Our First Annual Christmas Party! Details Below

The Aero Aerial

The Newsletter of the Aero Amateur Radio Club
Middle River, MD
Volume 12, Issue 12
December 2015

Editor Georgeann Vleck KB3PGN

Officers		***Committees***	
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		Contests	Bob Venanzi ND3D

Website: http://w3pga.org
Facebook: https://www.facebook.com/pages/Aero-Amateur-Radio-Club/719248141439348

About the Aero Amateur Radio Club

Meetings

The Aero Amateur Radio Club meets on the first and third Wednesdays of the month at Essex SkyPark, 1401 Diffendall Road, Essex. Meetings begin at 7:30 p.m. local time. Meetings are canceled if Baltimore County Public Schools are closed or dismiss early.

Repeaters

W3PGA **2 M :** INPUT : 147.84 MHz, OUTPUT : 147.24 MHz
W3PGA **70 Cm:** INPUT : 444.575 MHz, OUTPUT : 449.575 MHz
W3JEH **1.25 M:** INPUT : 222.24 MHz, OUTPUT : 223.84 MHz

Club Nets

Second Wednesday Net – 10 Meters (28.445 MHz) @ 8 p.m. Local Time
Fourth Wednesday Net – 2 Meters (147.24 MHz Repeater) @ 8 p.m. Local Time
Fifth Wednesday Net – 70 Centimeters (449.575 MHz Repeater) @ 8 p.m. Local Time

Radio License Exams

The Aero Amateur Radio Club sponsors Amateur Radio License Exams with the ARRL VEC. Examination sessions are throughout the year. Walk-ins are welcome.

2016 Examination Schedule

Where:	White Marsh Branch Baltimore County Public Library 8133 Sandpiper Circle, White Marsh, Md. 21236
Time:	1 p.m.
Dates:	January 30
Contact:	Patricia Stone AC3F, email: ac3f@juno.com, landline: 410-687-7209

LOCAL AREA NETS

Day	Time	Freq. (MHz)	Net Name
Daily	9 – 10 am	145.330	Oriole Net
Daily	6 pm	3.820	Maryland Emergency Phone Net
Daily	6:30 – 7 pm	145.330 no PL	Baltimore Traffic Net (b/u 146.670 PL 107.2)
Daily	7 pm & 10 pm	3.643	MD/DC/DE Traffic Net
2nd Tue	7:30 pm	146.670	Baltimore County RACES Net
2nd Wed	8 pm	28.445	Aero ARC Net
4th Wed	8 pm	147.240	Aero ARC Net
5th Wed	8 pm	449.575	Aero ARC Net
When activated by NOAA		147.030	SkyWarn (primary)

FROM THE PRESIDENT'S DESK

I think we should keep the same SNOW PLAN as last winter.

If Baltimore County Schools are closed for the day or have an early dismissal, the Aero club meeting for that night will be canceled. Late school openings don't count. If a meeting is canceled due to weather, we will run a 2 meter net at 8pm that evening.

On other weather events, following snows or ice, I will go to the SkyPark between noon and 4 pm and report to the club members by 5pm. The airport does not always plow the parking lot, it's not safe to walk on hard snow or ice!

Any questions or suggestions?

Joe Miko WB3FMT

REMINDER

AERO CHRISTMAS PARTY

Wednesday, December 16, after the business meeting.
Bring some goodies. Coffee and eggnog will be provided.

NOTICE: ARRL ANNUAL DUES INCREASE ON JAN 1st

As of January 1, 2016, there will be a $10 increase in ARRL's annual dues rate. **It would be to your benefit for you to either join the ARRL or renew your membership before January 1st.**

The current rate is $39 for one year, $76 for two years, or $111 for three years. The current life time membership fee is $975.00.

Effective January 1, 2016, the membership rate will go up to $49 for one year, $95 for two years, $140 for three years, and a lifetime membership will cost $1,225.00.

The ARRL basic dues have been held at $39 a year since 2001.

Source: MDC Section News, Vol. 10 No. 10, October 13, 2015

NET REPORTS

Due to circumstances beyond the Editor's control (senior moments are not predictable), the net report for 9-30-15 was not included in the October Aerial. Here it is.

09-30-15: 2 meter net on 449.575r, 20:00 to 20:59 local.

W3PGA Joe (NCS) Essex, KB3JVP Ken Middle River, KB3VAE Rich Middle River, N3VBJ Jerry Dundalk, NE3A Ken Middle River, KA3SNY Dave Essex,
AC3F Pat Middle River

11-11-15: 10m net on 28.445MHz, 20:00 to 20:28 local.

W3PGA Joe (NCS) Essex, W3JEH Ron Perry Hall, KB3PGN Georgeann Essex, KA3SNY Dave Essex, W3VRD Phil Essex

11-25-15: 147.240 MHz, 20:00 to 20:44 local.

W3PGA Kelly KC3APF (NCS), KB3JVP Ken, KB3JDE Eric, W3VRD Phil, N3VBJ Jerry, KB3PGN Georgeann, KB3VA Richard, KA3SNY Dave, KC3FZZ Margaret, KC3ANJ Charles, W3JEH Ron, KB3QWC Larry

Welcome back to KB3JDE on his Thanksgiving visit home to see his new granddaughter (5 months old). W3VRD has lots of new QSL's on 40 m PSK31. Congratulations to KC3FZZ for her first solo TX.

STATION ACTIVITIES

Jerry N3VBJ has been working on the club website. Check it out.

Upcoming Second Wednesday Presentations

These presentations will be given at the Essex SkyPark FBO building after the business meeting.

Date	*Topic*	*Presenter*
Jan. 20	Radio Comm at Witty Tom: An AZ Ham Adventure	Georgeann KB3PGN
TBD	Contest Logging with N1MM	Bob ND3D

Any questions call Joe Miko at 443-956-0197.

"Radio Comm at Witty Tom" describes something of how the Yavapai Amateur Radio Club organizes a major annual public service event, the Prescott Road Rally, which is run over the backroads of Arizona in a fairly remote location. We zero in on a portion of the race which one ham has covered for the past 9 years.

Presenters who wish to submit a description of their talk may email it to Georgeann at KB3PGN@reagan.com for inclusion in the Aerial.

VE CORNER

by Pat Stone, AC3F

The AERO VE Team held its November 14th, 2015 session at the White Marsh Library. Congratulations to new Techs, Margaret KC3FZZ and Debbie KC3GAA.

A very special thanks to KB3VAE, WB3FMT, KB3EK and KC3APF for assisting me with this session. Thanks again to all who have volunteered to join our VE Team. A special thanks to Kelly, KC3APF, who served her first (of many, I hope) session.

Just a little observation, this was the first AERO test session where the girls in the room outnumbered the boys! Way to go Ladies!!!

Our next test session is scheduled for January 30th, 2016 at White Marsh.

CLASSES, ETC.

Skywarn Basic 1, Jan 21, 2016, 7 – 10 pm
Anne Arundel County Office of Emergency Management
7480 Baltimore Annapolis Blvd, Glen Burnie, MD 21061
This class is for New Spotters. To register, go to:
http://annearundelcountyskywarnbasic.eventbrite.com/

SkyWarn Winter Weather, Tuesday, December 15, 2015, 6:00 - 9:00 pm
Prerequisite: Basic 1. You will need your Spotter Number.
Taught by: Gary Zamerski of MEMA
Location: MEMA, 5401 Rue Saint Lo Dr., Reisterstown, MD 21136
To register go to:
https://memaskywarnwinterwx.eventbrite.com

Source: Jerry N3VBJ, Northeastern Coordinator for SKYWARN

DO YOU WANT TO LEARN MORSE CODE?

Here's the way the US Navy taught the International Morse Code. Click on: <www.arrl-mdc.net/LearnCode/CW.html> for a step-by-step self-study guide in which you can learn each of the alpha-numeric characters and commonly used punctuation in International Morse Code at your own pace.

If you follow the lesson plan precisely, you should be able to learn the International Morse Code and have your code speed up to 13 words per minute in four to six weeks, or less.

Source: MDC Section News, Vol. 10 No. 10, October 13, 2015

UPCOMING HAMFESTS and EVENTS

Saturday, January 30, 2016: Post Holiday Hamfest, 8:30 am - noon
NEW LOCATION Odenton Baptist Church, 8410 Piney Orchard Pkwy, Odenton, MD 21113
Maryland Mobileers Amateur Radio Club
<https://sites.google.com/site/marylandmobileers/hamfests-1/hamfest-2>
Talk-In: 146.805/146.205 (PL 107.2)
Contact: Frank Winner, N3SEO, 283 Oak Court, Severna Park, MD 21146
Phone: 410-647-3335, Email: <n3seo@aol.com>
Map and directions can be found on the website above.

Saturday, April 16, 2016: Delaware State Convention (Delmarva AR & Electronics EXPO) – Rescheduled
Sussex Technical High School, 17099 County Seat Hwy., Georgetown, DE 19947. Website: <www.radioelectronicsexpo.com>
Sponsor: Sussex Amateur Radio Association. Talk-In: 147.090 (PL 156.7)
Contact: Herb Quick, KF3BT, PO Box 1431, Seaford, DE 19973
Phone: 302-629-4949, E-mail: <herb@hamiltongraphics.com>

CONTEST CORNER

Bob ND3D sent us his results for the ARRL Sweepstakes Contest, SSB, Class: SO Unlimited LP

Summary:
Band QSOs

20: 58
15: 41
10: 7

Total: 106 Sections = 49 Total Score = 10,388

See below for the rules of our club contest -- **AERO AMATEUR RADIO CLUB 25 DAYS AND 25 NIGHTS OF FUN.**

Feature Article
Submitted by Charles Ester, KC3ANJ

KB0P, Yaesu Fusion Repeater (DR-1x)

The KB0P Repeater is the FIRST C4FM to be placed into service in the U.P. Of Michigan

KB0P/R_____442.200/447.200 MHz_____C4FM/FDMA (Yaesu)

INTRODUCTION

FUSION: Popularity Increasing

During the Winter of 2015, Yaesu's WONDERFUL promotion to distribute the DR-1X Fusion repeater with an offer that could not be ignored, I believe could lead to an increase in popularity of the FUSION (C4FM) digital mode on 2 Meters and 70 CM. I travel a lot for my job, and I have connected with amateur radio operators throughout many cities in the USA and every place I have visited has at least one club that plans to replace some of their repeaters with a Yaesu DR-1X machine. I am excited to watch and see what becomes of all of this.

FIRST C4FM Repeater in the U.P.

The U.P. (Upper Peninsula of Michigan) currently has no other digital FM repeaters in operation during this writing (April 14, 2015). However, many U.P. Amateur Radio clubs have signed up for and purchased the Yaesu DR-1X repeater. Soon, C4FM will be the digital mode of choice for the U.P. I received our Yaesu DR-1X in March 2015, and the FIRST C4FM repeater in the U.P. went on the air on March 14, 2015! As far as I am aware, based on my correspondence with other U.P. clubs during my travels, the KB0P/R repeater is the FIRST digital FM repeater to go operational in the U.P. of Michigan. This repeater is located in Ishpeming, Michigan; operating on 442.200(+) MHz; mode of operation is C4FM/FDMA. To access the KB0P/R repeater, one needs to use a Yaesu radio capable of C4FM (the FT1D handheld, the FTM400DR mobile, or the FT-991 base tranceiver).

MY QUESTIONS

(Q1) Can I cross-band my FT-8800 (base station) between 2 Meters and 70 CM, and then transmit with my Yaesu FT1D handheld using C4FM, to extend the range of my HT in order to work a distant FUSION C4FM repeater?

ANSWER: No. What I mean by this is, "no, it does not work". I tried this without success. The FUSION repeater receives the signal from the FT-8800 as a analog signal and does not trigger the C4FM mode. Also, due to the limited audio bandwidth of the FT-8800 used in this manner, the full bandwidth of the C4FM is not completely passed through.

(Q2) Can I connect IRLP/Echolink to the 15-pin accessory port on the rear of the DR-1X, and will it work?

ANSWER: Yes and No. It worked. At first I had to work out some keying issues (I will address these issues, below) and there are still other minor issues with the PTT. It works in one instance, but did not work in another instance, and I will show how I did it, below.

(Q3) When using FM (analog) or C4FM (digital), the audio that is exported out the 15-pin accessory jack on the rear of the DR-1X, is it analog or digital? Analog audio is required at the 15-pin accessory jack if the DR-1X repeater is installed on an existing analog FM linked repeater system.

ANSWER: Yes, I learned by experimenting that analog and digital audio is available on the 15-pin accessory jack.

(PIN 8) Discriminator is accessed on this pin. When a digital station is received by the DR-1X receiver, the output of PIN8 will be digital audio. When a analog station is received by the DR-1X receiver, the output of PIN8 will be analog audio (pre-emphasized).

(PIN 9) This pin provides analog audio (de-emphasized). Regular "human being" audio is present at this pin no matter if the user is transmitting FM (analog) or C4FM (digital).

(Q4) I purchased a Yaesu HRI-200 Wires-X box (why? I don't know?). Now that I own the thing and have it registered, I must figure out how to work it. The Wire-X box connects to the DR-1X through the 10-pin (round S-Video-looking plug) accessory jack on the rear of the repeater. I turned it on once and played with it and then gave up and went to shovel snow, instead (frustrated). **My question is** Can I connect the HRI-200 to the 10-pin jack, and connect a repeater controller (IRLP) to the 15-pin jack and allow inter-connectivity? I tried this briefly (prior to going out to shovel snow) and I think it worked. First, I must figure out how to work Wires-X!

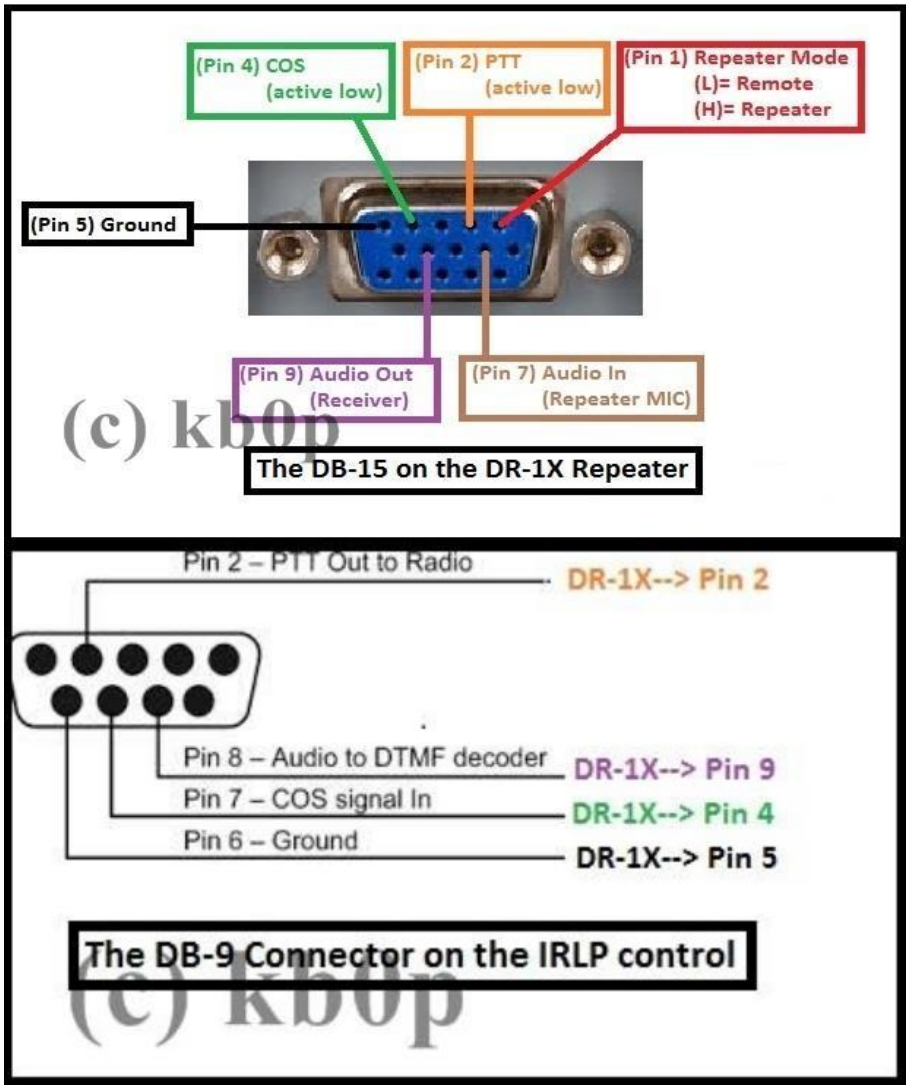
ANSWER: Still to be determined.

EXTERNAL WIRING/ CONNECTIONS

IRLP/ EchoLink Wiring Connection (with no external repeater controller):

The first remote wiring connection I made to the DR-1X repeater was to interface my IRLP/Echolink system to the repeater utilizing the 15-Pin accessory jack on the rear panel of the DR-1X. This

connection worked well, but I did experience a couple issues. I will address these issues, below, under the ISSUES heading:

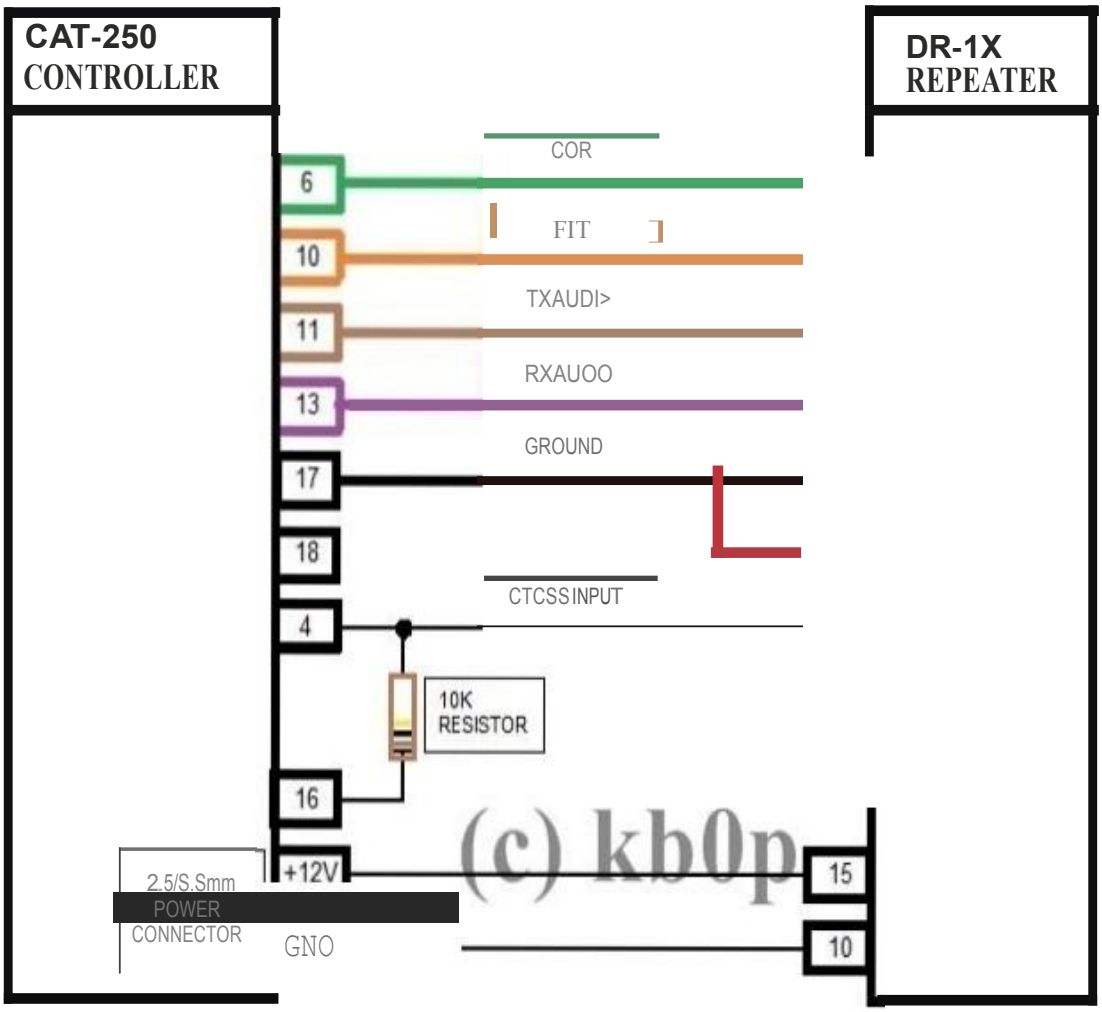


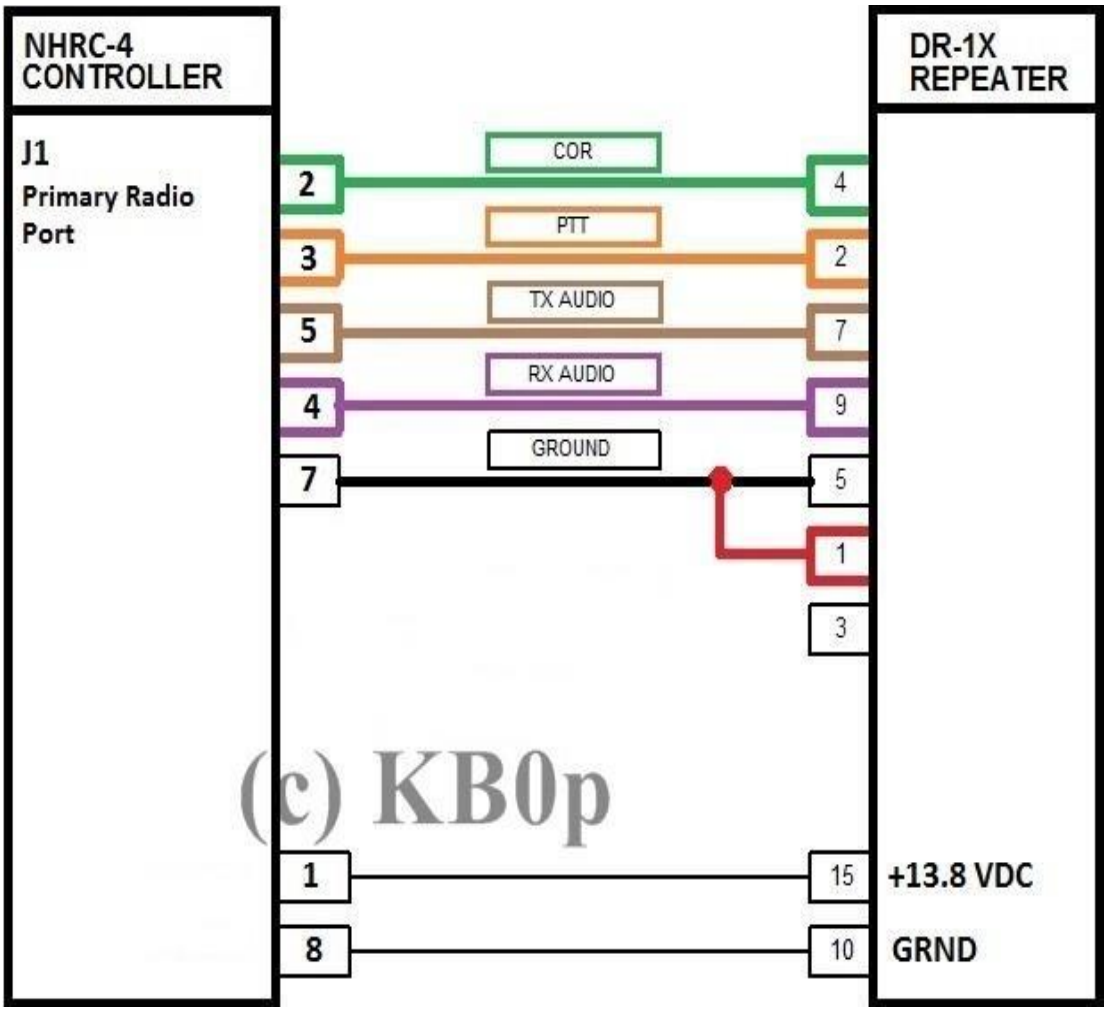
- The diagram to the left shows the assignment of the 15-pin (female) accessory jack on the rear panel of the DR-1X repeater (as you see it). I called out the pins that were used to interface the IRLP/Echolink board to the repeater.
- The diagram to the right shows the assignment of the 9-pin (female) jack on the IRLP control board. To help associate the connections between the IRLP board and the DR-1X repeater accessory jack, I remained consistant on the coloring of the labels.

Remote Controller Wiring:

Chances are, the DR-1X will be installed at a repeater site as a direct replacement for older equipment, requiring the use of an external repeater controller. Since I own CAT Repeater Controllers, this diagram is used as an example on how to wire the DR-1X repeater to the CAT-250 controller. An important point is that with this configuration, I am NOT able to use AUTOMATIC MODE (AMS) on the DR-1X repeater; this diagram is for ANALOG use of the DR-1x, only. Below, I show the wiring diagram used at my repeater site to connect an external repeater controller to the DR-1X repeater. All PIN references are made to the DR-1X, 15-PIN accessory jack on the rear of the

DR-lX.


CAT-250
CONTROLLER
DR-1X
REPEATER
COR
6
FIT
10
TXAUDI>
11
RXAUOO
13
GROUND
17
18
CTCSS INPUT
4
10K
RESISTOR
16
(c) kb0p
+12V
15
2.5/S.Smm
POWER
CONNECTOR
GNO
10



On The DR-1X Accessory Jack

- (PIN 1) This pin must be grounded to activate the 15-pin accessory jack on the rear of the DR-1X.
- (PIN 5, PIN 10) These pins are ground.
- (PIN 9) This is the repeater receiver audio AFTER it has been decoded. If you plan to use only ANALOG, you could use PIN-8 instead, which is discriminator audio output.
- (PIN 15) This is +13VDC, used to power on the CAT-250 controller. This pin is internally fused. DO NOT short this out!

On The NHRC-4 Controller

- The audio from the DR-1X receiver into the NHRC controller had to be maxed out (VR4 on the NHRC4).
- Still, to obtain a good transmit audio level, VR3 and VR5 had to be adjusted. It seems that there was not a lot of audio drive from the NHRC controller.

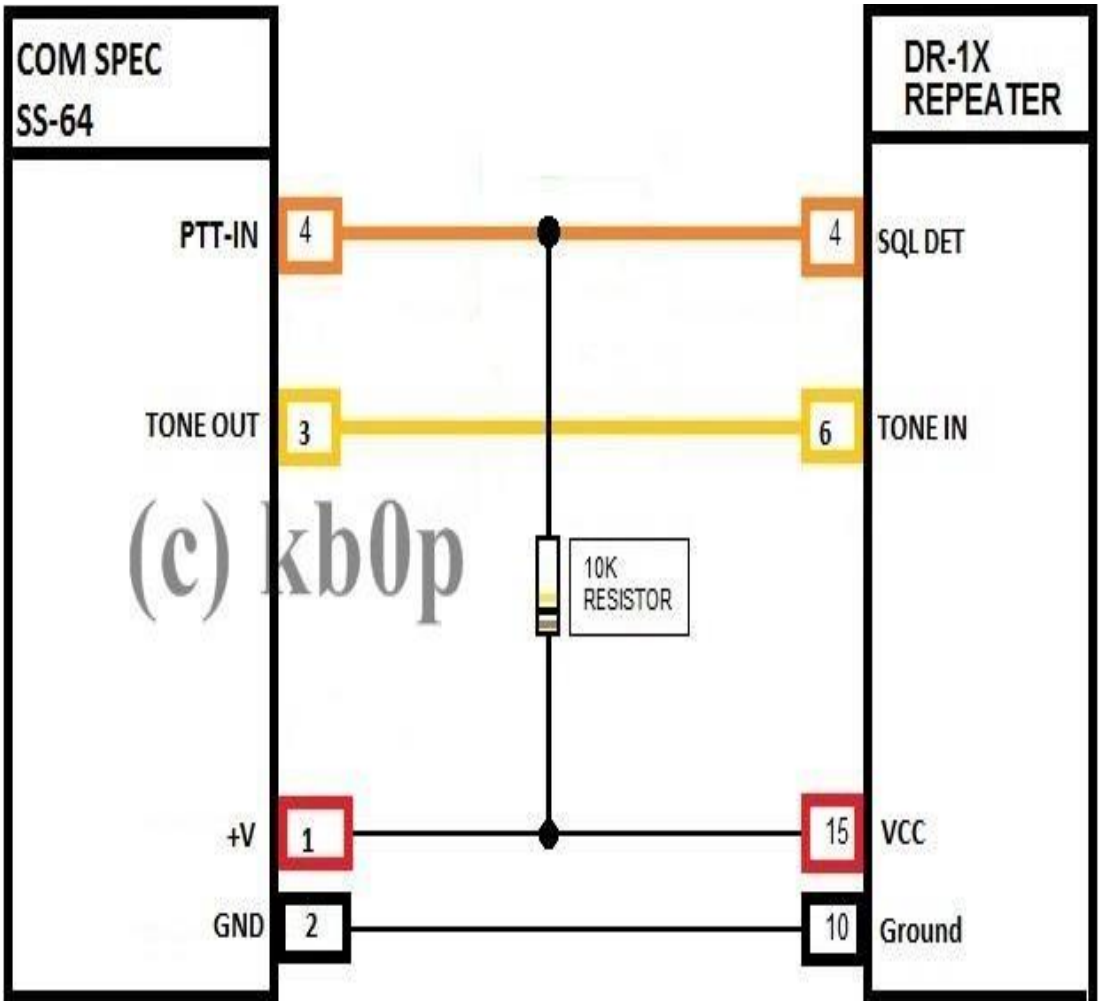
PL Tone on COR

With the onset of repeater linking and IRLP and EchoLink, being able to produce a PL tone on COR (or COS) is necessary; this is required to remotely control the remote devices (remote repeater or IRLP or Echolink system). Essentially, it is required that the repeater transmits (encodes) a PL tone

ONLY when the repeater receiver squelch is open (when the repeater is receiving a signal). When no signal is received (for instance, when the repeater transmits to send an ID), no PL tone is transmitted.

I've been asked to help setup the Fusion DR-1X repeater to produce "PL on COR", to allow remote connections to linked-repeaters and IRLP or Echlink computers. Can it be done? YES. I did some experimenting and I will share with you what works and what does not work. To produce "PL on COR", it is required to use an external PL Board (such as the Communication Specalists SS-64 or TS-64).

This is a wiring diagram of how to interface the TONE BOARD with the DR-1X to produce the "PL on COR" needed for repeater linking and IRLP/ Echolink systems. In my example, I am using the DR-1X as a repeater (the internal controller), in ANALOG mode (fixed mode), and a Com.Spec. SS-64 tone board. Whenever a signal is received by the repeater, the tone board is turned on and a PL tone is transmitted over the air.



- **According to the book:** Page 17, Pin 6 (TONE IN) is not active until Pin 1 is grounded. This is NOT true-->this pin is active ALL THE TIME, and you DO NOT require an external PTT or PIN 1 does NOT need to be grounded.
- Set your external PL tone deviation to 0.75 KHz (750 Hz) as the standard deviation level for PL tones.

SPECIAL NOTE

An attempt was made to use the REMOTE I/O (PINS 11, 12, 13, 14), combined with the COR (PIN 4), in order to untilize the internal PL Encoder in the DR-1X, to produce a PL-ON-COR, without the need for an external PL board. This did not work. Yes, the PL Encoder built into the DR-1X can be turned on and off using the REMOTE I/O logic, but.....once the PL Encoder was latched, it would NOT reset until after the repeater transmitter dropped out of transmit. In other words, in theory a great idea, but in reality it did not work. The use of an external PL Encoder is required to achieve PL-ON-COR.

Remote Mode VS. Pin 1 Connection

There may be some confusion when it comes to REMOTE operation of the DR-1X repeater. In the menu of the DR-1X, there is a REMOTE function that can be enabled or disabled (page 25 in the manual). Then, there is the grounding of PIN 1 on the 15-Pin accessory jack, which activates REMOTE MODE. The two modes are different and pointed out, here:

- Ground PIN 1-- This essentially "turns on" the 15-pin accessory jack to allow a remote repeater controller to take over the repeater (which disables the internal repeater controller inside the DR-1X).
- Activate REMOTE in the MENU (page 25)-- This activates the EXT Port Pins (Pin 11, 12, 13, 14) to allow remote logic control of the DR-1X. This logic can be used to turn on and off certain functions of the internal repeater controller in the DR-1X.

Issues (when using 15-PIN jack wired directly):

(1) The Receiver Audio: The wiring of the IRLP board to the DR-1X involved 5 connections: Ground, PTT, COS, Audio in, and Audio out. During the initial test, I used DR-1X "Pin 8" as my audio-out connection to send repeater-receiver audio into the IRLP board (for receive). DR-1X "Pin 8" is discriminator audio output of the repeater receiver. This audio is NOT de-emphasized (which may be what you would like, in your case). But, the major issue I discovered with "Pin 8" audio is that it represents exactly what the repeater receiver hears over-the-air. When the DR-1X repeater is used in FM (analog) mode, the audio at "Pin 8" is analog audio. However, when the transmitting station into the repeater is using C4FM (digital) mode to communicate, the audio at "Pin 8" is C4FM (9600 baud, digital, white noise audio). So, it was learned that DR-1X "Pin 9" must be used to send receiver audio to the IRLP computer. "Pin 9" audio is analog when the repeater user is FM and the audio is decoded analog when the repeater user is C4FM.

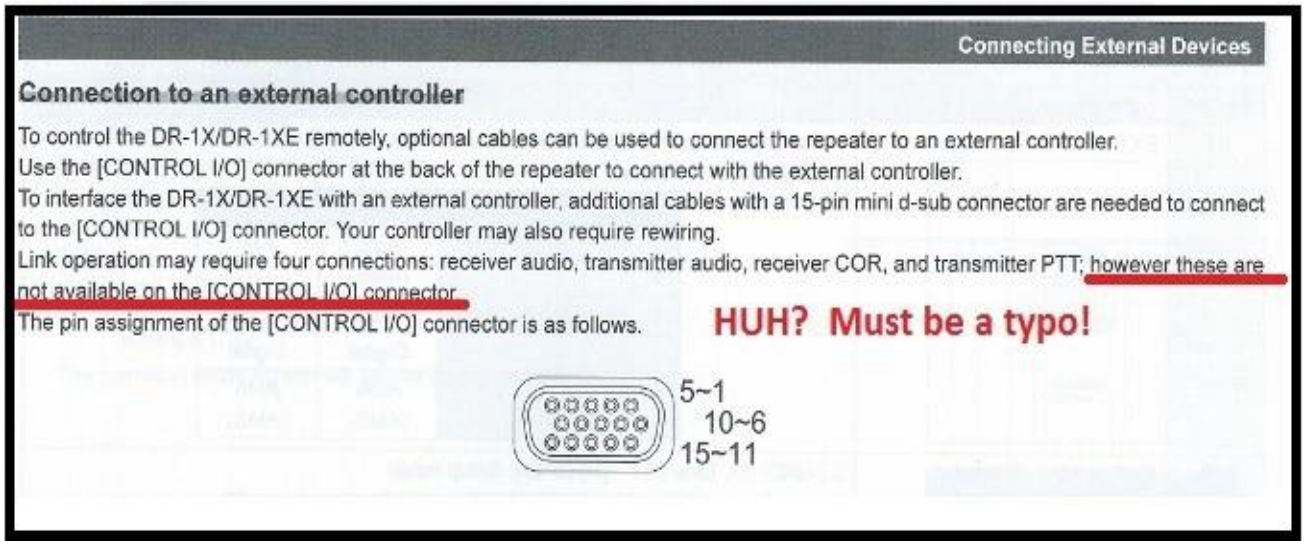
(2) The PTT Did Not Work: The repeater would not key up! WHAT! I was using the PTT (pin 2), why isn't it working? I even went into the menu of the DR-1X repeater and turned on the REMOTE MODE, and still nothing. It didn't take long to figure out a solution. I learned that DR-1X "Pin 1" must be pulled low (L) to allow the "Pin 2" PTT to work. In my setup, I did not want to leave the DR-1X in remote mode (only when IRLP/Echolink is keyed up), to allow the repeater to work normally (as a repeater) when IRLP is idle. I soldered "Pin 1" to "Pin 2" as a test. When IRLP keys up the PTT, it also activates REMOTE by pulling both "Pin 1" and "Pin 2" to ground. When the station on

IRLP/Echolink is done transmitting, the two pins return to high (H) and the repeater returns to normal control. THIS WORKED!

(3) Auto Mode Does Not Work: When using external PTT (Pin 2) along with REMOTE MODE (Pin 1) --*remember that I tied these two pins together*-- When the repeater is placed in AUTO MODE, the external IRLP board will not PTT the repeater. However, when the repeater is selected to FIXED MODE (no matter FM or C4FM), the external IRLP board does PTT the repeater. I have a theory that this is due to a **"logic race"** issue, but I will investigate and report the results, here.

(4) Internal Controller Bypassed: Simply, when using the 15-Pin accessory jack to control the Yaesu DR-1X, I confirmed that the DR-1X internal controller is bypassed. Therefore, the CW ID does not trigger, the squelch-tail does not work, and the TOT (time-out-timer) does not work. **BE CAREFUL!**

TYPO in the Manual?



Refer to PAGE 17 in the DR-1X OPERATING MANUAL, and read the paragraph titled **"Connection to an external controller"**. Do you see what I saw? When the paragraph is describing the pinout on the 15-PIN ACCESSORY JACK, it explains that in order to connect the DR-1X repeater to an external control, one must utilize the *receiver audio, transmitter audio, receiver COR, and transmitter PTT*, then the sentence goes on to mention that, oh, by the way, these points are NOT available on the CONTROL I/O (15-PIN JACK).....have a nice day. Say what?!

Let me assure you that these points ARE available on the 15-PIN ACCESSORY jack, and I am using them, today. Everything will be okay. But, I do have to admit, I did panic at first until I tried it for myself, and then I sighed a breath of relief...whew!

MORE TO COME

AERO AMATEUR RADIO CLUB
25 DAYS AND 25 NIGHTS OF FUN

When: 0000 UTC Friday, 1 January 2016 (1900 EST Thursday 12/31/15)
0359 UTC Monday, 25 January 2016 (2259 EST Sunday 01/24/16)

Eligibility: All current AERO members.

Station: You may operate from any amateur radio station…from your home, a guest's home, terrestrial mobile, maritime mobile, aeronautical mobile, here or abroad. A station may even be operated remotely!

Bands & Modes: Work any legal mode and band allowed by your license class. Echo Link and IRLP contacts are not permitted. Repeater contacts are OK.

Scoring:

- One tenth (0.1) point per CW contact.
- Two (2) points per AM contact
- Three (3) points per SSB or FM contact
- Four (4) points per RTTY contact
- Five (5) points per DIGITAL contact
- Six (6) points per SSTV contact
- Ten (10) points per ATV contact

Bonus Points:

- Any contact with another AERO Club Member 25 points per contact
- Any straight key CW contact on January 1 50 points per contact
- Any contact above the 10 meter band 100 points per contact
- Any contact via remote operation 250 points per contact
- Any satellite contact 500 points per contact
- Any EME (earth-moon-earth) contact 1000 points per contact per team member
- Any HAR (high altitude ballooning mission) 100K points per mission per team member

Other Info:

- The same station may be worked any number of times.
- Winner(s) of this contest will run the contest next year.

Results:

- E-mail log sheets to KB3EK at cwhittaST4@AOL.COM by Monday, February 8, 2016

There are lots of opportunities to make contacts during the AERO Contest period:

- ARRL Straight Key Night, January 1
- ARRL RTTY Roundup, January 2 & 3
- NCJ NAQP CW, January 9 & 10
- DARC 10M, January 10
- NCJ NAQP SSB, January 16 &17
- CQ 160M CW, January 27 – 31
- ARRL VHF, January 30 – 31

HAVE FUN . . . . . MAKE SOME Q'S

From the Skies over Mt. Essex

SKY Events for December 2015

Dec 3rd -- Last Quarter Moon.; USA's Pioneer 10 1st Jupiter flyby in 1973

Dec 4th -- Jupiter 1.8° N of the Moon 06 UT (01 EST).; Earliest end of evening twilight.

Dec 6th – Mars is 0.1° N of Moon 03 UT (22 EST 12/5)

Dec 7th – Venus is 0.7° S of the Moon17 UT (12 EST)

Dec 8th - Earliest sunset 16:42 EST.

Dec 11th -- New Moon .

Dec 14th- Geminid meteor shower morning sky, approx 100 meteors/hr.,. From asteroid 3200 Phaethon, Moon is just past New. Look after 21:00 EST in the Eastern sky.

Dec 15th – USSR's Venera 7, first craft to land on Venus in 1970.

Dec 18th - *First* Quarter Moon.

Dec 22nd – Winter Solstice 11:48 EST., shortest day of the year 9h 20m. Sunrise 07:23 – Sunset 16:46 EST.

Dec 23rd- Aldebaran is 0.6° S of the Moon

Dec25th - *Full Moon* "Oak" for the English Medieval and the "Christmas Moon " for the Colonial American.

Dec 29th – Mercury greatest elongation E (20°)

Planet Lookout at mid-Month

Sunrise 7:19 EST and Sunset 16:16:43 EST

Mercury Visible at dusk 17:30 EST, Mag -0.6, Saize 5.2" arc sec.

Venus High at dawn rises 03:30 EST, mag -4.1, 15.9 arc seconds.

Mars High at dawn rises 02:00 EST, mag +1.4, 5.1 arc seconds.

Jupiter Dawn, rises 23:45 EST, mag -2.1, size 37.1 arc seconds.

Saturn Dawn rises 06:30 EST, mag +0.5, size, 15.2 arc seconds.

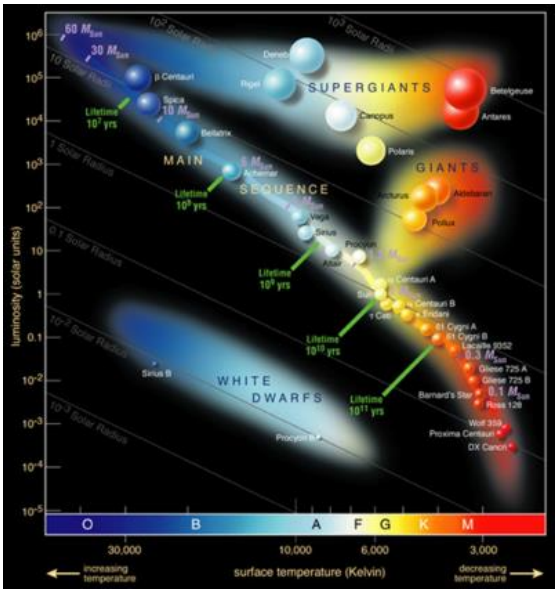
Uranus – Evening transits 19:30 EST, mag 5.8, size 3.5 arc seconds.

Neptune Evening, sets 232:30 EST, , mag +7.9, size 2.4 arc seconds.

Color of Stars

All of the stars come in color. The brighter stars color can be seen with the unaided eye. For example Betelgeuse is seen as red, and Rigel is seen as a blue star. Stars below the 3rd magnitude are hard to distinguish colors because the eyes are not sensitive to color in low light conditions.

Just think about it? You are driving at dusk or dawn and a car passes you, what color was it light green, blue, yellow..etc. Can't tell don't fret; our eyes can't see colors in low light. But stars do come in color. The color of a star, range the entire spectrum. We thank of ice cold blue and red hot, but in stars the blue ones are the hottest while the red ones are the coolest. The Hertzsprung-Russell diagram was developed around 1910, used to map the star's brightness against its temperature (color).



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In the classification of stars the hottest stars are O, the coolest stars are class M. The class goes O,B,A,F,G,K,M, hottest to coolest.. An old mnemonic is Oh Be A Fine Girl, Kiss Me.

Using a telescope to magnify a star will increase the light and our ability to see colors. Another example is to look at double stars, Albireo is known as the Scout double because of the blue and yellow pair. Our sun is a G (yellow) class star.