Frank Schneider Surface Mount LED Clinic
Slide 1 - intro

Cover why, where, and then how

III – n-scale, 1974 commuter line
Push pull service

Slide 2
What are SMT LEDs –
Used in household electronics
This mac

Slide 3
Cable box
Phone -2, messages, power

Slide 4
Even used in model RR
BDL168

Slide 5
Kato E9 – dual headlight
Kato 1 LED – piped to both headlights
Why do we care?
Beacon/mars light – two leds – not fit
DCC additional functions (Digitrax)

Slide 6
Gary Morris photo – thanks for letting me use it
1976 Milw E9
In or out of Union station?

Slide 7
Headed into or out of the Chicago Terminal
Remind – N scale

Slide 8
Con-Cor cab car
Into or out of CT – trick question
SMT LEDs powered by 2 AAA batteries
Each headlight has own LED
Could build circuit to have Mars light

Slide 9
For our HO friends
Taken on club layout (yes both N and HO)
Flagman – not paper
SMT LED powered thru DCC track power
Trips detectors!
More visible, and cooler!

Other Aps –
N scale signals
Building lighting
Anywhere space is tight
Anywhere visibility of LED is an issue

Slide 10
So how do we get from here to here

Slide 11
We need SMD LEDs
Surf Mount Device
Order from Mouser
RoHS compliant (Restriction of Hazardous Substances)

Slide 12
Go to Mouser, search Standard led – smd
I just want an LED
Catalog search func horrible
Get to catalog page and start looking
Narrow down to color and size – apply filter
then look at pages and start browsing

Slide 13
Augghhh

Slide 14
Zoom in
Color (click)
Lens vs. light
Red light vs. light behind a red lens
Price – anyone bought thru hole white LEDs recently?
Package size – In 100ths of an inch (aprox)
0603 - .063" x . 031" #50 drill bit
0805 - .08" x .05" #41 drill bit
1210 - .126" x .1" #20 or 11/64 drill bit

Size is for led component only – add for soldering pads at each end

Luminescence intensity – larger = brighter
Fwd voltage – important for resistor

Slide 15
Click on LTW-170TK
Voltage and op current
3 v and 20 mA, or .02A
OHM's law

Slide 16
Ohm's law

Slide 17
Order SMD resistors fm Mouser

Slide 18
What other supplies do we need – wire
Magnet wire – 36 AWG
Copper w/ polyurethane/nylon insulator

Slide 19
Tools –
Solder station

Slide 20
Tweezers
Multi hand

Slide 21
Grab LED in tweezers, lens side down
Try to center in tweezers, with both solder pads accessible by iron

Slide 22
Put tweezers in clip and tin both solder pads –
Use flux and low heat

Slide 23
Burn insulation off wire –
Turn up heat on soldering iron all the way
Get a blob of solder on the iron and put the end of the magnet wire into solder
Only a small tip of the wire should be soldered
Bend the wire into an L and put it over the solder pad of the LED
Touch with soldering iron – low heat
Pull hard to test solder joint

Slide 24
Voila – LED with wires!
You need to figure out cathode/anode (A+)
Look at sheets – mark on LED or which is toward spindle side of tape
OR – attach to power supply (Transformer) slowly add power until glows
Tie knot in + wire

Slide 25
In – wire burn off insulation about the length of your resistor
Put wire in blob of solder – iron up full

Slide 26
Tin pads on resistor (Ohm's law)
Use fun tack to attach resistor to tweezers
Grab tinned part of wire with tweezers and bend ends down
Solder – low heat

Slide 27
Soldered – wire across resistor

Slide 28
Use x-acto knife to cut wire over resistor

Apply!