on the top with the primary amp on the bottom. The digital amp is the intermediate amp mounted on the bottom with the primary amp on the top. Each Comark amp contains an integral 32VDC 900 watt power supply, plus an integrated fan.


NOTES:
1. Last reference letter used: B
TX 23Cm
1258 MHz
80W
W8PQL AMP
+35dBM
RA18H12130 BRICK
+14dBM
5dB ATTEN
+19dBM
COMTECH
TRANSMITTER
1258 MHz FM TRANSMITTER (SHT 1)
Dist. amp modified with:
- internal 2m receiver
- Jumpers between A/B Hi and A/B LO inputs
- Two dual 3.3V/12V power supplies
- TR switch
- External RF connectors
- Three front panel LEDs
3.3VDC
12VDC
Ext TX
Level Potentiometers (Front panel access)
DA208 PC Board
PC bd Socket/Plug
115VAC
Outputs
Inputs internally wired
Standard C108A
2m Handheld
MFJ-1708B
RF Sense T/R Switch
3.3VDC
ANT
REC (To 2m transceiver on top of cabinet)
DA208 Audio Distribution Amp (SHT 2)
DRAWN BY: Bruce Kobie, K8FIX
DATE: 12/16/22
REVIEWED BY: Dave Pelaez, AH2AR
DATE: 12/16/22
TITLE
DARA ATV SYSTEM SCHEMATIC
SIZE B
CAGE CODE
DWG NO
REV Orig
SCALE N/A
SHEET 3 of 3



KD6ILO portable MESH node

Live IP video from Orange County

MESH ATV: Mario, KD6ILO, has sent us some photos of his new portable MESH node set. He says "I've assembled a new Mobile/Portable Node for my local area support. It's working great but not fully completed yet. Waiting for a MikroTik SXTsq Lite2 10 dBi, 2.4GHz dual chain integrated CPE/Backbone. 5 GHz will be integrated as a DTD on this unit. It will be active with the Hap-ac-Lite {onboard}, 5 GHz {future install} and 2.4 GHz {onboard}. San Marcos will be a key access point. I currently have the 2.4GHz RF access to N6JO-101 link to Oceanside EOC. I will be adding an IP camera also w/ Ham Digital TV. This MESH Mobile / Portable unit to be used to link SDATV to the SOCAL MESH network. It works but is not fully completed yet. More to follow."

1] The first phase of this project is completed, the second phase is integrating Node [6B} as part of the unit which will be the manpack SXTsq-2nD the 2.4GHz Transceiver as part of the DTD interface with the Hap-ac-Lite onboard Node 6A.
2] The second phase the manpack DTD unit will be providing the uplink to the backbone network. When integrated with Node 6A's Hap-ac-lite, the Hap-ac-lite 2.4 GHz radio will be turned off, it is only used for close on site use within a half mile radius.
3] Phase three(3) will be integrating an IP camera and the [D]ATV television integration unit.

SPF-5189 Bad News - Good News: Daniel, VE7LCG, in the Vancouver, BC., SARC Communicator (Jan-Feb 2023 issue), informs their readers that the beloved, low noise MMIC, SPF5189, has been discontinued by it's manufacturer, QORVO. But the good news is QORVO has a similar replacement, the SPF5043Z. This table compares the two. The significant differences are in the drain current and the package.

Parameter	**SPF-5189**	**SPF-5043**	**Parameter**	**SPF-5189**	**SPF-5043**
Freq Range	0.05-4GHz*	0.05-4GHz*	Technology	GaAs pHEMT	GaAs pHEMT
NF (0.9GHz)	0.55dB	0.8dB	NF (1.9GHz)	0.8dB	0.8dB
Gain (0.9GHz)	18.7dB	18.2dB	Gain (1.9GHz)	12.8dB	12.9dB
P-1dB (0.9GHz)	22.4dBm	22.6dBm	P-1dB (1.9GHz)	22.7dBm	22.7dBm
Vd / Id	5 V, 90mA	5 V, 46mA	Package	SOT-89-3	SOT-343-4

(*) note frequency response spec. is NOT flat. 35dB at low freq, dropping to 8dB at high freq.

FEED-BACK from readers of previous issues:

ARRL HANDBOOK: Jim --- What a great read! Thanks for the call out of our Handbook 100 color insert. It is the Easter egg of the book and we loved adding it to our regular technical content.

Very 73, David, NA2AA, ARRL CEO

HI Jim…Great newsletter, as always.

Regarding the **ICOM905**: They have been promising the PW-2 HF Linear for several years and it isn't here yet, so I am not getting my hopes up about the 905. I think that the PW-2 is delayed because the dealers, such as HRO, are not selling very many of the $35 reservations, which is probably the indicator they are using to decide whether to finish the project. Pure speculation on my part, however.

Q5 bought all of DownEast's product line for 1296 and below 5 or 6 years ago, as DEMI wanted to focus on their microwave products. Q5 is supposed to be building the DEMI designs, but is probably making changes as available parts change.

73, Have a happy and safe 2023! Tom Holmes, N8ZM, Tipp City, Ohio

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New ICOM microwave antennas

New IC-950

ICOM IC905 NEWS from JAPAN: Hello KH6HTV Jim --- An article introducing SHF was published in a web magazine related to the release of ICOM's IC-905. It also contains information on microwave activity in the United States and Germany.

https://www.fbnews.jp/?fbclid=IwAR2yx6J2fxWEHdlQR4tS5EW3Pgu7c82_uY1EXNqhAdnv6Ol5Zm1-ZYHH2I#worldwide

73 de JA0RUZ, Fumio Sekizaki

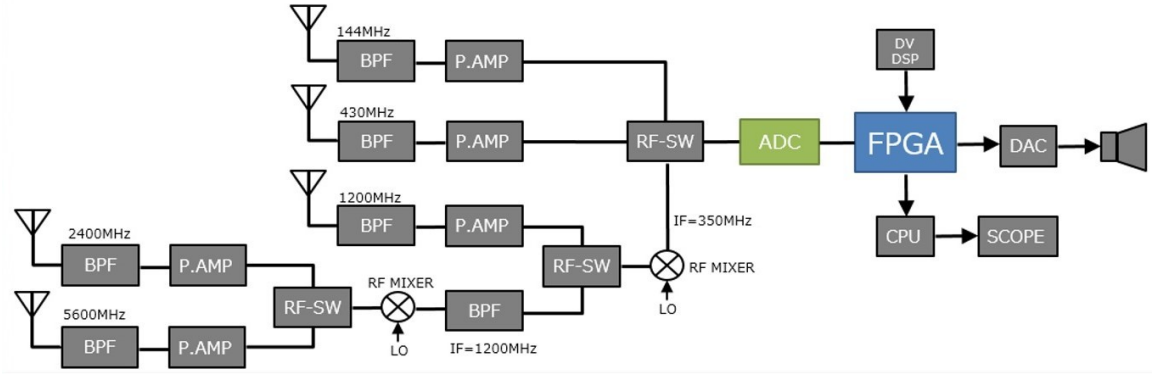
On December 18, 2022, just before the end of the year, the Icom Fair was held at the Icom Narayama Laboratory in Nara, Japan. The **IC-905** had already been shown to the public at last year's ham fair in Tokyo and other ham events, but many visitors were at the Icom Fair to see it and to get updated information since then. Among them, the price and release date were of interest. According to the on-site staff, the main unit is priced at about **JPY400,000** and the 10 GHz transverter at about **JPY150,000**, which is a tentative price but gives a general idea of what it will cost. The product will be released around spring of 2023. For more details, see: https://www.fbnews.jp/202301/w_specialarticle/special04/

(editor's note ---- at current exchange rate, 400K Yen is approximately $3K US dollars)

Also included in the **www.fbnews.jp** URL from Fumio are three interesting, lengthy, technical articles.

1. "Current Microwave Band Operation in Japan", by Fumio
2. "Today's SHF Ham Radio Activities in Germany" by Michael Kohala, DL1YMK / SA6BUN
3. "SHF Operation in the USA" by Wayne Yoshida, KH6WZ

*FB News (**www.fbnews.jp**) is an electronic, on-line, monthly ham radio magazine in Japan, published by ICOM. Google translate makes it quite easy to read.*



144/430 MHz : RX=Direct sampling system TX=DAC system
1200 MHz : Single conversion system
2400/5600 MHz : Double conversion system
10G Hz : Triple conversion system

Receiver Block Diagram for NEW IC-905

MAX-2870: *Note: this revised issue #120, has removed a note from Claudio, I2NDT, regarding poor phase noise performance of the Maxim synthesizer pc board. After issue 120 had been sent out on Jan. 9th to some of the 500+ distribution list, Claudio informed the editor of a major measurement error he made. Thus, his article and photos have been removed from this revised issue. -- sorry for the inconvenience and apologies to Maxim. --- kh6htv, 10 Jan. 2023*

Low Band, Narrow Band - DATV: HI Jim --- Just a quick note to advise that Roger VK5YYY has set up for narrow band DATV on 6 metres here in Australia. I am currently building a system that includes a Down Converter from my Hides 24 cms DVB-T plus power amplifiers. I intend to use the Knucker as the receiver. The path between Whyalla (≈ 1,000 km) and Melbourne is often open over the summer/autumn via sporadic E and or tropospheric. With the possibility of a peak in the sunspot activity it will be interesting to see how it goes. May have a back channel on HF to assist. Will forward more details later.

Regards Peter, VK3BFG, Wantirna South (Melbourne), Victoria

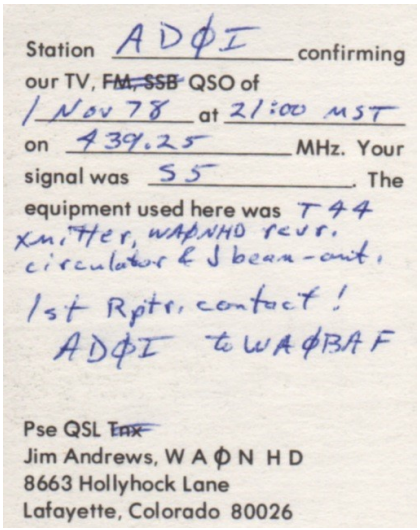
More on NB-DATV: Jim: Hello, happy new year. Thank you for your ATV report.
Recently, narrow band video quality non-HD ATVs using SDR have become popular. What do you think about that?

1. Do you think that an ATV system that can be used in a narrow band using SDR or the like is better, even if the image quality is poor?
2. Don't you think that high-definition video on par with professional TV broadcasts is better for ATVs?

As for ATVs, I think we prefers full high-definition ATVs, and developed Japan's digital terrestrial broadcasting system (ISDB-T system) ATVs,which have become mainstream in Japan.

In addition, broadband ATVs in Japan can only use the microwave bands according to the Radio Law, and the microwave bands has enough broadband to be used. Broadband D-ATV on the VHF/UHF band or 1.2GHz band is not permitted. Also, in Japan, the current situation is that only "all radio wave format bands" can be used to operate digital ATV, and the "ATV band" is analog only, which is very troublesome.

73 de JA0RUZ, Fumio Sekizaki, Japan


Station ADØI confirming our TV, ~~FM, SSB~~ QSO of 1 Nov 78 at 2100 MST on 439.25 MHz. Your signal was 55. The equipment used here was T44 xmitter, WA0NHD revr. circulator & 3 beam-ants. 1st Rptr. contact! ADØI to WAØBAF

Pse QSL ~~Tnx~~
Jim Andrews, W A Ø N H D
8663 Hollyhock Lane
Lafayette, Colorado 80026

Boulder ATV Rptr QSL - 1978

TRIVA SECTION:

While going thru and scanning some old photo albums of my brother's, I came across this picture of myself on my 9th birthday in 1950. In addition to the birthday cake was my prized possession - a new AM broadcast band radio. It started my career in electronics. KH6HTV


Jim's 1st Radio - 1950

W0BTV Details:

Inputs: 439.25 MHz, analog NTSC, VUSB-TV; 441MHz/6MHz BW, DVB-T & 1243 MHz/6MHz BW, DVB-T

Outputs: Channel 57 --- 423 MHz/6MHz BW, DVB-T, or optional 421.25 MHz, analog VUSB-TV. Also, secondary transmitter, FM-TV output on 5.905 GHz (24/7).

Operational details in AN-51a Technical details in AN-53a. Available at: ***https://kh6htv.com/application-notes/***

W0BTV ATV Net:

We hold a social ATV net on Thursday afternoon at 3 pm local Mountain time (22:00 UTC). The net typically runs for 1 to 1 1/2 hours. A DVD ham travelogue is usually played for about one hour before and 1/2 hour after the formal net. ATV nets are streamed live using the British Amateur TV Club's server, via: ***https://batc.org.uk/live/*** Select ***ab0my or n0ye***. We use the Boulder ARES (BCARES) 2 meter FM voice repeater for intercom. 146.760 MHz *(-600 kHz, 100 Hz PL tone required to access*).

Newsletter Details: *This is a free newsletter distributed electronically via e-mail to ATV hams. The distribution list has now grown to about 500. News and articles from other ATV groups are welcomed. Permission is granted to re-distribute it and also to re-print articles, as long as you acknowledge the source. All past issues are archived at: https://kh6htv.com/newsletter/*

ATV HAM ADS

Free advertising space is offered here to ATV hams, ham clubs or ARES groups. List here amateur radio & TV gear For Sale - or - Want to Buy.

SLATS

ST. LOUIS AMATEUR TELEVISION SOCIETY

Buy - Sell - Trade - Giveaway

WWW.SLATSATN.NET

Click on the MENU tab "Want Ads"

Items for sale include: Black Magic Mini Video/Audio Switcher, Icom IC-910H, Flex Radio 3000, assorted microwave components and test equipment, Marconi 6970 RF Power Meter, Hallicrafters Remote Antenna Tuner, HP 85024A hi-freq Probe, 23cm Transverter, AOR ARD 9000 HF Modem Digital Voice Adapter, Hi-Des UT-120 DVB-T Receiver, Tektronix 1710 Waveform Monitor, etc.