



Photo courtesy AC8FJ

Hello, NTS Treasure Hunters!

Well, the first NTS Treasure Hunt of 2026 is complete! Sixteen stations completed all five rounds in the January 2026 NTS Treasure Hunt:

- AA2QL Freddie Cruz
- KC1TLF Dave Marcucci
- KD2QAR Mark Vincett
- KE8HKA Matthew Foltz
- KFØPZP Juanita Moore
- KN6HXP Warren Halstead III
- N1CVO Shawn Dodds
- N7YD Mark Galbraith
- W1LEM Lem Skidmore
- W7AAF Matthew Rau
- W8ROY Roy Watts
- WA5EWN Emmett Ward
- WB1F Gil Arevalo
- WB2JNQ Bob Jordan
- WX2DX Bill Smith
- K5ANP Alan Prager

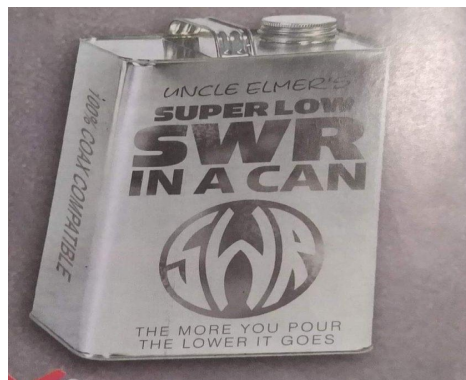
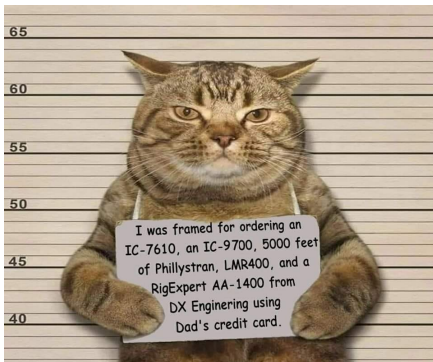
Field Organization Reports — January 2026

Public Service Honor Roll

This listing recognizes radio amateurs whose public service performance during the month indicated 70 or more points in six categories. Details on the program can be found at: www.arri.org/public-service-honor-roll.

640 ADBCM	180 K5DB	135 AG9G	110 N9CK	99 N4NCA	68 KB2VAA	75 KG5ACP	74 N2RTF	70 W5XX
335 N9VC	KV2J WM2C N2LC	KE4RS W5YVQ	KM4WHO WV5Q	KC1HHO	KD2KUB	NK4AA K9WC AA3N	73 K7GC	KD2TDO WB3FTO
320 WBROY	175 KB5PGY WA3QLW	130 K0D-HH KJ5UC KY2D	107 A8F	95 KM2 KT4WX	86 WB8RGE N2RFB K2PHD	75 N2ZW WB4ZDU WB2VUF	74 W2ZXN W4TTO	70 W5XX KD2TDO WB3FTO
317 W7EES	173 W9RY	106 W9BGJ KW1U	106 N2ZW K9MDA	94 WB4ZDU WB2VUF	86 WB8RGE N2RFB K2PHD	75 N2ZW WB4ZDU WB2VUF	74 W2ZXN W4TTO	70 W5XX KD2TDO WB3FTO
300 WASN	170 W9FE	105 N1ULZ	105 W0ZH	92 K1YBD	83	75 N2ZW WB4ZDU WB2VUF	74 W2ZXN W4TTO	70 W5XX KD2TDO WB3FTO
246 WSWMC	N4CNX	125						

The following stations qualified for PSHR during these previous months, but have not been recognized yet: (Dec. 2025) AD8CA 600, AC8NP 185, N2LC 180, KE4RS, KC8PBU 155, N8SY 135, KBMDA 129, NA7G, KD8JUB 120, KEBANW 105, KB8GUN, N8MRS, WB8SIQ, W8MAL 100, WB8YYS 99, N7UWX 94, KL7RF, N8OD, K3RC, K9KRA, W8GSR 90, KA8BJA 80, KD8WH 76. (Nov. 2025) AD6SM 575, AC8NP 215, N2LC 155, KD8JUB, KC8PBU 150, KE4RS 145, N8SY 140, WB8YYS 125, NA7G 120, KBMDA 106, W8MAL, WB8GUN, KC8WH, WB8SIQ, N8MRS 100, N7UWX 94, KL7RF, K3RC, N8OD, K9KRA, W8GSR, 90, KA8BJA 80. (Oct. 2025) AD8CA 780, AC8NP 270, KEBANW 200, N8SY 155, KBMDA 144, KE4RS 140, WB8SCH 135, N8MRS, W8GSR 130, KD8JUB 125, KL7RF, WB8YYS 120, KC8WH 116.



Mat-Matics # 128: HP 435B Power Meter Repair

-Mat Breton, N8TW

Overview:

At the Dayton Hamvention several years ago I found and purchased an analog RF power meter with a matching sensor. This was a rare find (at least the sensor portion). For well-behaved sine signals like RF carriers or CW, you can calculate RF power using an oscilloscope and math instead of an RF power meter. When dealing with non-sinusoidal or modulated signals this method will not work well and this is where RF power meters shine.

Power Meters:

RF power meters are used to measure the strength of radio frequency signals in various applications, especially for testing and calibrating radio transmitters, receivers, and other RF equipment. Here is how they are typically used:

Research and Development: Engineers use RF power meters during the design and testing phases of new RF devices to validate performance and optimize designs.

Testing Transmitters and Receivers: RF power meters help verify that transmitters are outputting the correct power and that receivers are functioning within specifications. This is crucial for maintaining reliable communication systems.

Calibrating Equipment: Accurate power measurements are essential for calibrating other RF equipment, ensuring that devices operate efficiently and within regulatory limits.

Troubleshooting: Technicians use RF power meters to diagnose issues in RF circuits, such as signal loss, faulty components, or incorrect power levels.

Field Measurements: Portable RF power meters, like the HP 435B, are used in the field to check signal strength, antenna performance, and system integrity.

How RF power meters work:

Classic power meters consisted of a sensor unit that can easily be replaced or changed out (sensors might come in several power and/or frequency ranges, for example), and metering unit that processed and displayed the sensor signal. Because the sensor is usually extremely sensitive the transmitted signals is usually run through an attenuator first (or a attenuating coupler).



Typical measurement setup

The meter itself consists of a power source for the sensor, the measurement circuit that processes the sensor signal, and the display. In analog models like the HP 435B, this is displayed on a moving-coil meter. In digital models, the signal is converted and shown on a digital display. The measured power is displayed in units such as milliwatts (mW) or decibels-milliwatts (dBm). In meters that can use multiple different sensors there will be calibration controls and range selectors to ensure accurate readings across different power levels and frequencies. In the case of the 435B this is a selector knob combined with a

About the sensor:

The RF power meter uses a sensor that absorbs the RF energy from the signal source. This sensor converts the RF energy into a measurable electrical signal. The sensor is the heart of the measurement system. It is also the part the is most often damaged or missing. It is possible to find a used power meter without a sensor for little to no money ... but finding a sensor that is both compatible and it working is much harder: they are very easy to overload and damage or destroy. By nature, most of these sensors are not repairable ... so even slight damage is the same as destroyed.



HP 431C, 432A, 434A, 435A, 436A

Types of Sensors in RF Power Meters:

1. Thermocouple Sensors: These sensors absorb RF energy and convert it into heat. The temperature rise generates a voltage via the thermocouple effect, which is proportional to the RF power.
 Advantages: Wide frequency range; Accurate for both CW (continuous wave) and modulated signals
 Use case: Common in laboratory-grade meters and calibration standards.
2. Diode Sensors: Diode sensors rectify the RF signal, producing a DC voltage proportional to RF power. They are typically used for lower power levels.
 Advantages: Fast response; Good for low-level signals
 Limitations: Less accurate for modulated signals unless compensated
3. Barretter Sensors: These use a thin wire that changes resistance as it heats up from absorbed RF energy. The change of resistance is measured to determine power.
 Use case: Mostly found in older or specialized meters.
4. Bolometer Sensors: Like thermocouples, bolometers measure the change in resistance of a material as it heats up from RF absorption.
 Advantages: High sensitivity
 Used for very low power measurements

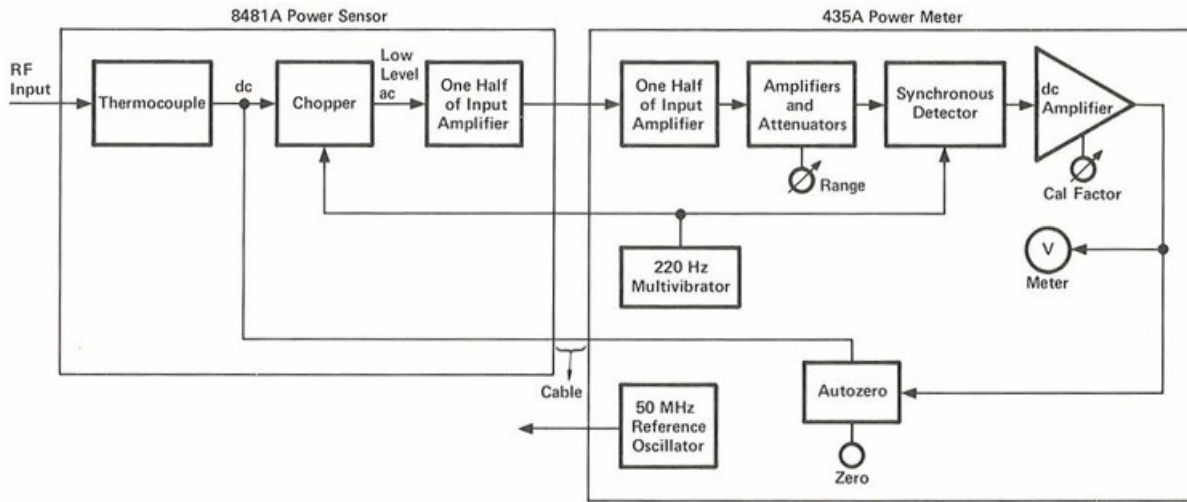
HP Power Meters:

Hewlett Packard made a series of power meters, beginning with the HP 430. There were multiple revisions for each model (HP 430/430A/430B/430/C) as well as multiple generations (HP 430/431/432/434/435/436/...).



HP 431C, 432A, 434A, 435A, 436A

HP 435B Model: The HP 435B was part of the last series that used an analog meter. The next generation, the 436x, switched to digital meters. Note that nowadays power sensors often now have a USB cable that will connect directly to a laptop/PC. The PC is then responsible for the processing and display of the sensor data ... saving the expense and maintenance of the metering unit. The 435B RF Power Meter is an analog power meter, compatible with the entire series of 848(X) power sensors. Depending on which sensor is used, the 435B can measure power from -65 dBm to +44 dBm, full scale, at frequencies from 100 kHz to 110 GHz. It cost \$2195 new.



Operation of the 435A meter with a sensor (from HP manual)

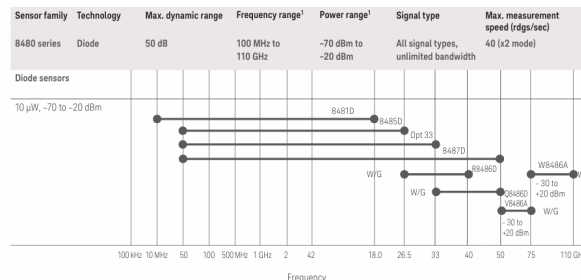
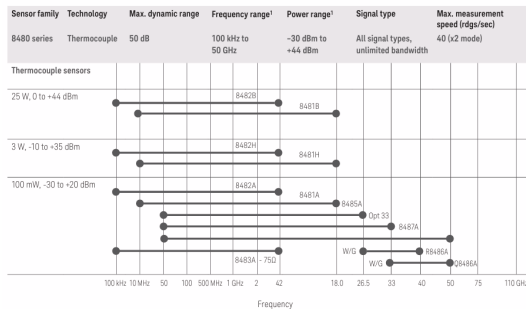
This versatile instrument also features <1 percent instrumentation uncertainty, low noise and drift, auto-zero, recorder output, optional battery operation, and long cable options up to 61 m (200 ft).

Additional Features: Optional battery for fully portable operation, Accurate internal calibration source for long-term accuracy, Nine interchangeable sensors for a wide range of applications. Options:

- 1 RECHARGEABLE BATTERY INSTALLED PROVIDES UP TO 16 HOURS OF CONTINUOUS OPERATION
- 2 INPUT CONNECTOR PLACED ON REAR PANEL IN PARALLEL WITH FRONT
- 3 PARALLEL SENSOR INPUTS FRONT AND REAR PANELS, REFERENCE OCILLATOR OUTPUT ON RAR PANEL

Sensors:

The 848x series thermocouple and diode power sensors provide extraordinary accuracy, stability, and SWR over a wide range of frequencies (100kHz to 110GHz) and power levels (-70 to +44 dBm). The diode sensors are better for exceedingly small power levels, and frequencies above 50GHz. The thermocouple units are better at higher power levels.

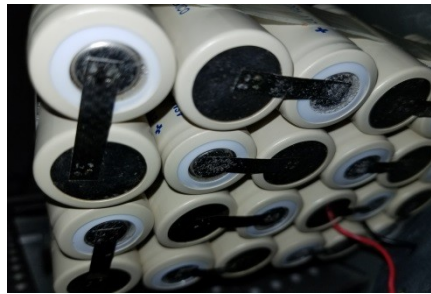
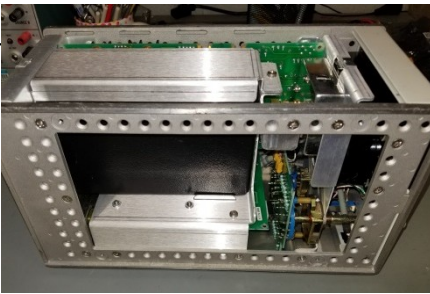


The family of 848x power sensors

The 8482H thermocouple-type sensor that came with the meter is 100KHz to 42GHz, -10 to +35dBm (3W max). This is a good sensor for radio as it has a higher power capability and works well with modulated signals. Used sensors on eBay start at \$100.

Battery Removal:

The 435B was a "portable" model with an optional NiCad battery. The unit I purchased had that NiCad battery installed. I tested it and it was truly dead: while it showed ~20V when unloaded, the voltage would immediately collapse when turned on. It would not charge, with all the charging power producing heat instead of being stored chemically. Since I would not be using the instrument in a portable manner, and I did not want to leave the dead NiCad batteries in it ... I removed them and brought them to a battery drop off location. I put the empty box back into the unit. After the removal, the power supply worked normally when plugged in.



Case (left), leaking cells (middle), emptied case (right)

Meter Repair:

The analog meter needle was sticking about 75% towards full-scale. There was a mechanical interference inside the meter assembly. After fixing, the meter worked normally again.



The analog meter movement

Capacitor Replacements:

There is only one electrolytic capacitor in this design, a 20uF 150V axial unit. I replaced it with a 22uF 160V axial part (closest available). There was also a metalized paper "RIFA" brand capacitor across the line/neutral for conducted noise suppression. I replaced that with an X2-rated film capacitor. If you have followed my other articles, you know that I always replace metalized paper capacitors X/Y line capacitors ... I have had too many fail in older pieces of equipment.



RIFA Capacitor (left), Al-Electrolytic (right)

As mentioned in previous articles, capacitors are something that have continued to improve as technology improves. Modern electrolytic capacitors are smaller and longer lasting primarily due to improved electrolytic fluid.



Old and New Capacitor Comparisons

Operational Testing:

After getting the meter running properly it was necessary to perform testing to see if it was functional and operating within performance limits. I used a frequency generator to provide the measurement source, and a separate oscilloscope to verify the frequency generator’s amplitude. I could only verify up to 500MHz (plenty for me). The sensor and meter, once calibrated, operated within acceptable margins across frequency and magnitude.

To use the meter, you must hook up the sensor. Then you must select the correct dial plate for the sensor. Then you zero the meter with no power applied to the sensor input. Then you adjust the sensor Cal for the frequency of interest (the sensors come from the factory with a chart on them). Finally, you are ready to take a measurement.

Summary:

For the price of a couple of capacitors, I was able to get the power meter running again. Total out of pocket was less than \$50 (\$40 for the meter/sensor, and less than \$10 for the capacitors with S&H).



Editorial:

On a personal note, I wanted to say thank you for the numerous emails, texts and well-wishes from so many of you. I’m pleased to report that my illness was nothing serious. The biggest problem was that it left me a little weak, resulting in a fall at 3:00am, that left me a little bruised and sore, but overall no worse for wear. I’m back up and about and looking forward to seeing everyone Tuesday night

73,
Don, KC8VCX



So, only one brave soul even tried to identify the couple in this picture, and that wasn’t really a guess because it was him. If you haven’t guessed yet, it is childhood sweethearts Scott (WT8S) and Mary Deykes.

(photo courtesy of Mary Deykes)

I made a list of nets when I was getting started in the hobby.
Needs some reorganizing, but do you have additions or corrections?
Best
N8XZ Ron

- ◆ GMARC Breakfast - 0930 Saturdays Sero's on 12 mile Madison Heights
See extensive net Schedule: <https://gmarc.org/>
- ◆ District 2 ARPSC net
2nd & 4th Wednesday
443.075, 1900
- ◆ Livonia ARC
Thursday 2000
145.350, 100
See LivoniaARC.com
- ◆ WC ARPSC
Wednesday 2100
145.330, 100
See: <https://sites.google.com/view/wayne-county-arpsec>
- ◆ Michigan ARPSC
See: <https://mi-arpsec.org/net>
- ◆ HPARC Net Sundays 2100
DART VHF repeater (146.640 MHz, 100.0 Hz PL, negative offset),
and can also be reached using the DART UHF repeater (443.225 MHz, 107.2 Hz PL, positive offset),
Echolink ("W8HP-R" or node 980938), and IRLP (node 4520).
- ◆ Shanon, Glenn each morning on the W8DTW-C D-STAR repeater about 7:45am. 7 days a week.
- ◆ HPARC meets for breakfast on Saturdays at 0830 at the Cozy Cabin on 12 and Dequindre.
- ◆ Warren CERT net
2nd/4th Monday 2030, 443.550
- ◆ Macomb County Net - 147.200, 100Thursdays 2000
- ◆ Motor City Radio Club Net
Tuesdays 21:00 – 22:00
Traffic Net follows at 22:15
147.24 net W8MRM
2000 Sunday
- ◆ USECA Traders & Builders net 147.180
- ◆ Ford Amateur Radio League net - Tin Lizzy
- ◆ Washtenaw RACES Net - N8DUY 145.150+ 100PL 2100 Sunday
- ◆ Hazel Park Amateur Radio Club
DART VHF repeater (146.640 MHz, 100.0 Hz PL, negative offset),
and can also be reached using the DART UHF repeater (443.225 MHz, 107.2 Hz PL, positive offset),
Echolink ("W8HP-R" or node 980938), and IRLP (node 4520).
2000 Monday
- ◆ AARC Net 146.96(-)
- ◆ Auburn Hills D-STAR net
2100 Monday
- ◆ Monroe ARPSC 146.72- (PL 100)
- ◆ SATERN - 145.330
2000 Tuesday
- ◆ East Coast Reflector tech net
on GMARC 443.075
(Pre check in via texting callsign only to 716-317-9050)
2100 Wednesday
- ◆ National Capital Region D-STAR Net - REF025C
2000 Thursday
- ◆ LARC 145.35, 100Hz Echolink W8WQU-R
SATERN - 147.180 (PL100) / USECA
2000 - First of the month
- ◆ Sandberg radio club net 146.420
- ◆ GMARC ragchew net Wednesdays, 443.075
- ◆ GMARC net
Mondays 2000 443.075

PRIZES

HAMFEST & SWAP MEET BENEFITTING



**LUCAS COUNTY AMATEUR RADIO
EMERGENCY SERVICE, Inc.**

DATE: SATURDAY MAY-02-2026

TIME: 1000 - 1400

ADMISSION: \$5.00

VENDOR TABLES \$10.00

LOCATION - INDOORS

Merchants Landing (Bingo Hall)

6182 Summit St. Toledo, OH 43611

VE TESTING ON SITE



*Provided by the colaberation of
Lucas County ARES and NSLPQ
ARC Amateur Radio Cooperative
PRE-REGISTRATION REQUIRED
GO TO THE FOLLOWING LINK TO
REGISTER FOR TESTING, OR SCAN
THE QR CODE FOR ACCESS TO
REGISTRATION*

<https://tinyurl.com/LCARES2026>

TALK IN 444.925 103.5 PL



Email : swap@lucasares.org

Phone Number: 419-405-3299

The Wexaukee Amateur Radio Club Presents the 66th Annual

*Free
Parking*



*LARGEST
Swap
in the North*

*Testing
Session for
New or
Upgraded
Licenses*

**Cadillac
Amateur
Radio &
Computer
Swap**

Talk In on
146.980
K8CAD
Cadillac
Repeater

Saturday May 2
Doors Open at 8 AM
Admission \$5.00
Mackinaw Trail Middle School

8401 South Mackinaw Trail — Cadillac, Michigan
wexaukeearc.org