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Mike Shy

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SRO Meeting
Salvation Army Apr 11th

Presidents Message April 2023

Today I want to talk about something that happened recently. I have a friend with two 500W solid state amplifiers. It was an ICOM, and in my time as a ham I have found ICOM products are fairly reliable. One of the amplifiers stopped working and the problem was the power supply did not have any output. Since the power supply was separate from the RF sections we were able to verify that the RF Deck was not the cause of the failure. Opening up the failed power supply I found that the Bulk supply to the regulator was working normally and putting out 60 volts as it should. The failure was the Pass Transistors (2 in Parallel) were open between the collector and emitter. The supply has a 30amp fuse and it showed no sign of heating or anything that would tell me that the was a short outside the power supply. My friend purchased new transistors and I replaced them and the Driver Transistor that controls the Pass Transistors. When operating correctly the Pass Transistors drop the 60 volts to 40 volts that the RF deck requires. Now for a little math The transistors will have 20 Volts across them and at 500 Watts the current would be about 16.25 amps (assuming the amplifier is 70% effective) well within the specs for the pass transistors. I connected the amplifier to a 1KW dummy load
and fired the radio up. Checked the amp at 100 W out on all bands and all was well. Crank amp up to 200 W, all is well. Cranked it up to 300 W and power supply goes to 0. The original transistors were Toshiba and the

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SRO General Meeting Notes

for February 14, 2022
(Or: A Valentine for Ham Radio!)
By Jim Hawes AA9DT

FEBRUARY MEETING.
We convene again at the Salvation Army Citadel in Norridge. President Mike Leibovitz WA9EVF opens the meeting at 7:30 p.m. Tonight, the treasurer's report is our sole new business. Details are private, and available only to members. Treasurer Mike Brost WA9FTS will answer your questions at the next general meeting. WA9EVF wrapped up this evening's meeting in record time: One minute!

TONIGHT'S PROGRAM
is Mike Leibovitz' presentation on Baofeng radios. Mike's lecture includes how to program your radio with the Chirp program. (Chirp is free, open-source software. You can download it at...
www.chrip.danplanet.com/chirp/wiki/Home)

BRICKS AS SUPERCAPACITORS.
Hematite is what makes bricks red. Washington University researchers combined brick hematite, plus a PEDOT polymer coating, to build a supercapacitor. The PEDOT creates nanofibers, and the porous brick absorbs them. Next, the brick receives a coat of weatherproof epoxy. Perhaps after development, such "brickacitors" could store electric charges from solar cells.
Voila: Sundown power! But what happens when the brickacitors wear out? Raze the building?

SRO Meeting Feb 14th

Mike WA9EVF
Cathy KA9ZWZ
Rich WA9NZW
Tom N9CBA
Danny KD9HIL
Jean KB9FXL
Jim AA9DT
Mike WA9FTS

President's Message continues from Page 1

replacements were also Toshiba. Maybe we got a bad one or both?
My friend ordered 10 more transistors, and all the solid-state devices on the regulator board. I had checked the devices with power off and I was sure they were good, and also the voltage at the pass transistors base and emitters were proper. I put in 2 new pass transistors and cranked up the amp. 10 minutes later they blew again. I then took the power supply apart and removed the regulator board and replaced the solid state components, and checked all resistors with an ohm meter. I replaced the Pass transistors and driver and put the supply together. They blew again. To say I was agitated is being kind. I had one other thing to try. I put in 2 more pass transistors, pulled the fuse and replaced it with a amp meter. I slowly brought up the power and blew the Transistors at about 9 amps (the power supply was designed to work at 25 amps). At that point I gave up!
My friend had another friend that lived about 6 hours away who was an retired engineer who was doing repairs and he took the amp to him. He explained what was happening. His friend then took out the failed transistors and actually removed the cover over the transistor (these were T03s) and showed what was the problem. With the cover off you could see the connection from the emitter to the substrate was too thin to carry the current. It turned out my friend was buying fake Toshiba transistors from amazon. After buying new transistors from a reliable distributer (which cost a whole lot more) , the amp was now back in business.
The moral of the story is Buyer Beware! There is a lot of fake stuff on the web.
Mike Leibovitz

Foxhunt Report

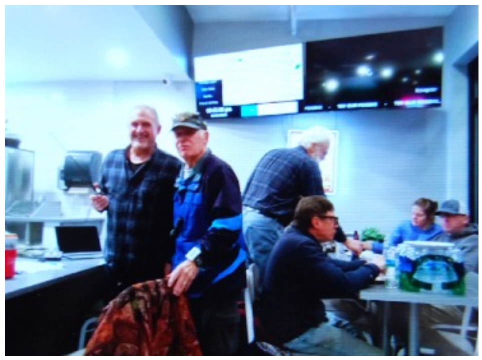
CFAR 2M Foxhunt -

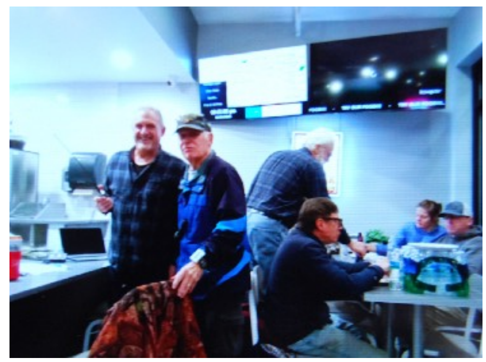
Mar 4th, 2023 by Mike WA9FTS - Fox - Marty N9LTE, Bill & John

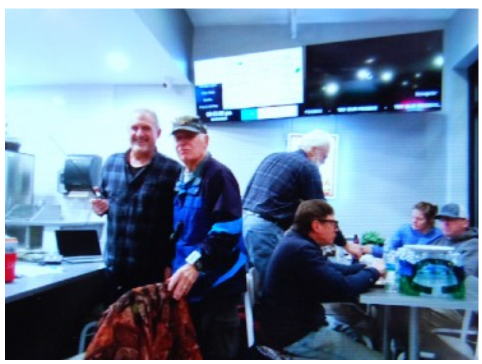
Eight hunters arrived to find Marty. It was a weak signal and 6 of thee 8 hunters got a direction to the west. The signal did not get stronger as we headed down Roosevelt Rd. Was Marty west of the Fox River? Yes he was as the hunters arrived a mix of condos and businesses. Matt and his group spotted Marty's car with a yagi on the roof and a sign telling him to go into Rose's place for the win. There were about 4 hunters running around and spotted the car and scored within minutes of one another. We then found out it was Marty's birthday (59) and he was going to buy everyone's food. Bill's birthday was 4 days earlier. They had a cake for everyone. Marty controlled the radio in his car with a Yaesu VX-7R. The Icom 2350 running 50w was in the car. Results:

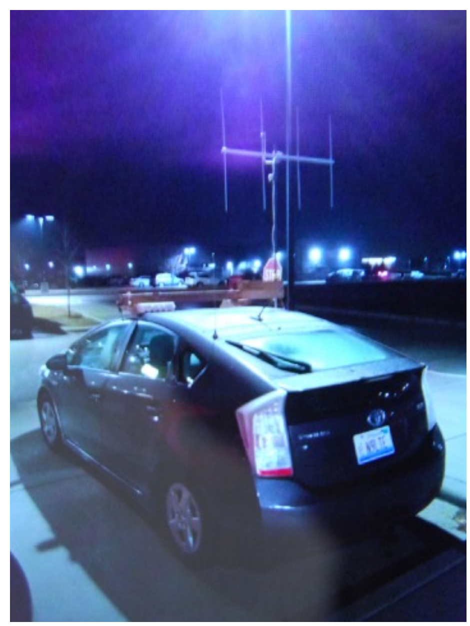
1. Matt KC9SEM, Patty N9PLS, Jacob KD9VLF, Mac KD9VVU - 8:52
2. Tim KC9YFI, Michelle KD9DJT, Landon, Autumn - 9:00
3. John WD9EXW, Janet, Mike WA9FTS - 9:01
4. Tony AA9CC - 9:02
5. Tom N9CBA - 9:03
6. Pete K9PW - 9:14
7. Mike N0MO, Wyatt - 9:22

DNF Don W9RA







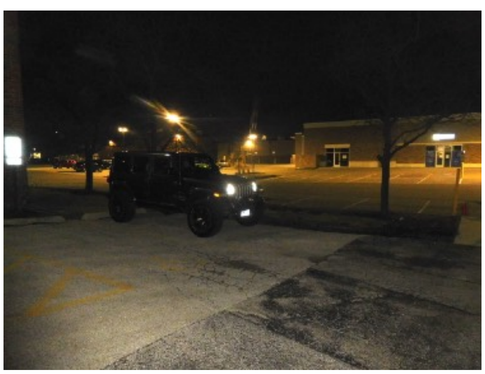


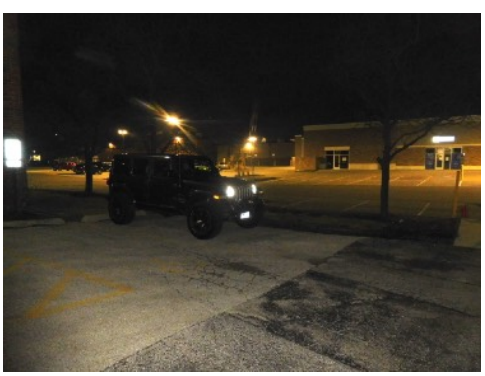
CFAR 2M Foxhunt - Apr 1st, 2023 by Mike WA9FTS - Fox - Matt KC9SEM

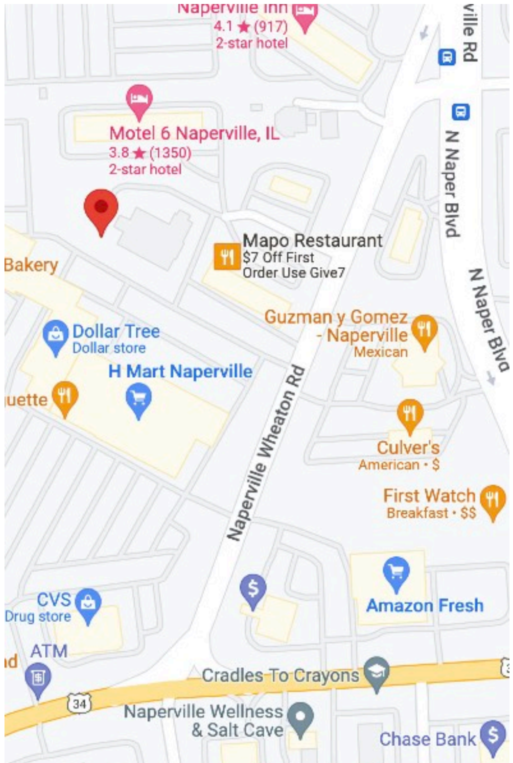
Since Mac was sick, Matt was the only to go out as the fox. I joined him as we headed to Naperville. We found a parking area around several large buildings but in the open. The weather was in the upper 30s and somewhat windy but much better than the night before. Five hunters were released at 8:04. Matt thought the first hunter should arrive about 8:40. That was close as Tony drove up for the win at 8:36. Matt asked Tony where we should meet and Tony picked Buona Beef which was very close. Five minutes later John and Janet drove up for 2nd. Another 6 min later Pete walked in from another direction for 3rd. Don said he was not close by and gave up going to the munch. Tom showed up in about the same location Pete was and walked in the end the hunt. We all met at Buono Beef. Results:

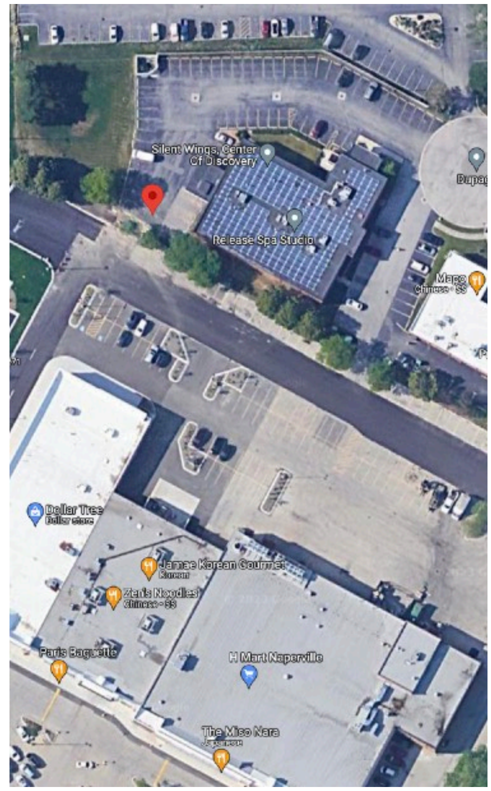
1. Tony AA9CC - 8:36
2. John WD9EXW, Jnet - 8:41
3. Pete K9PW - 8:47
4. Tom N9CBA - 9:10

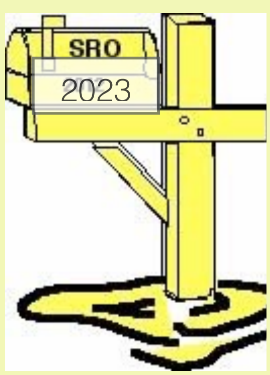
DNF Don W9RA - 8:53











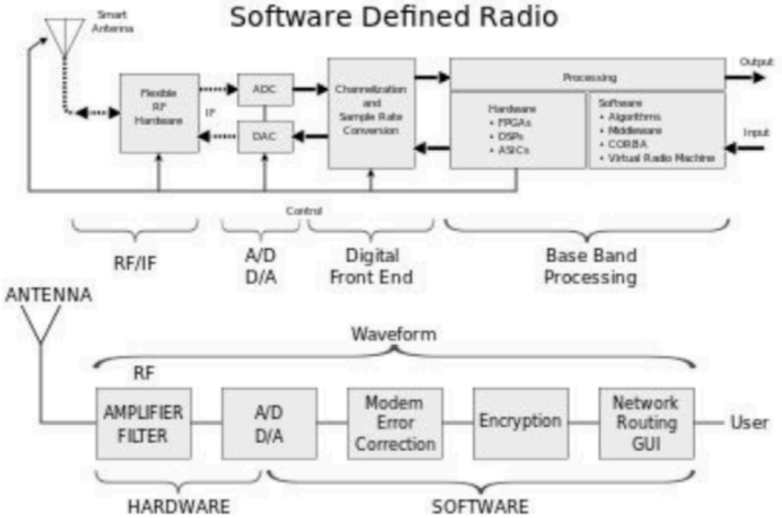
If you move, let the Editor know your new mailing and email addresses. It is our way of getting Mike Shy to you each time.

SDR Radio

At the February SRO meeting I was discussing SDR radios and the Baofeng SDR block diagram.
Being pressed for time I did not discuss the A to D and D to A processes. I have gathered some information to help fill in the some of the blanks. I was not able to copy the math equations, but you can find them at:
A Software-Defined Radio for the Masses, Part 1 By Gerald Youngblood, AC5OG ***and ARRL QEXJul/Aug 2002 13 Page 13***
And:

Software-defined radio - Wikipedia
https://en.wikipedia.org › wiki › Software-defined_radio

Operating principles



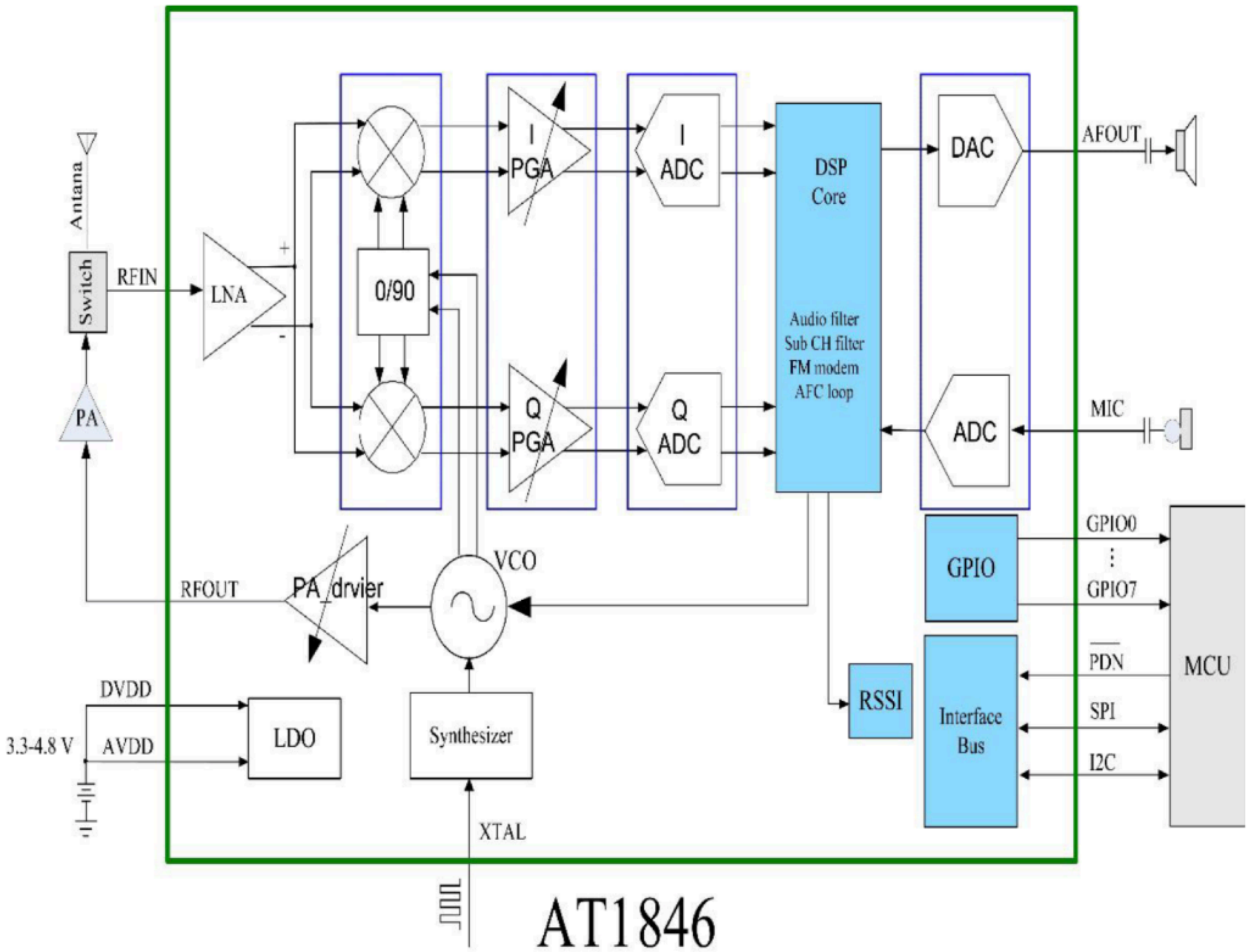
Software defined radio concept

Superheterodyne receivers use a VFO (variable-frequency oscillator), mixer, and filter to tune the desired signal to a common IF (intermediate frequency) or baseband. Typically in SDR, this signal is then sampled by the analog-to-digital converter. However, in some applications it is not necessary to tune the signal to an intermediate frequency and the radio frequency signal is directly sampled by the analog-to-digital converter (after amplification).

Real analog-to-digital converters lack the dynamic range to pick up sub-microvolt, nanowatt-power radio signals produced by an antenna. Therefore, a low-noise amplifier must precede the conversion step and this device introduces its own problems. For example, if spurious signals are present (which is typical), these compete with the desired signals within the amplifier's dynamic range. They may introduce distortion in the desired signals, or may block them completely. The standard solution is to put band-pass filters between the antenna and the amplifier, but these reduce the radio's flexibility. Real software radios often have two or three analog channel filters with different bandwidths that are switched in and out.

The flexibility of SDR allows for dynamic spectrum usage, alleviating the need to statically assign the scarce spectral resources to a single fixed service.[3]

SDR Block Diagram In Baofeng



A Software-Defined Radio
for the Masses, Part 1
By Gerald Youngblood, AC5OG

From ARRL QEXJul/Aug 2002 13 Page 13

Give Me *I* and *Q* and I Can
Demodulate Anything

First, consider the direct-conversion mixer shown in Fig 2. When the RF signal is converted to baseband audio using a single channel, we can visualize the output as varying in amplitude along a single axis as illustrated inFig 4. We will refer to this as the *inphase* or *I* signal. Notice that its magnitude varies from a positive value to a negative value at the frequency of the modulating signal. If we use a diode to
rectify the signal, we would have created a simple envelope or AM detector. Remember that in AM envelope detection, both modulation sidebands carry information energy and both are desired at the output. Only amplitude information is required to fully demodulate
the original signal. The problem is that most other modulation techniques require that the phase of the signal be known. This is where
quadrature detection comes in. If we delay a copy of the RF carrier by 90° to form a quadrature (*Q*) signal, we can then use it in conjunction with the original in-phase signal and the math we learned in middle school to determine the instantaneous phase and amplitude of the original signal. Fig 5 illustrates an RF carrier with the level of the *I* signal plotted on the x-axis and that of the *Q* signal plotted on the y-axis of a plane. This is often referred to in the literature as a *phasor diagram* in the *complex plane*. We are now able to extrapolate the two signals to draw an arrow or phasor that represents the instantaneous magnitude and phase of the original signal.
Okay, here is where you will have to use a couple of those extra functions on the calculator. To compute the magnitude m_t or envelope of the signal, we use the geometry of right triangles. In a right triangle, the square of the hypotenuse is equal to the sum
of the squares of the other two sides—
according to the Pythagorean theorem. Or restating, the hypotenuse as m_t (magnitude with respect to time):
The instantaneous phase of the signal as measured counterclockwise from the positive *I* axis and may be computed by the inverse tangent (or arctangent) as follows: Eq 4)
Therefore, if we measured the instantaneous values of *I* and *Q,* we would know everything we needed to know about the signal at a given moment in time. This is true whether we are dealing with continuous analog signals or discrete sampled signals. With *I* and *Q,* we can demodulate AM signals directly using Eq 3 and FM signals using Eq 4. To demodulate SSB takes one more step. Quadrature signals can be used analytically to remove the image frequencies and leave only the desired sideband. The mathematical equations for quadrature signals are difficult but are very understandable with a little study.[2] I highly recommend that you read the online article, "Quadrature Signals: Complex, But Not Complicated," by Richard Lyons. It can be found at www.dspguru.com/info/ **tutor/quadsig.htm**. The article develops
in a very logical manner how quadrature-sampling *I/Q* demodulation is accomplished. A basic understanding of these concepts is essential
to designing software-defined radios. We can take advantage of the analytic capabilities of quadrature signals through a quadrature mixer. To understand the basic concepts of quadrature mixing, refer to Fig 6, which illustrates a quadrature-sampling *I/Q* mixer. First, the RF input signal is bandpass filtered and applied to the two parallel mixer channels. By delaying the local oscillator wave by 90°, we can generate a cosine wave that, in tandem, forms a *quadrature oscillator*. The RF carrier, $f_c(t)$, is mixed with the respective cosine and sine wave local oscillators and is subsequently low-pass filtered to create the in-phase, $I(t)$, and quadrature, $Q(t)$, signals. The $Q(t)$

Fig 4—An in-phase signal (I) on the real plane. The magnitude, $m(t)$, is easily measured as the instantaneous peak voltage, but no phase information is available from in-phase detection. This is the way an AM envelope detector works.
Fig 5—I +jQ are shown on the complex plane. The vector rotates counterclockwise at a rate of $2\pi f_c$. The magnitude and phase of the rotating vector at any instant in time may be determined through Eqs 3 and 4.

Fig 6—Quadrature sampling mixer: The RF carrier, f_c, is fed to parallel mixers. The local oscillator (Sine) is fed to the lower-channel mixer directly and is delayed by 90° (Cosine) to feed the upper-channel mixer. The low-pass filters provide antialias filtering before analog-to-digital conversion. The upper channel provides the in-phase ($I(t)$) signal and the lower channel provides the quadrature ($Q(t)$) signal. In the PC SDR the low-pass filters and A/D converters are integrated on the PC sound card.

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Regular Meeting Place
Salvation Army every even month at 7:30 PM unless other-wise indicated in Mike Shy and SRO web site. Check for exact date & time.

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Apr 11th
7:30 PM