

**EXPERIMENTAL AIRCRAFT ASSOCIATION
CHAPTER 1098
SHAWNEE, OKLAHOMA**

The Shawnee, OK, EAA Chapter 1098 is an official chapter of the EAA, Wittman Airfield, Oshkosh, Wisconsin 54903-3089. Phone (414) 426-4800. Chapter 1098 was organized to promote aviation in the community, provide camaraderie, sharing of aeronautical knowledge and skills among those with interest in grassroots aviation and who share the objectives of the EAA. Chapter dues are \$20.00 per year, payable on January 1. Normally our meetings are held on the **Forth Saturday of the month at 2:00 PM at Twin Lakes Airport (2OK2) at a airport location announced each month.** Time, date and place is subject to change. Please check your newsletter for current meeting information.

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Chapter Website: <https://chapters.eaa.org/eaal1098>

Facebook: [EAA Chapter 1098](#)

Newsletter information: EAA Chapter 1098 publishes the newsletter once a month. Its purpose is to inform.

Members are encouraged to submit aviation- and member-related information and suggestions to the newsletter editor.

ATTENTION: Chapter Meeting time and location change

Due to Corona virus concerns and other considerations the Chapter 1098 meeting time and place have changed. Our regular meetings will now take place on the 4th Saturday of the month at 2:00 PM. Our meeting location has changed to the Twin Lakes airport (2OK2) at a airport location to be announced each month in the newsletter and on the chapter website at:

<https://chapters.eaa.org/eaal1098>

Meeting Notice:

THERE WILL BE A MEETING THIS MONTH

PLEASE BRING A MASK AND BE PREPARED TO RESPECT COVID DISTANCING

LOCATION: Gary Manning's Hanger
13801 Chandelle Dr. Newalla OK 74857

TIME: 2:00 PM Saturday January 23rd

Quote of the month:

"...do those things that are necessary to survive. Do them instinctively, and do them promptly."

-Jimmy Doolittle (On Air Racing)

Free From the FAA:

The Aviation Maintenance Technician Handbook - Airframe (FAA-H-8083-31) is one of a series of three handbooks for persons preparing for certification as an Airframe or Powerplant mechanic. It is intended that this handbook provide the basic information on principles, fundamentals, and technical procedures in the subject matter areas relating to the Airframe rating. Chapter 9 Covers Aircraft Electrical Systems.

Download Free Here: [FAA-H-8083-31A, Aviation Maintenance Technician Handbook-Airframe Volume 1](#)

A Few Thoughts On Electrical Wiring.

One of our members had a close call when he experienced a severe wiring short that burned up most of the wiring in his aircraft. Fortunately he kept his cool even when his wiring wasn't. Our pilot had decided to make a lap around the pattern prior to heading off on a short test hop and luckily was on downwind when things went bad. With a cockpit full of smoke he landed without further incident. But the damage was significant. The goal of this article is to provide a list of issues that contributed to the failure of this wiring system and issues that complicated the repair. Additionally direction to readily available information that may assist others in planning and installing Wiring and Avionics in any aircraft is provided.

The System

This aircraft is instrumented with a Dynon HDX1100 SkyView system. This is a modular glass panel system with broad capabilities. This installation includes these modular devices: HDX1100 display, Radio, Intercom, Transponder, ADSB in/out, Air Data, Attitude, and Heading Reference System (ADAHRS), Autopilot, Engine Monitoring System (EMS), Network interface, GPS receiver, and Battery back-up.

This system requires the installation of numerous wiring harnesses, power, ground, and sensor connections to make it tick. In addition to this sophisticated system the aircraft is equipped with Navigation lights, Strobes, pitot heat, independent elevator trim, voltage regulator, and USB power stations. The EMS monitors, CHT and EGT for four cylinders, oil pressure, oil temp, fuel pressure, voltage, current, and can support many other sensor inputs. Because of the complexity of this installation a person with previous experience on this installation assisted in the build. This person did most of the wiring.

The Failures

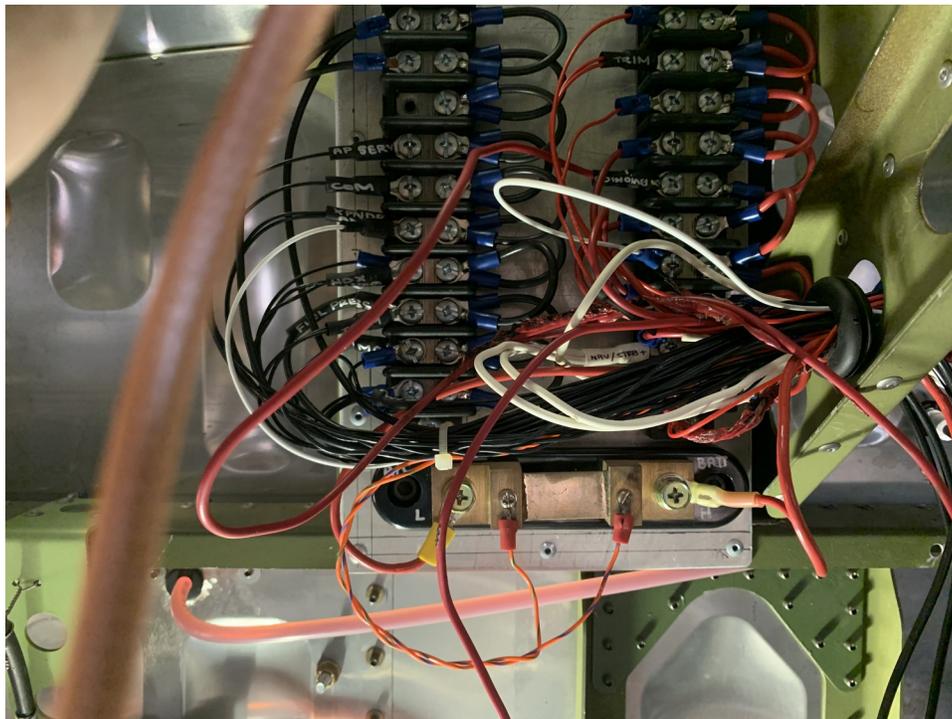
Three failures leading up to every bad event. #1 Previously the alternator on this aircraft failed with significant heat damage. All aircraft systems still worked and a check for wiring faults was not performed past the alternator harness as no breakers had tripped. #2 The alternator was replaced prior to this flight without checking to see why the main breaker hadn't tripped. Turns out the main breaker was inadvertently bypassed in daisy chaining the main power bus. #3 The cause of the original alternator failure was still present and progressed to a total failure in flight.



Bad alternator coil

New coil

The wiring in this application was collected into a single large bundle near the primary power bus. This bundle was routed through a lightening hole in a structural member. The lightening hole was oval shaped. The wiring was routed through a tightly packed round grommet in that oval hole. With aircraft vibration and flexing that grommet fell out of the lightening hole and allowed the wiring to chaff on a sharp sheet metal edge. Lack of slack was a likely contributor to this failure. One extra daisy chain link bypassed the main breaker rendering it useless. Heat from shorted power wires melted most of the wires that were routed through the firewall causing additional failures. Damage extended over about five feet of harness length. This included the EMS harness, power wires, ground wires, ignition wires, and starter wires. Fortunately the CHT and EGT leads were spared. There was also heat damage noted on the alternator coils however resistance/continuity checks indicate that the unit is still serviceable.



The Heart of the Failures. Note melted wires, displaced grommet, wire laying on sheet metal edges, and daisy chained buses

Routing - When routing through non-firewall structural openings 3/8" clearance should be provided around the harness to avoid chaffing. This can be achieved by using P-clamps and brackets as described in AC43.13 and the AMT. Other routing and clamping techniques are outlined in the previously mentioned documents.

Component placement - Don't forget the harness connectors and harness bends when planning. That includes space behind the back shell on connectors to allow for insertion and removal distance. Consider maintenance, component and bus locations should be selected so that after the aircraft is complete they can be accessed for maintenance and modification with relative ease. With wiring if it's hard to get to you will have problems maintaining or repairing it. Keep things up where you can sit in the cockpit to work on them. Don't build things into the aircraft in a way that you will not physically be able to access them. Like back

side of the firewall, under the instrument panel. Unless you like working upside down with a flap handle in your back.

Plan for the future - Coil and stow extra sensor wires for future expansion. Wire harnesses that come with your avionics usually provide ample wire length. Fold the ends of wires and put labeled heat shrink on them for future reference. Don't hide them inside large harnesses where you will have to dig for them. Coil them up in a generous radius loop and secure them to structure so they can't chaff or move. You can even place coils in padded plastic or cloth bags for protection. Do not untwist twisted pair wires when stowing.

Firewall feed through and adequate system separation - When penetrating the firewall with wiring consider separation of the primary wiring to the bus from other sensor and system routing. The battery has the potential to turn yards of wiring into a red hot mess. If the battery and alternator leads up to the bus are isolated they will do less damage to other wiring in the event of a uncontrolled short. Where wires do penetrate the firewall use fittings that protect the wiring from chaffing while preventing fire and smoke from entering the cockpit.

Bad crimping and multiple connections in one crimp - A crimp should have the same strength as the wire you are crimping. Not many people achieve this or even think about it. Pull test every crimp and don't be gentle. Make sure the crimp will stay. A large number of 14 ga wires pulled from the ring connectors with little effort. Don't put two or more small wires in a single large connector. The crimp may trap one wire but the other is more than likely loose. You are allowed to stack up to four ring connectors or three connectors and a bus bar on a single screw. This is way more secure than crimping multiple wires. The wiring in this aircraft just started falling apart with even gentle handling as multiple wires pulled from the ring connectors crimps. This extended the repair process as the unlabeled wires all had to be traced and verified before re-connection. Many of these were ground wires. Often switch signal wires are grounds. This wiring would have been plagued with many future faults in a short time. A single loose ground bouncing against structure can really ruin you day. Loose positive power leads are obviously a disaster.

Wire size selection and incorrect breaker sizing - Wire sizes need to increase toward the power source as they collect the demand for all of the devices in the aircraft. Really do your homework on the sizing for wiring. The same is true for breakers. Some of these solid state devices have very small breaker requirements. Consider using a .5 amp fuse in place of a .5 amp breaker as the .5 amp breakers are rather pricey. Don't use the next higher 1 amp because it's cheaper. You won't get the proper protection. Watch for the requirement for fusible links in the ammeter leads off the shunt. This can easily be missed.

The Aviation Maintenance Technician Handbook - Airframe Volume 1, (AMT), defines typical circuit layouts, wire sizing including dynamic/transient considerations, Crimping requirements and strengths, Number of ring connectors allowed on a single screw. Clamping, Harness tying, and lots of other subjects. Advisory Circular 43.13 xx is also a extensive source of detailed information for people maintaining, repairing, and installing aircraft components and shares directly content with and from the AMT.

Labeling trick write on heat shrink - Write wire identification with a fine line permanent sharpie on light colored heat shrink tubing. Slide it over the wire before adding connectors. When you shrink it in place the writing shrinks with the tubing making for neat labels. As a bonus the shrinking tends to improve your printing.



Routing in place harness construction - Building harnesses in place can be frustrating. Use the rubber band clamp shown in the picture below to easily control wires as you add, subtract, and re-route wires in the harness in aircraft. Use the clamps the same as a wire tie to hold bundles together and in place. Go back later and add wire ties to pull the harnesses in tight.



Rubber Band Routing Clamps



These wire strippers and crimp tool will take a lot of frustrations out of wiring

Website of the Month:

Free from GARMIN - A flight planning service for creating and filing IFR and VFR flight plans, obtaining weather briefings and navigation logs for flights. The free FLTPLAN GO app provides many of the functions of paid high end applications for GPS maps, weather, and airspace visualization in flight. Chart and Airport information downloads are free. For Apple and Android devices.

[FLTPLAN GO](http://www.flightplan.com)

Twin Lakes Airport information:

[2OK2 TWIN LAKES on AIRNAV.com](https://www.airnav.com/airport/2OK2)

[TWIN LAKES AIRPORT ON FACEBOOK](#)



VMC CLUB

Please review and be prepared to discuss at the meeting. Thanks John Myers!

The question:

January 2021, EAA/VMC Club

The question:

On the VFR sectional for the Las Vegas area, there is a radio frequency depicted. It is located at the South West Corner from the Class B airspace center on the 220-degree radial from LAS about 20 NM. It has a box-like a VOR would have, and a frequency of 112.05 and is named GOODSPPRINGS. However, there is no compass rose around the location. What is it? What is it used for?



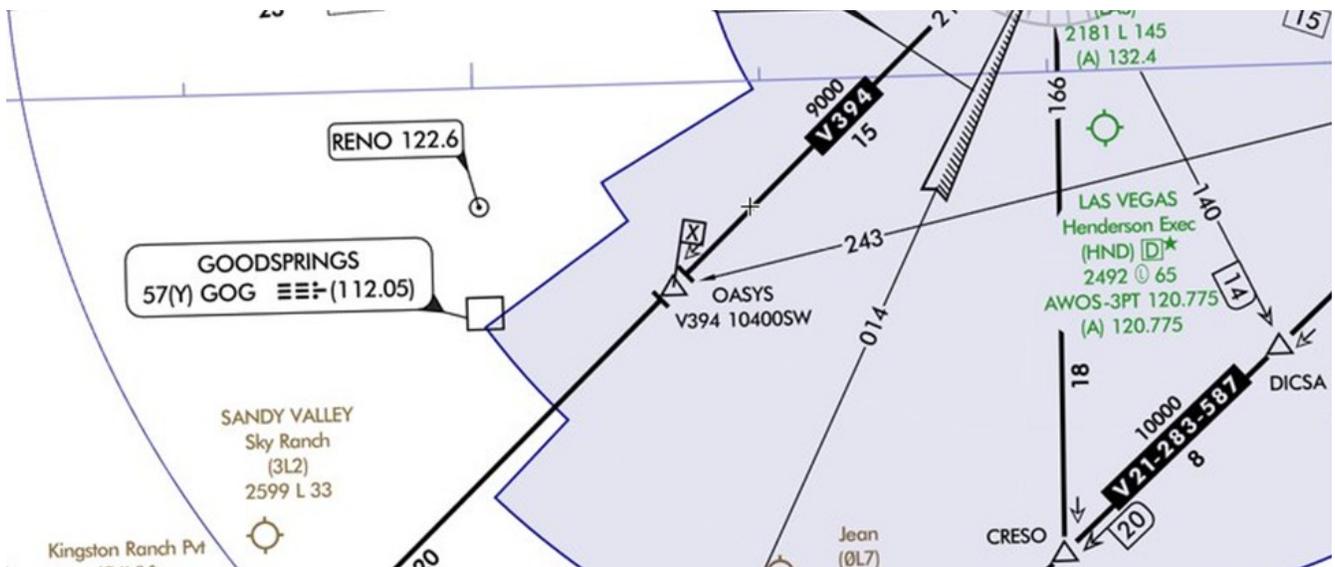
IMC CLUB

Please review and be prepared to discuss at the meeting. Thanks John Myers!

January 2021, EAA/IMC Club

The question:

On the IFR Low chart for the Las Vegas area, there is a radio frequency depicted. It is located at the South West Corner from the Class B airspace center on the 220-degree radial from LAS about 20 NM. It has a box-like a VOR would have, and a frequency of 112.05 and is named GOODSPRINGS. However, there is no compass rose around the location. On the VFR Sectional, the box appears also. What is it? What is it used for?



CLASSIFIEDS

If you know of a classified that is outdated, or want to submit a new one, please notify the newsletter editor at the email above.



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Qualifications

- Certified A&P Mechanic
- Inspection Authorization
- Rotax IRMT
- Private Pilot

What We Can Do For You

- Maintenance and Repairs
- Build Assist
- Pre-Buy Inspections
- Annual Inspections

Background

- A&P Mechanic, Jabara Airport
Wichita, KS
- Experimental Builds, Backcountry
Supercubs Douglas, WY



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NOTICE: If you are receiving the newsletter but are not a member of the chapter and would like to become a member, please contact our Treasurer, Greg Chapman, and he will provide you an application. If you are already a member of EAA National, all that is required is to fill out our application and pay \$20.00 and you are then a member of EAA Chapter 1098. If you are unable or do not want to join at this time, you are still welcome to attend our regular meetings.