May/June 2019

Tactical Notes

Next Meeting: Thursday, June 20th 7:00 p.m.
Meeting Topic: Soldering

MMCL show report

Soldering for modelers

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"**Tactical Notes**" is the Newsletter of the Military Modelers Club of Louisville, Inc. We appreciate your taking the time to read this little newsletter. We'd appreciate it even more if you would write something. **Yes, I am talking to you!**

Cover Photos: by D.M. Knights

Editor's Note

Greetings guys,

Hope you all enjoyed the show. It was a smashing success. Congrats to Terry, Stu, Bill and all of the contest committee. Also, we could't have done it without the members. Y'all did great.

The future looks so bright, MMCL membeers are going to have to wear shades. The contest committee is already working on next year. Our tremendous growth presents some real challenges.

Your newsletter needs articles. Please write them. Most of this newsletter has an article that ties into our presentation on soldering. Read and then show up to see it hands on.

David

President's Page

By Stu Cox

MMCL Members!

The MMCL Monthly Club meeting will be this Thursday, June 20, at KYANA. Myles Marcovitch will be conducting a SOLDERING DEMONSTRATION. We'll have a regular raffle and show-and-tell as well.

For FOURTH OF JULY, we will be having regular weekly WORKSHOP on Thursday MORNING, July 4th (instead of Thursday night workshop). Our regular Saturday workshop will be open on July 6th. Please plan to attend as we usually have a great turn out on 4th of July!

At this time, we are planning a regular meeting for July with a special guest presenter, and a possible Friday Night Fights and Swap Meet in August. More to come on events coming up this summer. Thanks much!

President Stu(g)

MMCL Contest Photos

As all club members know, in May we held our annual contest. It was the largest number of models entered since we've held it at the current location. The club members really stepped up and pitched in. I know that the contest committee appreciated all the hard work. Below are some photos from the show. Enjoy.


24
TOWING
555-247-HAUL


MC
2019 Invitational Contest
ENTRY FORM


Please
Don't
touch
the
models!


NOT


ENTRY FORM
ALTERATIONS:
ADDITIONS:

Myles Marcovitch
April 22, 2019

Precision Soldering for Model Builders

Myles Marcovitch
April 22, 2019

Precision Soldering for Model Builders

A Short Primer Leading to Fine Work

First, let's get something straight… Soldering is a metallurgical process, not a mechanical one. Solder works by literally dissolving itself into the top few thousandths of an inch of the substrate and forming a new, inter-metallic alloy (or amalgam). The fact that it works by an entirely different mechanism than Cyanoacrylates or other glues (not solvent cements which also weld the surfaces together) describes a lot of the characteristics and challenges of a soldered joint.

Soldering is defined as joining metals of higher melting points with alloys that generally melt below 600° F, above that temperature is referred to as brazing and when the metals in the joint themselves are melted together that's welding. For model making you need a range of melt temperatures if you intend on doing assemblies where the new joint is near to a previously soldered one. You would solder the first joint with the higher melt solder and use the lower temp solder for the second joint and so on.

Soldering of mechanical components entails different concerns than electronic/electrical soldering. But regardless of what type of soldering you're doing, more IS NOT BETTER! Since the strength of the joint is in the inter metallic alloy within the joint itself, any excess solder adds no strength. In fact, it will reduce the strength to the tensile strength

of the solder. Furthermore; the excess solder hides the joint and prevents doing a good inspection.

Electrical soldering in addition to the smaller is better mantra, has the "can't move the joint while the solder is solidifying" rule. Depending on the solder alloy, for example, 50% lead/50% tin (plumber's solder), as the solder transitions from liquid to solid it passes through a slushy phase. If the joint is moved in this phase, the solder will form large crystals which have high electrical resistance. This is referred to as a "Cold Solder Joint". It's a misnomer, it's really a "disturbed solder joint."

There is a way around this. A solder alloy of 63% tin/37% lead (called eutectic solder) goes from liquid to solid instantly with no slushy phase. It's slightly more expensive, but I recommend it for all electronic work since it effectively eliminates disturbed joints.

To establish the amalgam, the surfaces to be soldered must be chemically clean. A micron layer of oxide will prevent solder dissolution into the surface. Oxide is also a good insulator meaning both electrical and thermal. If you soldering electronic components, many are already pre-tinned to facilitate soldering. If your soldering to a copper-clad circuit board you must first determine if the board was properly protected after manufacture. Heavily oxided copper is basically non-solderable, and may need mechanical cleaning before attempting to solder.

To make the amalgam, and to chemically clean and protect the solder joint you use some form of flux. Flux serves two functions: it strips off the oxide before you add solder to the joint and protects the joint during heating to prevent additional oxide from forming. For electrical soldering you are limited to only rosin due to its mild nature and non-

corrosive attributes. Chloride and acid fluxes are limited to mechanical joints only since any residual will corrode the joint and destroy any electrical properties. Even though rosin is mild, you should still remove excess after the joint is cool using iso alcohol.

Electronic solders have their rosin as a core in the solder wire. Mechanical solders are solid core where you apply the flux separately. That is not to say you can't use rosin-core solder for small mechanical jobs. In fact, for our modeling purposes when attempting to solder photo-etched parts, fine gauge, rosin-core solders work just fine.

So we have an amalgam that requires a chemically clean surface which is created by the flux and now we need two more factors: heat and some way to stabilize the work during soldering.

SOLDER TRAVELS TOWARDS THE HEAT!! Therefore; you put the heat source on one side of the joint and the solder on the other, and on its way to the heat source flows completely through the joint where it's supposed to be. If you apply the solder to the iron, it flows onto the iron and may miss the joint entirely. It also works poorly when you put a drop of solder on the iron and attempt to "stick" it to the work. That said, there are some times when using the iron to directly apply a thin film of solder is just the right technique. If I'm joining two flat pieces of stock and I want to pre-coat one piece, after fluxing, I can wipe a loaded iron onto the surface and lay down a solder film. I would then place the other piece on top, and heat the joint from the outside, re-melting the pre-tinned surface and making the joint. This is referred to as "Sweating the joint".

Lastly, we need a way to hold the joint together while we are applying the solder and the heat. With a conventional iron, and for

mechanical work, I recommend a ceramic soldering pad. Then using T-pins, I can arrange and hold assemblies in soldering position with reasonable security. I also have a 40 year-old Panavise with wire loom that's good to hold wires for tinning, and applying tension to stabilize an electrical joint before soldering.

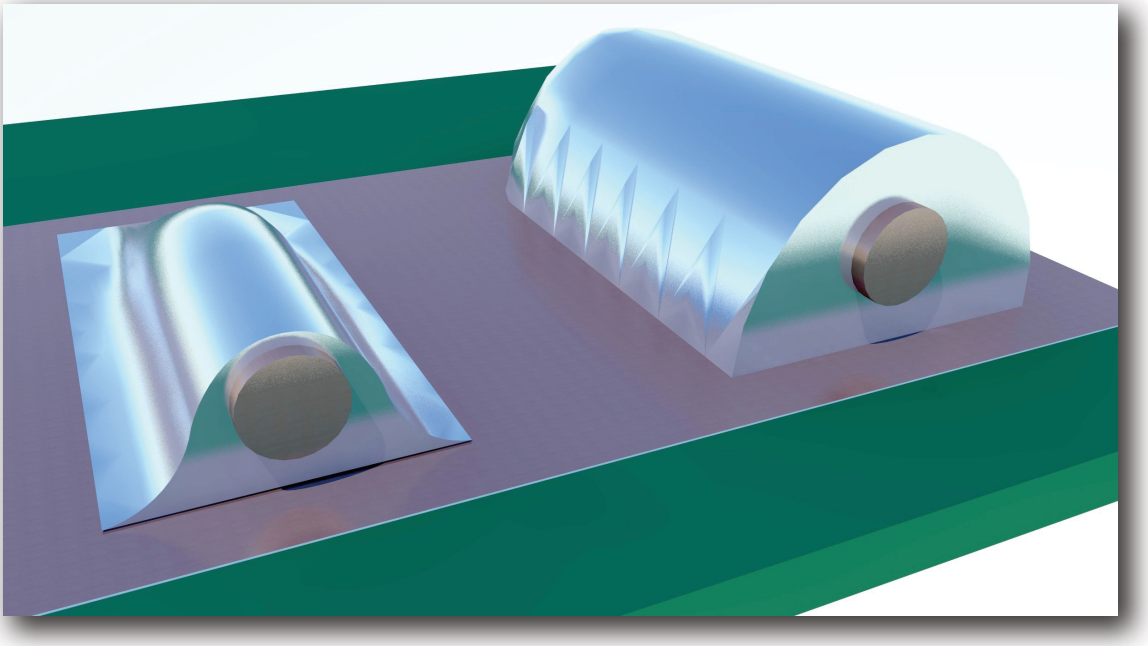
However, if you have the Cadillac of soldering systems, a resistance soldering unit (RSU), you have the ability to hold the joint together with the heat source using just one hand, and then apply the solder with the other hand. RSUs are not cheap starting above $400 for an American Beauty US Made hobby system, but they are indispensable for soldering small assemblies which are next to impossible to hold together while soldering.

The RSU works by passing a high current (50 to 100 amps) at low voltage (3 volts) through the joint using stainless steel electrodes. There is a rheostat to control the amperage, but really the capacity limit is when the electrodes aren't robust enough to transfer the power and withstand the heating. Once the workpiece mass goes past an ⅛" you might find the electrodes going to red heat and getting soft and still not have the joint hot enough to melt the solder. Unlike the iron, the RSU generates its heat directly in the joint itself.

When I reach my RSU's capacity limit I turn to a micro-torch fueled by butane. Regardless of the heat source, the heat goes on one side and the solder on the other. Also, if I heating a structure with a very thick part and a thin one, I heat the thick part. and let it heat the thin part by conduction.

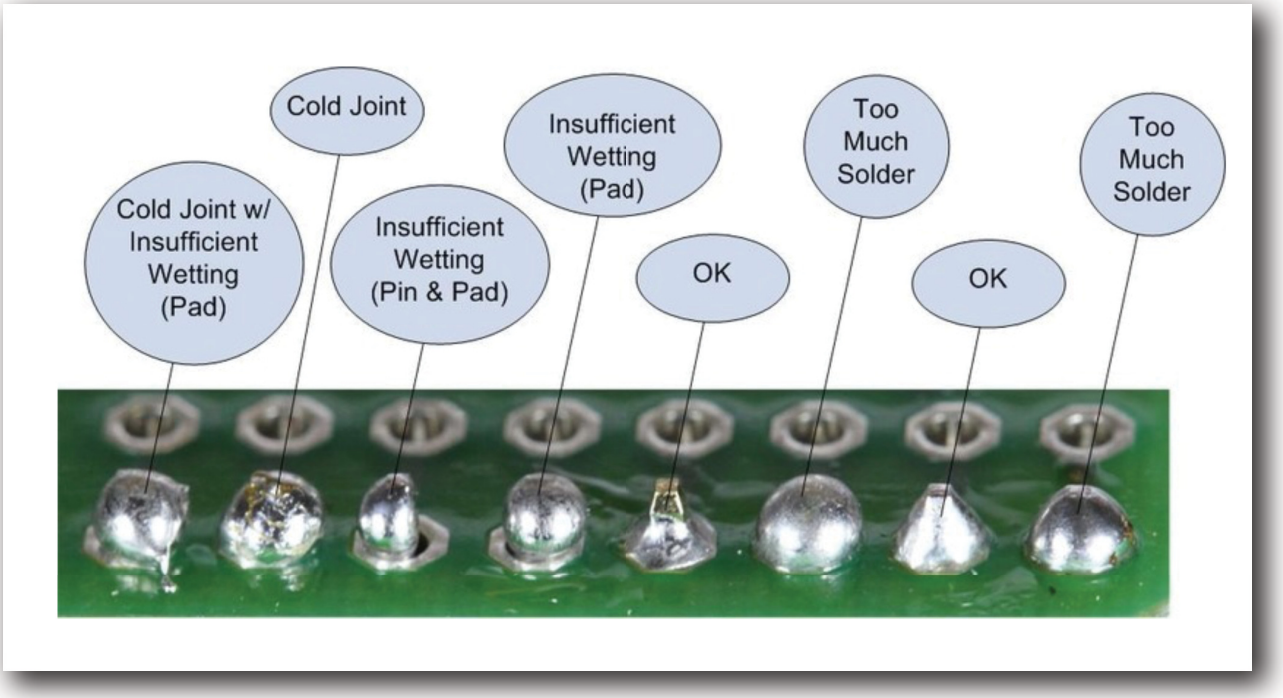
You have to be careful using the mini-torch since it can easily overheat the joint making it again… yes… unsolderable. As soon as the metal starts changing color, it's getting too hot and oxide is forming on the surface. Flux can only do so much.

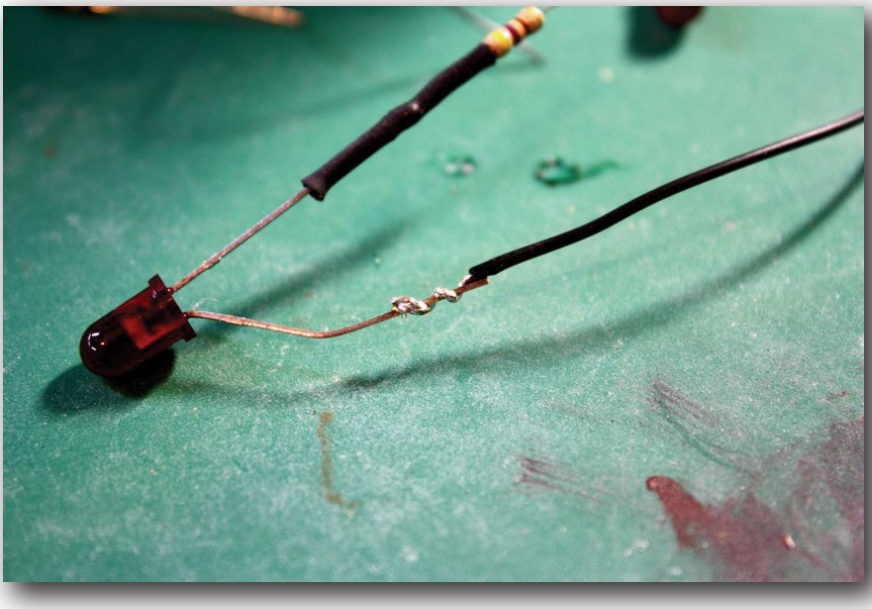
When the solder joint is correct, meaning that it is fully whetting the joint and not sticking to itself by internal surface tension, it will have nice smooth, concave surfaces tapering off to fine edges. If it's electrical, you should see the wire or component lead contours and even see the wire strands themselves. The wire on the right may not even be adhered to the surface. It could very well be connected to the circuit board with solidified rosin flux and could be popped off with a finger nail.



Myles Marcovitch
April 22, 2019

This next illustration shows the range of solder joints one could expect in inspecting a circuit board.





LED leads are pre-tinned and are sharp-edged which grips the wire that's twisted around the lead before soldering. For this application, Iron goes on the bottom and solder goes on the top. I use a temperature controlled Weller conventional soldering station.

You do not have to mechanically connect the wires, but you do need them to be stable during the soldering.

Here's how I solder the tripod mast for my Essex. I made the platform out of two pieces and then soldered in each leg. To prevent de-soldering the previously soldered leg I use hemostats judiciously to do

double duty: as work holders AND as a heat sink to catch the heat and divert it before it gets to the old joint. It works!

For PE you have to decide if soldering is worth the effort. In some cases where there is no physical loading, relying on CA can be sufficient.

But, on antenna, gun sets, masting where there's going to be rigging, soldering is more secure, albeit maybe a bit more challenging. For these RF radio towers I pre-tinned one edge while still in the flat and then folded the piece. While holding just a tad of pressure on the fold so the edges would touch, a brief contact with the iron and the joint was made. The brass is so thin that the heat conducts almost instantly. You don't need much solder so it's not critical if there are some gaps in the solder flow. A correctly solder joint can have a tensile strength that actually exceeds the substrate. When trying to physically pull off a well-soldered wire, you will probably separate the wire and not the joint. When I'm soldering PE with the RSU I set the temp control to a low 10 on a 100 point dial.

I have a very low-temp solder I use last called TIX. It has its own flux that's a liquid which I use for lots of solder jobs, not just with TIX solder. TIX is funny… If you get the joint done right the first time it's quite strong, but, if for some reason, the joint wasn't quite right and it separates, it just get worse and worse. You may have to abrade the solder to physically remove it and start over.

Here's some more information about the RSU:

You can't get shocked because the voltage is too low to do much damage, but the tips do get very hot very fast. Not show above is the real magic part: the foot switch. You clamp the parts together with the tweezers, when it looks right, you step on the foot switch to heat the

joint, add the solder, and then let go of the foot switch, but don't release the tweezers. You hold them until you're sure that the joint is solid. It's the ability to turn the current (heat) on and off without releasing the pressure that makes the RSU so useful.

On my Essex, all of the masting was soldered. I use CA to hold on railings, but when railings were attached to PE I used solder. It is so much more secure.

Financial Report

By Rich Guetig

Military Modeling Club Of Louisville MMCL

May **2019** **PNC Bank**

Starting Cash Balance: **$4,922.14**

Cash Receipts	Date		Check Receipts	Date	
Workshop		$295.00			
MMCL Invitational Deposit		$3,662.00	Item		$0.00
			Item		$0.00
			Item		$0.00
			Item		$0.00
			Item		$0.00
			Item		$0.00
Item			Item		$0.00
Item			Item		$0.00
Item			Item		$0.00
Item			Item		$0.00
Total Cash Receipts		$3,957.00	**Total Reimbursements**		$0.00
TOTAL RECEIPTS		**$3,957.00**			

Cash Or Debit Expenses:	Date		Cash Or Debit Expenses:	Date	
Check # 7077. (E) KYANNA Rent	5/20/19	-275.00			
Start-up Cash for MMCL Invitational		-300.00	Item		
New check order		-47.77	Item		0.00
Reimbursement		-38.31	Item		0.00
Reimbursement		-48.00	Item		0.00
			Item		0.00
Item			Item		0.00
Item			Item		0.00
Item			Item		0.00
Item			Item		0.00
Total Cash Expenses:		$709.08			

Reimbursable Expenses:	Date		Reimbursable Expenses:	Date	
Item		0.00	Item		0.00
Item		0.00	Item		0.00
Item		0.00	Item		0.00
Item		0.00	Item		0.00
Item		0.00	Item		0.00
Total Reimbursements:		0.00			
TOTAL EXPENSES		**$709.08**			

NET Monthly Increase(Decrease): **$3,247.20**

ENDING CASH BALANCE: **May** **2019** **$8,170.06**

MMCL Club 2019 Show Financial Report

Item	Debit	Credit
Crown Trophy (Special Awards/Date Plates/Cases)	$851.18	
Crown Trophy (Gold/Silver/Bronze- Should be eno	$712.85	
Table Rental	$511.42	
Start-up Cash	$300.00	-$300.00
Paypal Registrations		$67.00
Trophy Sponsership		$275.00
Raffle Totals		$1,538.00
Registration Totals (Includes $76.00 from PayPal Registration)		$966.00
General Admission		$285.00
Table Registration		$620.00
Membership Renewal		$10.00
Totals	$2,375.45	$4,061.00

Net Profit Total $1,685.55

International Plastic Modelers' Society/USA
Membership Application / Renewal Form

New ☐ Renewal ☐ IPMS #:

Name: _____

Address: _____

City: _____ State: _____

Zip Code: _____

Phone: _____ E-Mail: _____

Chapter Affiliation, if any: _____

Junior (17 years or younger)		$17.00	_____	Date of Birth: _____
Adult	One year	$30.00	_____	
	Two years	$58.00	_____	
	Three years	$86.00	_____	
Canada & **Mexico**		$35.00	_____	
Foreign	Surface	$38.00	_____	

Family (1 set of Journals) _____ ← Adult fee + $5.00 # of cards? _____

Your Signature: _____

If recommended by an IPMS member, please provide his/her:
Name: _____ IPMS #: _____

PAYMENT OPTIONS:

Cash ☐ Amount: _____

Check ☐ Check #: _____ Amount: _____

Billing Address, if different than above -

Address: _____

City: _____ State: _____

Zip Code: _____

Applications should be printed and mailed to: IPMS/USA, PO Box 56023, St. Petersburg, FL 33732-6023.