

the

Monitor

March

The MRCS Officers

2012

President:

Arthur Deane
21690 Bedford Dr.
Northville, MI 48167
Phone: 248.348.2058

Vice-President:

Ken Myers
1911 Bradshaw Ct.
Commerce Twp., MI 48390
Phone: 248.669.8124

Secretary:

Lynn Morgan
15790 Penn
Livonia, MI 48150
Phone: 734.679.8468

Treasurer:

Scott Rellinger
15003 Ellen Drive
Livonia, MI 48154
Phone: 734.462.0778

Safety Officer:

Dave Stacer
16575 Brooklane Blvd
Northville, MI 48167
Phone: 248.924.2324

Head Instructor:

Ken Myers
1911 Bradshaw Ct.
Commerce Twp., MI 48390
Phone: 248.669.8124

Newsletter Editor:

Ken Myers

The Next Meeting:

Date: Wednesday, March 7, **Time:** 7:30 p.m.

What's In This Issue:

Guest Speaker: Ken Myers, "Twins, Are You Ready?" – It Won't Fly – A Bit More On Wing Cube Loading (WCL) – The February Meeting – Upcoming Events

February Meeting

The 7:00 video was an excellent one on the EAA museum in Oshkosh, WI. What a fantastic place to visit!

Twins, Are You Ready?

by Ken Myers

Twin-engine aircraft, twins, seem to



fascinate many RC modelers. Maybe it is an historical image we carry in our minds. We can picture a Doolittle B-25 lifting from the deck of the Hornet or the sleek design of a de Havilland DH-88 Comet.



Unfortunately, all too often our fantasy, when put into practice with a model twin, doesn't work out all that well.



Helicopter Frequencies

21,27,29,39, 41

Sailplane Frequencies

Are Twins Really More Difficult to Fly?

On any given day at our flying field, who do you see flying a twin? It might be Keith Shaw (DH-88 Comet “Black Magic”, Aero Commander Shrike or modified TwinStart so seaplane), Jim Young (DH-88 Comet or Gloster Meteor), Denny Sumner (Sportwin, Super Sportwin or HOB Commander/Shrike), Rick Sawicki (Banana Hobby P-38), Paul Sockow (Multiplex TwinStar II) or Jim Senia (Dynam Grand Cruiser Twin). There are other folks in our club with twins, but you just don’t see them flying them day in and day out.

What do all five of these pilots and all of their planes have in common? They all use electric power systems in all of their planes. They have removed one of the big headaches of flying a twin by using a reliable power system.

Electric power systems are NOT THE ONLY WAY TO GO for powering twins! A pair of reliable glow, gasoline or turbine engines are a must though.

Factors Influencing Twin Success

There are four factors that greatly influence the success of any twin.

The first factor is the wing loading. A review of the article, “Cubic Wing Loading (CWL)”, on our Web site demonstrates why wing cube loading (WCL) works ‘best’ when trying to compare the fly-ability of one aircraft to another. <http://www.theampeer.org/midwest/articles/cwl.html>

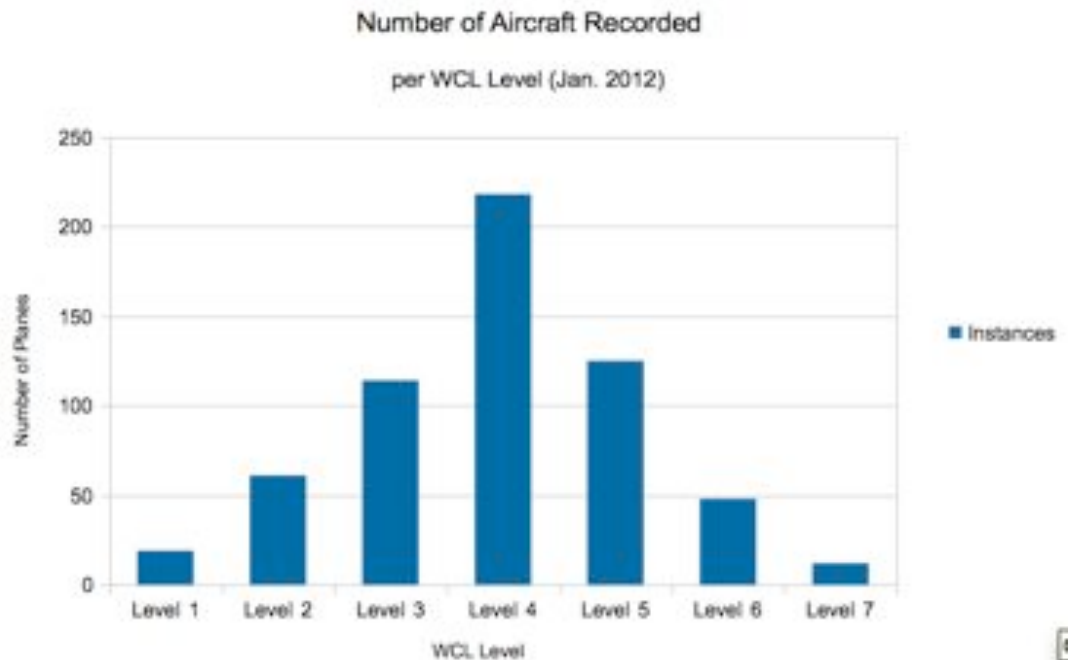
I have found seven WCL levels.

- Level 1** ? - 2.99 oz./cu.ft. flies like indoor
- Level 2** 3 - 4.99 oz./cu.ft. flies like backyard flier
- Level 3** 5 - 6.99 oz./cu.ft. flies like park flier
- Level 4** 7 - 9.99 oz./cu.ft. flies like trainer/sport
- Level 5** 10 - 12.99 oz./cu.ft. flies like adv. sport
- Level 6** 13 - 16.99 oz./cu.ft. flies sporty for an Expert

Level 7 17+ oz./cu.ft. requires expert finesse on the sticks and a complete understanding of the things not to do with the particular aircraft!

The majority of planes flown by the whole RC Community, electric/glow/gasoline, are **WCL Level 4** planes. On any given day at an RC flying field you see more planes that belong in **Level 4** than any other type.

Over the years I have logged data for over 600 individual aircraft. The data comes from reviews in magazines, online and personal experience. The data in the graph demonstrates that **Level 4**, 7 oz./cu.ft. through 9.9 oz./cu.ft., is the dominate type of RC aircraft. Well over 1/3 (218) of the logged planes are of this type.



The majority of RC twins (tables on next page) are found in **WCL Levels 5, 6 and 7!** The majority of RC pilots fly planes in **WCL Levels 1 - 4 or 5.**

A second factor that influences the success of a twin is speed. There is no, or very, very little data available on actual flight speeds for the majority of RC models.

In his article, “Electric Twins”, by Keith Shaw, *Model Airplane News*, Dec. 1991, he notes “Actual flight speed for streamlined twins will be at the prop (pitch) speed or a little faster. Twins with higher drag such as large radial cowls or large cross-section

WCL Level 5 Planes	Wt. oz.	Wing Area	WCL	WAL	
NICK ZIROLI GIANT SCALE PLANS for 1/7 B-25 Mitchell 118"	720	2400	10.58	43.20	
Dynam 4Ch Twin Brushless SkyBus 58"	46.2	381.3	10.72	17.45	
WOWPlanes Messerschmitt Bf 110	96	608	11.07	22.74	
G&P Sales 81" PBY-5A Catalina	168	876	11.20	27.62	
Great Planes ElectrIFly PBY Catalina Seaplane EP ARF	52	395	11.45	18.96	
Hobbico TwinStar 25	88	560	11.47	22.63	
Silver B-25J Mitchell 52 - 71" Multi Twin Engine Nitro	148.8	778	11.85	27.54	
HOB Electric Commander	18	187	12.16	13.86	
G&P Sales PBN NOMAD	320	1270	12.22	36.28	
Transall C-160 26 - 72" Scale Nitro	100.5	581.25	12.39	24.90	
G&P Sales G-44 WIDGEON	720	2160	12.39	48.00	
Jim Young's DH-88 Comet wiretracts	38	300	12.64	18.24	
Piper Twin Comanche 46 ARF by Seagull	176	830.8	12.70	30.51	
Rittinger Sportwin	29	248	12.83	16.84	
Rittinger Super Sportwin	71	450	12.85	22.72	
Top Notch Aero Commander Shrike	56	382	12.96	21.11	
	average:	177.97	775.46	11.97	25.79
	median:	92.00	570.63	12.19	22.73

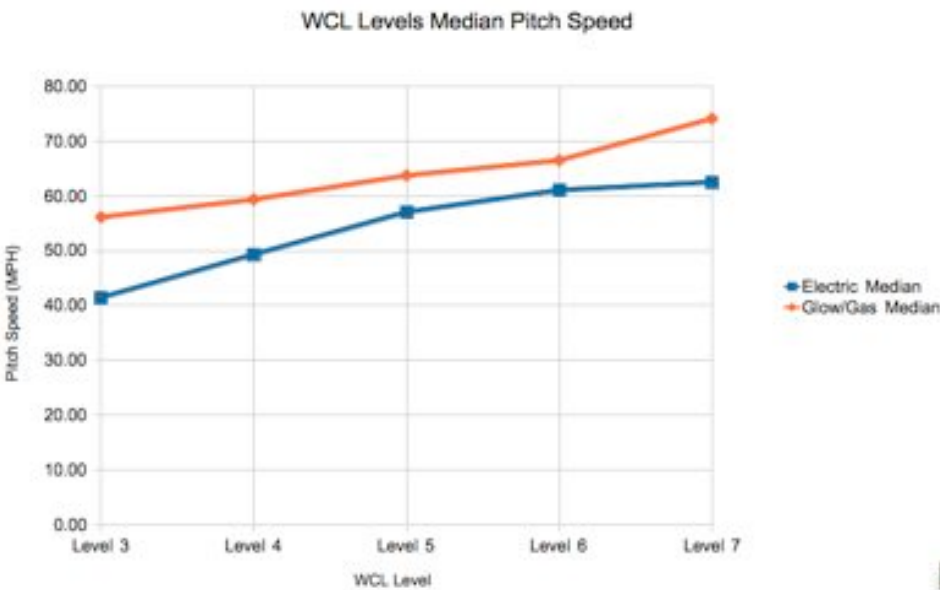
WCL Level 6 Planes	Wt. oz.	Wing Area	WCL	WAL	
Jim Young's Gloster Meteor	130.0	668.00	13.01	28.02	
P-52 Twin Mustang 40 - 70.5" Nitro	152.0	736.00	13.15	29.74	
WOWPlanes Lear Jet	112.0	600.00	13.17	26.88	
Pica Dualist	172.0	795.00	13.26	31.15	
CMP de Havilland Mosquito 25-32 - 73" Nitro	184.0	825.00	13.42	32.12	
Electric Brushless/Nitro Gas OV-10 Bronco 15 - 48"	70.4	434.00	13.45	23.36	
Top Flite Douglas DC-3 Twin GE Kit	160.0	750.00	13.46	30.72	
WOWPlanes B-25 Mitchel	64.0	404.00	13.62	22.81	
WOWPlanes B-26 Marauder, 60" span	80.0	460.00	14.01	25.04	
VQ 1/9 Scale P - 61 Blackwidow	328.0	1177.50	14.03	40.11	
PBY 5-A CATALINA (Wing span 104 inches)	368.0	1270.00	14.06	41.73	
WOWPlanes B-26 Marauder, giant scale	192.0	820.00	14.13	33.72	
NICK ZIROLI GIANT SCALE PLANS for 1/8 B-25 Mitchell	576.0	1700.00	14.20	48.79	
E-flite Deuces Wild	168.0	740.00	14.42	32.69	
Twin-Engine Sky Trainer 48 - 71" Nitro/Electric Powered	176.0	763.00	14.43	33.22	
NICK ZIROLI GIANT SCALE PLANS for 1/5 D-18/C-45	720.0	1950.00	14.45	53.17	
NICK ZIROLI GIANT SCALE PLANS for 1/7 P-61 Blackwidow	720.0	1875.00	15.32	55.30	
eRC B-25 Apache Princess EPO Twin	61.5	356.00	15.82	24.88	
BH Commander Twin 46 ARF w/Air Retracts 81"	169.6	697.00	15.93	35.04	
G&P Sales F7F TIGERCAT	192.0	736.00	16.62	37.57	
	average:	239.8	887.83	14.20	34.30
	median:	170.8	745.00	14.04	32.40

WCL Level 7 Planes	Wt. oz.	Wing Area	WCL	WAL	
B-25J Mitchell ARF by Hangar 9	248.0	851.00	17.26	41.96	
Great Planes ElectrIFly G-44 Widgeon EP ARF	72.0	373.00	17.27	27.80	
WOWPlanes A-10 Thunderbolt II 74" span	224.0	790.00	17.43	40.83	
NICK ZIROLI GIANT SCALE	672.0	1625.00	17.73	59.55	
NICK ZIROLI GIANT SCALE PLANS for 1/8 C-47/DC-3	720.0	1700.00	17.75	60.99	
Twin Otter ARF by Hangar 9	211.2	738.00	18.20	41.21	
BH Commander Twin EP ARF 58"	73.6	360.00	18.62	29.44	
Top Flite Cessna 310 Twin ARF	320.0	914.00	20.01	50.42	
DIAMOND DA-42 FULL COMPOSITE	112.9	448.26	20.55	36.26	
Keith Shaw's Aerocommander Shrike	96.0	200.00	21.99	25.92	
ESM F7F Tigercat	371.4	944.64	22.10	56.61	
C-160 TRANSALL	91.7	341.00	25.16	38.72	
VQ A - 26 Invader	176.0	510.00	26.41	49.89	
VQ P-38 Lightning	265.6	645.00	26.02	59.30	
	average:	256.7	745.7	20.6	44.2
	median:	217.6	691.5	19.3	41.6

fuselages might only be 85 to 90 percent of the prop (pitch) speed.”

I have calculated the median pitch speed and average pitch speed for the 600 models based on their stated prop pitch and RPM.

There are no glow or gasoline powered WCL **Level 1** planes and only 3 WCL **Level 2** glow planes in my collected data. The graph shows the median pitch speeds for **Level 3** through **Level 7**. Median indicates that half the planes are faster and half slower, but it gives a reference point.



The trend is quite clear. As the wing cube loading (WCL) level increases, the median pitch speed also increases. Most of the planes at the flying field, WCL **Level 4**, are flying at a median pitch speed of between 50 mph and 60 mph. Most twins are found in levels 5 through 7 where the median pitch speeds are between 58 mph and 75 mph.

The **third factor** is wing planform and overall design. As demonstrated by the photo at the bottom

right of page 1, a highly double-tapered wing planform can sometimes provide unwanted consequences, even worse than when used on a single engine aircraft.

Advice For a Successful Twin Project

Two articles online can help in selecting a successful twin project. They are “So You Want To Fly Twin Engine RC Planes” author unknown and “twin tips - 1/21/2012” by Ed Moorman.

<http://www.anything-rc.com/twin-engine-rc-planes.html>
http://www.rcuniverse.com/forum/m_10913690/tm.htm

Both articles stress the importance of having a reliable power system. It doesn't matter which type of power system, glow, gasoline or electric, but it must be reliable!

Both authors are vague about wing loading.

Author Fly Twin, “Wing loading is higher than standard airplanes and so landing speeds are faster... Do not try to slow down and risk a stall...”

Ed Moorman, “5. Twins are heavy... and have a higher wing loading.

6. Twins land faster. Since they are heavier, a twin tends to land a little bit faster...”

Increasing the Chance of Having a Successful First Twin Experience

For the ‘typical’ sport pilot, it is a good idea to select a plane with a lower WCL than a typical twin.

As with most things in life, there are exceptions. Twins are no different. (See the Exceptions table)

According to *Model Aviation*, Feb. 2012, page 97, Jeff Weisend's DC-3 has an astoundingly low WCL of

WCL Level Exceptions:	Wt. oz.	Wing Area	WCL	WAL
Jeff Weisend's DC-3 (MA Feb. 12, p.97)	116	1421.28	3.74	11.75
Multiplex TwinStar II (Fly RC Nov. 2006)	53	667	5.32	11.44
de Havilland DH-84 Dragon-2, RC electric scale 94.7" wingspan	232	1700	5.72	19.65
New 310-Scale 90 - 92.5" Twin Engine Nitro Power	176	1318	6.36	19.23
Keith Shaw's de Havilland Comet w/28 Nicads	136.0	900.00	8.70	21.76
Dynam Grand Cruiser Twin (wing area estimated based on full-size)	42	380	9.80	15.92
SIG Do 217	35.0	335.00	9.86	15.04

3.74 oz./cu.ft. and flies like a backyard flier. With a wing area of approximately 1420 sq.in. and a weight of only 7.25 lb./116 oz. it is truly amazing. This is not something a typical modeler would be able to create, not that they might want to. As noted in the text, "... the model looks better in the air from a distance, as one can see the effect on the plane of the slightest breath of wind."

<http://mysite.verizon.net/milkyway99/id3.html>

A biplane twin like the de Havilland DH-84 Dragon-2 or the DH-89 Rapide are good choices. The biplane configuration lowers the WCL. With no retract the weight is kept down and construction kept simple.



The New 310-Scale 90 - 92.5" Twin Engine Nitro Power Radio Controlled Plane ARF has what appears to be an extremely low WCL, based on **their** specifications.

<http://www.nitroplanes.com/new319092twe.html>

None of the data that I've collected on RC planes ranging from 1000 sq.in. and up suggests the advertised flying weight of 11 lb. is possible. P

Dick Pettit Associate Editor of *R/C REPORT* Magazine reviewed this plane here:

<http://www.rcgroups.com/forums/showthread.php?t=619652>
His weighed 16.5 lb. WCL at 16.5 lb. is 9.5 oz./cu.ft.

A twin the size and weight of Keith Shaw's "Black Magic" is best left to the master. The empty fuselage weighs just 4 oz. Can you do that?



The Multiplex TwinStar II is a good place to start a 'twin experience'. It has the WCL of a park flier, although it is too heavy to fit the AMA definition of a Park Flyer, but it flies like one. Good choice on that one Paul!





The Dynam Grand Cruiser Twin flies like a sport plane. Anyone who is comfortable flying sport planes should be successful with it. Good choice Jim!



The SIG Do 217 provides one more clue to producing a successful twin. It has a WCL on the high side of sport or low side of advanced sport, which indicates that folks who generally fly planes in the **Level 4** category shouldn't have a problem flying it. The designer used several "tricks" to make this a twin that can be flown by the 'masses'.

One reason that it flies like a sport plane is because the designer enlarged the wing. Using the fuselage length to scale the model from the full-size plane, it is about 1/19-scale. At 1/19 scale the wing area should be 242 sq.in. With a 242 sq.in. wing the model would have a WCL expected of a typical twin, ~16 oz./cu.ft.

Using the wingspan, the plane scales to about 1/16-scale. At 1/16 scale the wing area would be about 349 sq.in. The given wing area for the model is 335 sq.in. By enlarging the wing the designer moved the WCL to just about 10 oz./cu.ft, which makes it a bit easier to fly for most RC pilots.

Also, by having the rudder and the landing gear as "optional", the designer cut down on the ready to fly (RTF) weight.

The **fourth factor** is pilot experience.

To learn what your pilot experience is, inventory the planes that you fly day in and day out and calculate their wing cube loadings.

$$WCL = RTF \text{ weight in ounces} / ((\text{wing area}/144)^{1.5})$$

The highest WCL of your regularly flown fleet indicates the level that you are comfortable flying at.

For me, it would be my Bill Griggs Rocket and my self-designed E-250. The Rocket has a CWL of 16 oz./cu.ft and the Lightening (yes, I meant Lightening not Lightning) E-250 14.9 oz./cu.ft. Both are CWL **Level 6** types. Personally, I would choose a twin like those listed in the **Level 5** table to start with and then move up through each progressive level to reach my 'ultimate scale twin'.

Powering a Twin

Whenever possible, follow the recommendation of the manufacture, designer, supplier or what was used on similar types and sizes found in the modeling press or online.

If that is not possible, selecting a power system for a twin propeller type plane, whether using internal combustion engines or electrics, depends on ground and fuselage clearance. The largest diameter prop should be chosen that provides sufficient clearances.

A chart like the one found at <http://www.coastalplanes.com/tools/propchart.htm> is useful for selecting the appropriate size glow or gasoline engines based on the usable largest diameter prop.

The table at that Web site also provides typical RPM ranges the type of engine. With the known RPM, the pitch is selected to allow the pitch speed to be at least the median for the WCL level of the twin.

There are many ways to select an electric power system, if one is not recommended. If you are unsure of how to do that, please drop me an email or give me a call. Also, see the February 2012 *Ampeer*. I describe how to select a power system for an 80" PBV and that information may be applied to other twins as well.

Final Tips When Choosing a Twin

- 1.) Use a reliable power system.
- 2.) For your first twin, choose a subject with a WCL similar to or just below the WCL level you are comfortable flying at now. There is a lot to learn about twin engine operation. Learning to fly with a WCL greater than you are comfortable with should not be one of them.

3.) Before flying your twin, put in a lot of practice time on your highest WCL plane(s) and consider acquiring a single-engine type with an even higher WCL or even adding weight at the CG to a plane you already have.

4.) If you 'roll your own' designs, consider going through a series of steps to get to your ultimate twin. Remember that the more options* that are added to the airframe the heavier it becomes with a resulting higher WCL and the more difficult it becomes to fly. (options* - anything that is added to the airframe that has nothing to do with controlling the airplane. Keep the Sig DO-217 design in mind; start with only the necessary flight controls, keep the landing gear simple, if used, fudge the wing area of the early prototype.)

Addendum

The February 2012 *Ampeer* contains even more information on twins and selecting twin power systems.

<http://www.theampeer.org/ampeer/ampfeb12/ampfeb12.htm>

Information about wiring brushless twins:

Video:

<http://www.youtube.com/watch?v=aADN7iCx9E4>

Web Links:

<http://www.electricflyermagazine.com/page17.html>

<http://www.electricflyermagazine.com/page16.html>

<http://www.electricflyermagazine.com/page18.html>

Magazine:

November 2004, *Fly RC*, Tom Hunt's article on multi-motor brushless power systems.

It Won't Fly

From Barry Jones barbbarry52@aol.com



Hi,

Here is my latest. It is The Irishman, a 1/48-scale salvage tug. It is my first electric.

2 motors 12 volt

2 speed controls

It has dual rudders, mast lights, side lights, back facing code lights, spot lights, control cabin lights, and hull lights. The radio and lights run by 6 volt 3300 mAh batteries. It weighs 20 lb. plus and is 36 inches long, 24 inches high and 12 inches wide.

I don't think I can build a wing big enough to get it to lift off and fly.

Barry

A Bit More On Wing Cube Loading (WCL)

By Ken Myers

After the February meeting, **Jim Cross** and I discussed the WCL concept. Jim noted that it is a mathematical construct to describe this technique based on the wing area. WCL does NOT describe or really ascribe a cubic volume to the wing, even though the result is presented as "ounces per cubic foot (oz./cu.ft.)". I did mention this during the presentation. It is somewhat difficult to 'get your head around it' if you keep thinking it has something to do with the wing volume, since all wings are three dimensional.

Here are the links to several articles on the topic. At one time I described it as cubic wing loading (CWL). Don't be confused. When I misuse the term WCL as CWL, I mean the same thing.

Cubic Wing Loading: What it is and how to use it.

<http://www.theampeer.org/M1-outrunners/M1-outrunners.htm#CWL>

WING CUBE LOADING (WCL) by FRANCIS REYNOLDS

<http://www.theampeer.org/CWL/reynolds.htm>

WING CUBE LOADING, by Roger Jaffe

<http://www.theampeer.org/CWL/jaffe.htm>

3D Wing Loadings: a Better Way to Scale Models and

Compare different size models easily by Larry Renger

<http://www.theampeer.org/CWL/larry.htm>

Wolfgang, here's the answer to your question.

Cessna 172: wing area: 174 sq.ft., **Empty weight:**

1,691 lb., **Gross weight:** 2,450 lb.

To change your email address contact Ken Myers at kmyersefo@mac.com

The 2012 membership application is available at the club Web site, <http://www.midwestrcsociety.org>, for downloading with the link on the homepage.

IMPORTANT: Channels 36 & 56 May NOT be used at the 7 Mile Rd. Field

Upcoming Events:

March 7, Wednesday Midwest monthly meeting.
Aviation video at 7 p.m. followed at 7:30 by meeting.

WCL (cont. from page 7)

Empty Weight: $1691 * 16 = 27,056$ oz. / 174 sq.ft
 $\wedge 1.5 = 2295.2176 = 11.79$ oz./cu.ft. (adv. sport)

Gross Weight: $2,450 * 16 = 39,200$ oz. / **2295.2176**
 $= 17.1$ oz./cu.ft. (expert)

Piper Cub: wing area: 178.5 sq.ft., Empty weight: 765 lb., Max. takeoff weight: 1,220 lb.

Empty weight: $765 * 16 = 12240$ oz. / 178.5 sq.ft. $\wedge 1.5 = 2384.8295 = 5.14$ oz./cu.ft. (backyard)

Max. takeoff weight: $1,220 * 16 = 19520$ oz. / **2384.8295** = 8.19 oz./cu.ft. (trainer/sport)

The February Meeting

Arthur Deane started the meeting by calling on **Lynn Morgan**. Lynn reminded us that our dues are due by **March 7, otherwise the \$25 fee is added to your dues**. He always has applications with him at the meeting.

Ken Myers noted that the Mid-Am sanction has been sent in and the dates are **July 7 & 8**.

There was no show and tell.

Let's get some of our projects in next month!

Our March guest speaker will be Larry Markey.



The Midwest Monitor/Ken Myers
1911 Bradshaw Ct.
Commerce Twp, MI 48390

<http://www.midwestrcsociety.org>

The Next Meeting:

Date: Wednesday, March 7, 2012

Time: 7:30 p.m. – Video starts at 7:00

Place: EAA building, Mettetal Airport,
Plymouth, MI