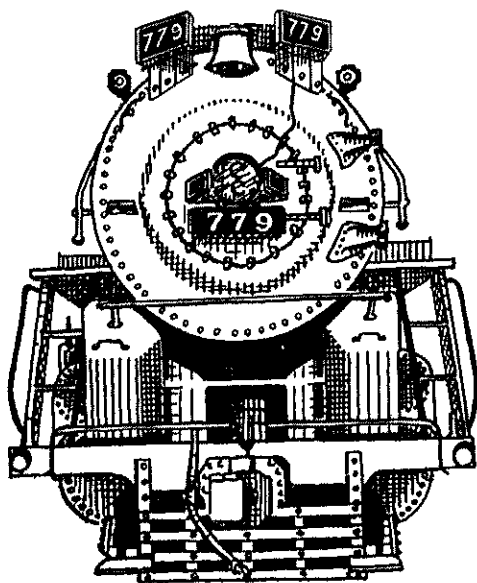


When Superdetailing Must Be The Very Finest

"In True Scale"

Go

S Scale



*Third Edition
Blue Book*

Locomotive & Supply

250
7643
-410

Join The Gauge Of Craftsmen



A PERSONAL MESSAGE

We, at "S" Scale Locomotive and Supply, wish to take this opportunity to thank each and every one of you, personally, for your wonderful patronage and your orders during the past years. It is with a sense of great, justifiable pride that we tell you of the many letters we have received concerning our materials, stating that they are of the highest quality in the trade - the principal reason for "S" gauge very rapidly regaining its rightful place, with new S gaugers everyday. We are extremely appreciative of your friendship and your many complimentary and "keep it up" letters.

On our part, we shall continue to especially design our castings and other parts to provide you with the best detailed, finest quality equipment in any gauge, while continuing to keep our prices as low as possible. We trust that our "helpful information" and the remarkable castings will give you more building pleasure than ever. With your continued help with further patterns, we expect, ultimately, to be able to give you such a variety of available parts that you may build almost any engine.

Again, with sincere thanks, we remain,

Very truly yours,

"S" SCALE LOCOMOTIVE AND SUPPLY"

Catalog \$2.00

You have chosen a good clean hobby at home, one that you would be proud to have your children follow and one that you can work on any time the desire strikes. It isn't necessary to wait for certain dates, times or places (possibly at quite a distance) to enjoy it.

Model railroading is unique in that its scope is so broad that almost anyone can find a phase of work that is particularly pleasing - Building of engines, cars, roadbed, scenery and structures; Painting of engines, cars, scenery and structures, plus the addition of aging, lettering, etc. for various periods; Scenery gives unlimited challenge to the imagination as to what can be devised and the effects accomplished; Electrical is also unlimited in the range from simple wiring for the novice to complicated, fully automatic operation and the effects of electronics and relay races; Castings are available through the national and regional (local) NMRA conventions for all of the above phases, except electrical. The national conventions give you the opportunity to travel to different parts of the country each year, meet new and hospitable friends and see other layouts.

In the long run, the cost of model railroading is probably less than many other hobbies or pastimes as equipment is accumulative and can be used for a lifetime. Too, much of the cost can be recovered if you ever leave the hobby. Many hobbies or pastimes give pleasure for a couple of hours or days and are then forgotten, ordinarily with little economic return. Thus, over the years, they are very costly.

S GAUGE

We in S gauge feel that our's is a perfect gauge. While we cannot give you a lay-out on a hat brim or cars that you can ride, we can give you an "in-between" size, large enough to be more trouble-free than the miniatures but not so small as to lose the attractive, realistic detail that you as a modeller demand. The miniatures cannot give you the detail, and oddly enough, the larger gauges do not give as much detail as S gauge. As you will see throughout this catalog, "S" is the "superdetailed" or craftsman gauge and not the toy or tinplate gauge that you may have been led to believe. Our cars, engines and parts are almost perfect scale.

While it is true that S gaugers are in a minority, we're confident that this is a "temporary" condition with the addition of new products, more suppliers and many hobbyists converting to "S". There is little "junk" in the S hobby equipment now available.

OUR CASTINGS

All parts listed here are American-made brass castings unless otherwise noted. Many castings have more detail than the drawings can show. If at all possible, our castings will show all the prototypical detail (you may have to use a magnifying glass to see some of it).

Some gauges have more parts than ours, but lack many of the critical items (wheels, drivers, frames, etc.) that few modellers can make. Without these parts, they cannot construct a single, complete engine. It is our policy and belief that all parts be made to complete a single, super-detailed model of a prototype, rather than making random, unrelated parts. We did this on our first locomotives - the Nickel Plate, Chesapeake & Ohio and Pere Marquette Berkshires (2-8-4). These were followed by the USRA engines listed below: light and heavy Hikes (2-8-2), light and heavy Pacifics (4-6-2) and light and heavy Mountains (4-8-2). These locomotives may be used "as is" for the period during and just after WWI, as a basic engine to be modified for a particular road, layout or period, and free-lanced to suit your personal tastes.

The straight USRA engine (if there is such a thing) can be used to make many different locomotives by simply changing a headlight, a truck on engine or tender, several pieces of piping, a dome or stack, pilot, bell, etc.

We expect to continue this system of providing new parts via new engines, until ultimately (with your help in contributing new patterns), you can build practically any engine. There seems to be a message here - learn to build engines, so that you can take advantage of this flexibility and variety of locomotives at a fraction of the cost of ready-to-run units.

Each part is common to a great many engines (not just the above) and many are used on all locomotives. They can also be used to upgrade American Flyer engines. After mating parts have been cleaned, they may be attached by soldering, with screws or epoxy (see "Epoxying Instructions"). or Cyanoacrylate adhesive.

Instructions will not be sent with each part including Trucks, Boilers, Valve Gear, Engine sections etc. Instead a separate printed "Parts Instruction Booklet", #260.1,

is available at cost, \$1.00. This is a must for the very first part ordered. It will be included with "Kit Booklet" particular to that engine and plans for Engine Kit or Basic Running Gear Section, but not for other sections. So order #260.1 & #276.1 otherwise.

THIS CATALOG

To aid you in building your locomotives, the parts numbers are listed in the most general building order, with the exception of a few similar parts which do not have the same location on all engines. This should be of great assistance to the novice. The catalog also lists the parts in engine section order, starting with the Running Gear (all below the Boiler), Boiler and Boiler Parts, Boiler Front Parts, and Tender. Accessory parts for each section are also listed.

We did not think scale drawings necessary as all parts are true S scale, 3/16" equals a foot or 1/64th of the prototype dimensions. To save space, we have used the smallest drawing that would still show the detail. We have given dimensions to parts that vary in size, such as domes and smoke stacks.

The listing of unpriced parts means that they are being made now or at a later date, as time permits, or as you make the patterns. Do not order unpriced parts at this time. Announcements will be made in our "S Gauge Herald" ad or price supplements.

To keep the catalog from being obsolete for the longest possible time, the center columns have been left blank. Permanent pictured supplements of new parts will be made available (at cost) for attachment near their corresponding numbers. Until the permanent supplements are received, the blank space may be used for pencil orders, notes and new introductions from our "Herald" ad.

PARTS CODES

To help you further, we have used a number-letter code to show what parts go with some of the most popular engines. Parts common to most locomotives are omitted. I would be impossible to list all popular engines, let alone the thousands that were built. To list all engines per part would make the catalog twice as large and expensive, hence the letter code. Our listing will not be 100% correct as we don't have large plans of all these engines to check every dimension. Thus, our code will be derived from magazine-sized pictures, plans, measurements and parts that we feel can be used or modified. Possibly you will never get a particular part ready-made. For example, there are many styles of Walschaerts Valve Gear Frames; Main and Side Rods come in various sizes and shapes for the same sized driver. Neither we nor anybody else will ever be able to produce all styles and shapes of engine parts. In some cases, a different engine number series will change the part used on the engine so we have given the engine number for the part code. Each part carries codes of parts they will go on. See the photos at end of this catalog.

INDEX

An alphabetical index would be rather lengthy since it is difficult to know which of several names should be used for many parts. For simplification and quick reference, we have used the visual index, both for finding the name of the part and the price. To find a part which interests you, simply look at the engine drawing on the back cover and check it's number in the catalog. You will notice that each type of part has only one basic index number (as on the index picture). A different size or style of that part is followed by a decimal. Therefore, you will only have to remember one basic number per part instead of three or four. When the name of the part is known but it's appearance is not, check the catalog of prices under the appropriate section - Running Gear, Boiler and Boiler Parts, Boiler Front or Tender, probably know the section the part is in.

ORDERING

Send check or money order in U.S. funds with order. No C.O.D. or credit on retail or dealers. Minimum orders retail \$2.00, dealers \$15.00 with discount. Because of higher postage outside U.S., Canada add 5%, others 10%. Prices are subject to change without notice as inflation and wage scale goes up. Do not order parts not priced or not on supplement.

IMPORTANT---PLEASE READ AND NOTE IN YOUR CATALOG

- 1) You will like S Scale. It has come a long way----of age---- in the last 10 years; with every thing you need for a realistic layout. Some other suppliers are listed in this catalog on pages 12 thru 14 and they are eager to help you. To our knowledge, there is no junk in S Scale, as in other scales, so you can feel confident what you order is good. S is large enough that it is easier to work with and show more detail on parts equipment(some O Gaugers say our lost wax castings have more detail than their larger O Scale). Decaling is not as hard, less adjustment to rail and turnouts(switches). Engines and cars being larger than HO are less critical. S layouts are not much larger than HO and much smaller than O. Instead of looking down from the sky as with HO, appearing further away, in S you are a part of the scene of cars and engines, especially if the layout is at stomach or chest level. A high quality brass engine kit from us is less costly than a comparable HO ready to run. It is to your advantage to build a larger to build a larger engine at lower cost, and building is part of the fun of real modeling. Think of the fun and pride of showing off what you have built. A child can show off what he has taken off of a shelf----10 year olds do this at Christmas, so is that modeling?? You can do better than that. Also if you build your engines, if you ever want to sell it, you can get at least 50% more than you paid for the kit, plus inflation and still have the enjoyment of using it in the mean time. Where else can you get 50% on an investment?? And have used it too?? On ready to run, you will do well to get close to what you paid for it. Also you will be able to build engines you want that will never be available RTR, and half the price. Try it, join the fun with other S Scalpers. Try building one of our kits, especially ^{with} Carbon Rod" below, #2.
- 2) Note artical on P14 on "Carbon Rod Resistance Soldering", for much easier, faster engine building than the torch, easier than gluing, heating small spot only. Makes building really fun, no waiting to start soldering, just flip a switch.
- 3) However if you do want RTR, the following will known builders are making RTR steam and diesel engines; American Models, Alco Models, Omnicon Ltd., Overland Models, and Sun-set Models. These engines are available from S suppliers in our catalog on P12, 13 & 14. There will no doubt be others to come along and more engines from these too.
- 4) Southern P-s4---We have a craftsman kit of this for the experienced builder, parts and chek list only. Our modern tender could be used, about 1'6" too long, not bad, \$184.00
- 5) S Scale has a national convention for the past 20 years thru the "National Association of S Gaugers." In 1980--Milwaukee, 1980--Syracuse, 1982--Cleveland, 1983--Boston, 1984--Buffalo, 1985--Sacramento, 1986--Buffalo and 1987: will be in Chicago. You should plan to attend and meet about 200 other S gaugers and many of your S suppliers and their equipment, clinics, sight seeing, wife's attractions and layout viewing. Use part of vacation, Kelly Days, permissable leave etc, or a combination of these. For more information write us.
- 6) You can order any section of engine or tender you wish---or can afford.
- 7) PLEASE NOTE---When ordering please use differentiating names for parts where applicable on Drivers , Domes, Stacks, Side Rods, Injectors, Funnals etc., adding 63", modern, USRA, pyrimidal, light, heavy, triangular, etc(many trucks are Commonwealth, so that is not a discription, Drop Equalizer, 4 Wheel Trailing, 2 Wheel Trailing etc. differentiates them. These discriptions where there are several of a kind are more important to us than the part numbers. If we have to look up the particular part you want a number of times, on some orders it can take a lot of extra time. If we are short of time, as you are sometimes, we have to set it aside for a day or two. So while listing the part and price, do us both a favor and add that discription.
- 8) BOILERS---1-Light Mike, 1 Heavy Mike \$5.00 each. 1-Heavy Mike all silver soldered, \$7.00. All these are plain sheet stock Boilers, not photoengraved.
- 9) BOILERS---1-Light Pacific, 1-Heavy Mike. Both brass castings, \$12.00 each.
- 10) MOTORS---Very good, quality, small Kemtron motors for small steamers or diesels. One has #10.1 worm. \$4.00 each or 3-\$10.00.

ALL CASTINGS AND MACHINED PARTS ARE 100 % AMERICAN MANUFACTURE AND LABOR

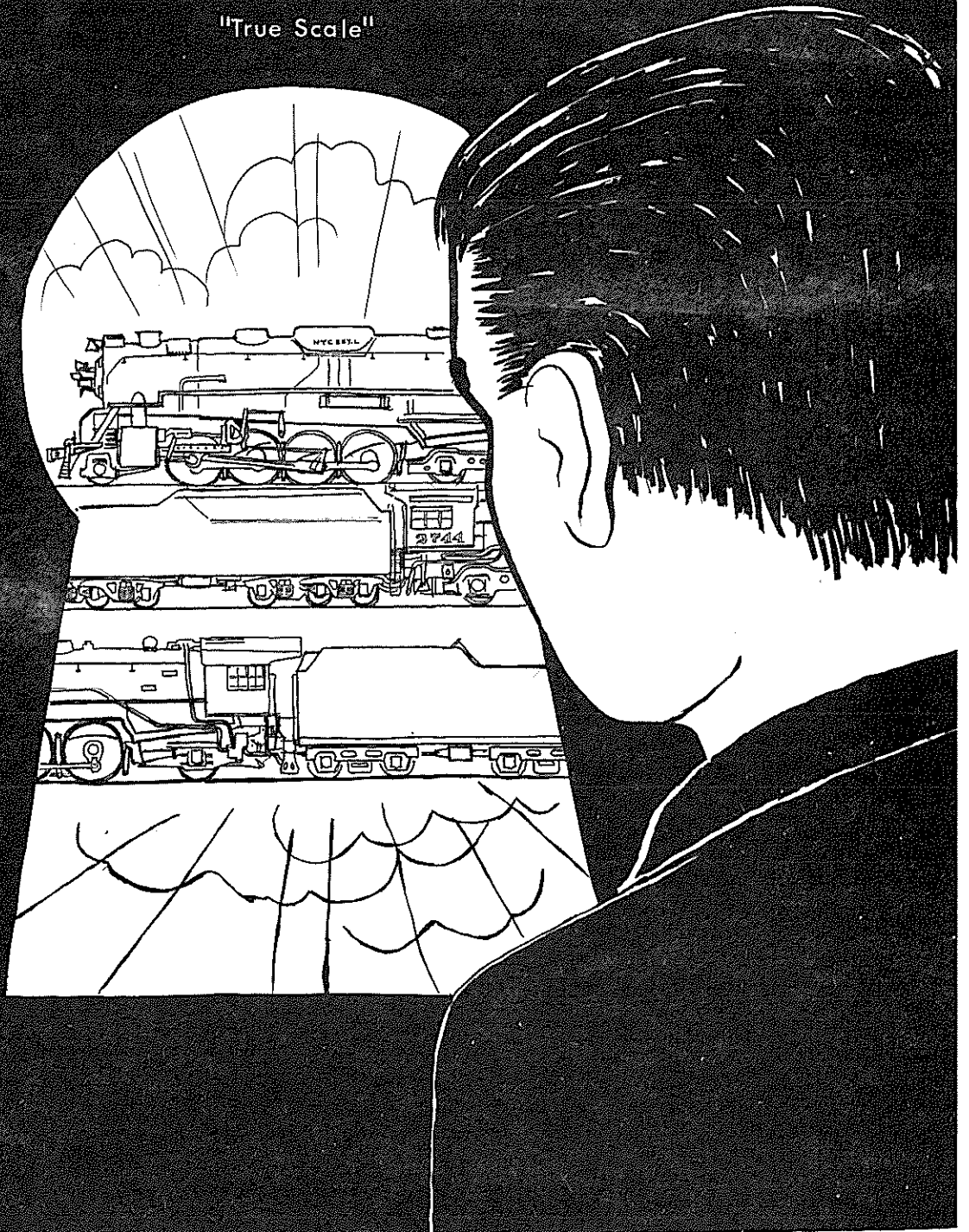
BEFORE ORDERING, PLEASE READ AND NOTE

- 1) You will like S scale. It has come a long way---of age---in the last 10 years, with every thing you need ;available for a realistic layout. Some of other suppliers are listed in this catalog on pages 12 thru 14, and they are eager to help you. Your knowledge, there is no junk in S scale, as in other scales, so you can feel confident what you order is good. S is large enough that it is easier to work with and show more detail on parts and equipment(some former O gaugers say our lost wax castings have more detail than their O gauge). Decaling is not as hard, less adjustment to rail and turnouts(switches). Engines and cars being larger than HO are less critical. S layout area does not take much more area than HO, and much less than O. Instead of looking down from the sky as with HO, appearing further away, in S you view as tho you were standing right in the rail yards among the engines and cars---because of its larger size---especially if your layout is built about stomach to chest height from the floor. A high quality brass engine kit costs about the same as a good HO ready to run engine. It is to your advantage to build a larger engine at the same cost, and building is part of the fun of real modeling. Think of the fun and pride pf showing off what you have built, rather than what you have bought off of the shelf-----any one can do that-----10 year olds do this at Christmas---same for cars-----is this modeling?? Also if you build your engine, if you ever want to sell it, you can get at least 50% more than you paid for it, plus inflation, and still have the enjoyment of having used it. Where else can you get 50%?? Are you getting it now?? Try it, join the fun with other S scalers. (You will do well to get close to what you paid for an engine off of the shelf).
- 2) Note new artical on page 14 on "Carbon Rod Soldering", for much easier engine building, and gear formulas on page 17, #1.
- 3) S scale has had a national convention thru the years thru the "National Association of S Gaugers" for about 20 years. In 1980 it was in Milwaukee, 1981 in Syracuse, and in 1982 will be in Cleveland. You should plan to attend. Meet your S suppliers, new and old friends go on tours of S layouts and important places in the city, and tours for the wives, clinics etc. So plan your vacation, long week-end or permissable leave or combination, but get there August 19-22. For more information, write Lee McCarthy, 8727 Rodview Rd., Broadview Hts., Ohio 44147. In the mean time, especially at Christmas time is good, have you thought of placing an ad in the newspaper, classified, to find or incourage a new S gauger buddy? Place the ad under toys, reading something to the effect of: "Wanted persons interested in S Gauge as a hobby". Would be well worth the small cost.
- 4) You may deduct 10% from the added total of the catalog prices, not each part. So as you are pricing parts, deduct 10% of each in your mind; a \$1.00 part is only .90, a \$2.00 part is only \$1.80, a \$5.00 part only \$4.50, or a \$200 kit only \$180, etc.
- 5) For our old customers, a word(or two) needs to be said about the two catalogs. When going thru this catalog, you will note the prices about 38% higher. But you added 20% to the old catalog prices and deduct 10% from the new one, so you are only paying about 8% more than the old catalog, for last 3 1/2 years, average. Engine kits only a couple dollars more. Some very few parts have been increased quite a bit, as previously had them priced just above cost, or because brass bar stock has increased double in last 3 years and machining tripple in last 3 years. Of course we have no control over these, and these items do not sell well.
- 6) We know it is psychology wrong to add 10% to prices you look at, even tho you will deduct 10%. We did this so the catalog prices would not become obsolete for a much longer time. So watch yourself and recognize this psychological effect so it will not deter your engine building and hobby. For comparison and ease your mind, even with the 10% not deducted, we are still much cheaper than the smaller HO, so you are still getting a good buy in S scale castings.
- 6) Next year we will determine whether a price increase will be needed(the 10% discount dropped), as we get a 10% increase from our casters every year, plus those mentioned above. In the July 1982 Model Railroader classified ads under "S Scale", we will note whether the 10% discount will be dropped or continued---and future July % increases, rather than

sending new pricing sheets to you----and you have to make all the changes of prices in the catalog----which is a lot of work.

-) The catalog would not be complete without some errors, so make these corrections.. On p23, Consolidations, cross out \$58 for the Vanderbilt Tender under MoPac and enter \$42 under 25'8" Rectangular Tender. All totals are wrong, so from left to right, starting with US,SP, they should be \$209, \$204, \$207, \$208, \$202, And \$203. These can be written in the space below under "Optional Extras". #96.4 American should be #96.3. #224.4 Medium Ladder should be #224.3. #16.22 Side Rods undrilled, price \$2.20. Put + signs to left of Frame #'s 18.43, .46, & .85 to match note at bottom of chart. For purpose of reference later, write 6-81 on cover of the catalog, when prices were figured. #211.10 & .11 should be pr. instead of each. Move all engine codes from #86.7 to #86.8, (no code for #86.7). #92.1 & .2 are per dozen. #62.1 thru 62.8 are pairs for the price.
-) Note on either one, or better still on both that #605.1 bulbs will fit into #84.1 Lamps. Change #86.7's #4414 & 2618 to 4414B, and #86.8's from 4414B to 4414 & 2618. #16 are pairs
- 0) 74" Box Pok and spoke drivers will not be replaced when sold----lack of interest, so order your future needs now and matching worm,
- 1) Do not order a part that does not have a price after it----it's not available!!
- 2) Again to keep the catalog up to date as long as possible, we do not now have these parts but will have them in the near future, so we are pricing them now. Make a pencil note beside each. #45.9, 45.10 Compressors. #73.1 Ash Pans. #165 thru 167 pipe joints (fittings). If you want any of these as soon as available, send us a SASE with pencil note of the ones you want.
- 3) It might be worthy to note to our old customers of a couple new items not previously available, #1.41 69" Box-Pok, #125.2 Universal Backhead,---it will fit the largest of engines, or some of the top, sides and bottom ground off for Consolidations and switchers. #605.1 Micro-Minature lamps (bulbs) that fit our Classification Lamps #84.1 have a lens at the tip for headlights, street lights, cieling lights in homes or industry, marker lights etc. or use the light from the sides for ordinary lighting such as classification lamps or number boards. Be sure your power supply goes to zero when testing them. An artical on the disireability and building of "Carbon Rod Resisting Soldering" on page 14. This makes a torch and soldering iron obsolete, making assembling of an engine simpler and quicker than glueing----very little to no wet swabs have to be used.
- 14) Boilers---We have several sheetstock boilers, plain---not photoengraved. For Light Mike or Heavy Pacific. \$5.00 ea.
- 15) Motors---small, very good new Kemtron motors, useful for small engines or other uses, good quality. One has a #10.1 worm on it. \$5.00 ea. (Have 3). (All 3 \$12.50)
- 16) Motor---1 large one, good for very heavy duty, such as a large diesel to carry a heavy load. Seperate leads from commutator and field so diodes can be installed for DC use and reversing. \$5.00
- 17) AF DC fields so AF engine can be run on DC and be reversed without use of sequence relay. Have two of them for steamers only. \$5.00 each (Would save putting in a DC motor)
- 18) Bulbs--- 2.5 volt baynette. Can be wired in series at 5 volts. .10 ea. (with socket)
- 19) AF Alco diesel wheels, new, copper, insulated, tinplate(hi-rail) .50 ea. (have about 5)
- 20) Wheel Sets---Hirail, aluminum, Northeastern or Miller made .50 ea
- 21) Relays---Have many uses. Operates on 10-18 volts, depending how many leaves are stacked up. Can have leaves easily restacked for any contact arrangement. They can be actuated by car or engine rolling over a rod pushing down on contact to close the circuit to actuate the relay to operate something somewhere else. Extra contact leaves furnished. .75 ea.

You Are About to Enter a Whole Exciting "New World"
That Will Make You a "Master Modeler" in
"True Scale"

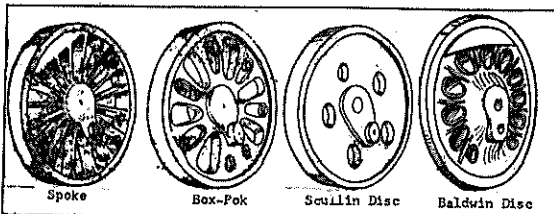


Lost Wax Casting

Basic Running Gear

Drivers (Scale flanges only, no hi-rail)

(By engine kit "sections" and most "general" building order)



Quartered on .162" diameter axles with 28 tooth gear, #10.2a

Part Number	Scale	Diameter & Type	Quartered		Engine Code	Scale Only	
			Flanged or Blind	Gear & Flanged		Tired **	Casting Only
1.1		51" Spoke	\$5.75	\$6.50	68*	\$2.00	.90
1.2		56" Spoke	6.00	7.00	*	2.25	1.00
1.3		63" Spoke	6.00	7.00	MIKESK	2.25	1.00
1.4		69" Spoke	6.00	7.00	bermo*	2.25	1.00
1.41		69" Box-Pok	6.00	7.00		2.25	1.00
1.5		72" Spoke	6.00	7.00	pc*	2.25	1.00
1.6		74" Spoke	6.00	7.00	*	2.25	1.00
1.61		74" Box-Pok	6.00	7.00	*	2.25	1.00
1.7		79" Spoke	6.00	7.00	MIKESK	2.25	1.00
1.71		79" Box-Pok	6.00	7.00	MIKESK	2.25	1.00
1.72		79" Scullin Disc	6.00	7.00	MIKESK	2.25	1.00
1.73		79" Disc 5 hole Same 4 hole			MIKESK	2.25	1.00

For blind Drivers add .35 for removal of each flange.

*43 tooth gear, #10.3b, on 51" & 56" quartered sets. Same part numbers for quartered and unquartered centers.

**Tired, 2-56 thread Eccentric holes and .162" axle hole for our #8.1 axle ready to quarter, or drill out for larger axles or plug up and re-drill for smaller size.

As most of you know, in the past we have been using flat or 3° angle treads on much tighter curves than prototype, which does not operate properly on our tighter than prototype curves.

Not only do most of our drivers, tires and wheels have the RP-25 contour, but experimentation shows our new 5-6° tread angles give the following advantages over 3° or flat treads.

1. Better differential action on curves, reducing drag by lessened skidding of one wheel and flange pressure on the rail. Reduced drag lessens chance of turn over on inside of curves and permits longer trains. Also less slipping of drivers from extra drag, with more even speed. As a result, Cars center better on track, improving coupling operations.
2. Reduced tread contact for smoother, surprisingly, gives better traction, an important quality.
3. Side to side rolling of treads on rail, in and out of curves, particularly, grinds off dirt and oxide much better than 3° treads, with less packing of dirt on treads. Thus keeping treads much cleaner----less maintenance.

All our steel wheel sets, and tires are pre-blackened for prototypical appearance, or a tooth if painting is desired. Steel wheels and tires have a special blackening which helps prevent rust by attracting micro quantities of oil from the journals, but not enough to pass to the rails.

The RP-25 fillet between tread and flange, besides reducing rail climbing, also reduces dirt build up, as this is the first place dirt starts to collect on wheels without fillets, then it spreads on out over the tread.

COUNTERBALANCES



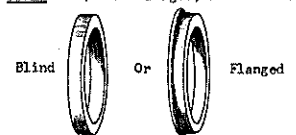
Style A

Style B

Lost-wax cast for your convenience to use on our drivers, in 2 styles. (Only 2 shown of 6 or 8 in a set. Can be filed narrower from flat side.)

Part Number	Style	Driver Dia.	Dimensions (Wide)	Code	Price
3.1	A	51"	6-1", 2-1/2"	68	
3.3	A	56"	4-1", 2-1/3", 2-2/3"		\$2.40
3.5	B	63"	4-1", 2-1/6", 2-2/4"	MIKESK	2.40
3.6	B	69"	4-1", 2-1/6", 2-2/4"	S	
3.9	B	69"	4-10", 2-1/2", 2-2/3"	ber	2.40
3.11	A	69"	4-1", 2-1/11", 2-1/15"	m	
3.12	A	69"	4-1", 2-1/6", 2-1/9"	oD	
3.16	A	72"	4-11", 2-1/4"	P	2.40
3.17	A	72"	4-1/2", 2-1/7"	c	
3.21		74"			
3.23	A	79"	4-11", 2-1/4"	a	2.40
3.24	A	79"	4-9", 2-1/4"	BU	

TIRES (Scale flanges, no hi-rail)



#5.1 Scale--51", 56", 63", 69", 72", 74", 79" ea. .60

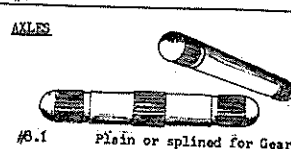
RP-25 contour, steel, 5-6 degree tread angle, and blackened. See description under "Drivers."

Note: 51" tires could be used for 48/453" Trailing Trucks, as only 1/4 of wheel shows below the Truck.

INSULATION

For Tires. Hard, high temperature motor and transformer "fish paper". Best to machine Driver .017" smaller than I.D. of Tires for thumb pressure fit. Epoxy "fish paper" in Tire, then epoxy Driver inside "fish paper". Be sure Tire is flush to face of Driver. 3-2"x4"x.007 thick .15

AXLES

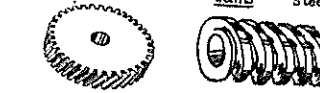


#8.1 Plain or splined for Gear

.162" diameter, splined for Drivers or splined for Driver and Gear, for use in our Frames. Grind ends of Axles flat.

ea. .20

GEARS



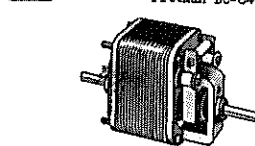
for Consolidations, switchers etc. Either can be drilled out larger or sleeves made and soldered in or plugged and redrilled smaller.

Designed to give prototype speeds of 1.1 times driver diameter with loaded engines of about 10-15 freight cars for large engines (3 lbs. drag) or about 4 cars for small engines.

#10.2a	Gear	For 63" and larger drivers, 28 teeth, 28:1 ratio with #10.2b worm. For DC-84 or other motors of 9500 RPM. .757" Diameter, .160" hole & .125" thick. \$2.75
#10.2b	Worm	For above. .341" diameter, .124" hole & .500" long. \$3.00
#10.3a	Gear	For 51" & 56" Drivers. 43 teeth for 43:1 ratio with #10.3b worm. For 13-14,000 RPM motors. .700" diameter, .163" hole & .125" thick. \$2.25
#10.3b	Worm	For above. .357" diameter, .0942" hole & .406" long \$3.00

SEE "CARBON ROD RESISTANCE SOLDERING" ARTICLE, PAGE 14

MOTOR

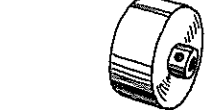


#12.3 Same-Drilled and tapped, with #10.2b worm installed for our frames. \$15.90

#10.2 gears and worms designed for this motor to give prototypical speeds under load of about 3 lbs., about 12 "freight cars. A Alnico VI field, .009 hp. 1 5/8" long, 1 1/16" wide, 1 3/8" high. 1/8" double shaft. 9,500 RPM.

FLY-WHEEL

Usually Brass



#13.1 1" dia., 1/2" total length, 1/8" hole, 2-56 set screw. \$1.25

#13.2 .800" diameter, .400" long & .096" hole for small engines \$1.75

Because of the small armature, a flywheel helps smoother starts, better feel to acceleration, deceleration and gliding stops rather than sudden stops. Dimensions are approximate.

CRANK PINS



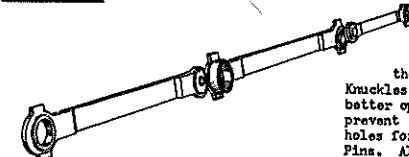
Long Pin can be used for Trailing Trucks and short ones for Tender Trucks.

#14.1 .075" long shoulder pr. .90

#14.2 .250" long shoulder pr. .90

For better grip to driver, 2-56 thread .200" long. Fillister heads for smaller prototypical diameter, except for Eccentric Crank, and Main Rod, which is flat head and long shoulder. They can be filed hex head and shallower, with slott sawed deeper. Shoulder is durable, 105" diameter steel sleeve. Sleeve can be removed to insert different 2-56 screw.

Side Rods Nickel Silver

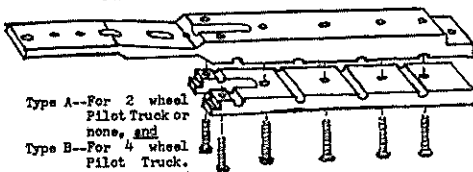


All rods universal right-left. All rollers on-----remove these not needed. Knuckles jointed for better operation, and to prevent warp. .106" holes for our #14 Crank Pins. All Rods for 4 Axles. For 3 axle, remove front section.

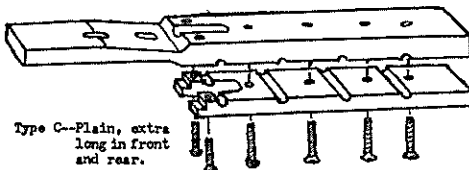
63" & 69" Rods marked front & rear on back of Rod, for that assembly order.					
#16.1	51" use. 5/16" betw. hole centers.	6"			
#16.2	51"-56" 5/16" " " " "	Plain 8"			\$2.90
#16.4	56" " " " " " "				
#16.6	63" " 5/16" " " " "	Plain MIKESK*			2.90
#16.8	69" " 5/16" " " " "	Plain ber mo			2.90
#16.12	72" " 5/16" " " " "	Fluted pc			2.90
#16.16	74" " 5/16" " " " "				
#16.19	79" " 5/16" " " " "	Fluted MIKESK			2.90

#16.22 Any size Side Rod with joints not drilled, so you can put Rods on Drivers in your Frame and drill exactly to fit your Driver-Frame axle holes. This could compensate for slight error in drilling axle holes.
NOTE: For plain Side Rods, fill flutes with solder and laquer to preserve the color of the solder.

Frames With .162" diameter axle holes, spaced as above Side Rods.



Type A--For 2 wheel Pilot Truck or none, and
Type B--For 4 wheel Pilot Truck.



Type C--Plain, extra long in front and rear.

Will fit AF Hudson and Penn. Railroad K-5 Boilers,

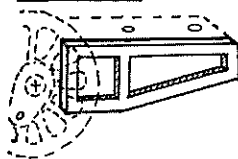
All mass, so easy to change by sawing, filing, or solder-applies to. Available notched for our Steam Chests, or plain and extra long in front and rear for your particular fitting. All mounting for current motor, now Pittman DC-84 and our gears and worms (10.2a & 10.2b).

Experts do not agree as to whether a sprung or rigid frame is best. We made ours the cheaper rigid, with instructions for a simple springing method that even a novice can make.

Part Number	Driver Size	Number of Axle Holes	Frame Type	Engine Code	Price
#18.1	51"	3	A	6	---
#18.11	51"	4	A	8	---
#18.12	51"	4	C	---	---
#18.2	56-51"	4	A	Consolida.	\$13.00
#18.21	56"	4	A	---	---
#18.32	63"	4	A	MIKESK	14.00
#18.33	63"	4	B	---	---
#18.34	63"	4	C	---	---
#18.42	69"	4	A	ber mod	14.00
#18.43	69"	4	B	---	14.00
#18.46	69"	5	A	---	15.50
#18.48	69"	5	C	---	---
#18.52	72"	3	B	pc	14.00
#18.53	72"	4	B	---	---
#18.82	79"	3	A	ahUD	14.00
#18.83	79"	3	B	---	---
#18.84	79"	4	A	---	15.50
#18.85	79"	4	B	---	---
#18.86	79"	4	C	---	---

A different geared slot can be made by drilling 3 close 1/4" holes close together over desired axle and file slot out. + Not always in stock, order months ahead.

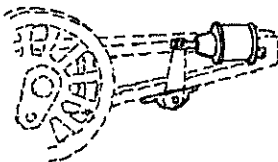
DUMMY REAR FRAME



#18.90 68Consolidations \$2.00

Dummy rear frame to be soldered or epoxied to frame of engines that do not have Trailing Trucks. Will make engine look more prototypical.

ENGINE BRAKE CYLINDER & LEVER BASE



#19.1 68 & Consol. pr. \$2.00

Used on many engines without Trailing Trucks. One cylinder on other engines in center of frame just behind Steam Chest, Fork rearward. Some are located elsewhere.

LEAF SPRINGS For Steam Engines



#20.1 40" long 68pacMIKESberk* pr. \$1.40
#20.2 48" long moUD* pr. ---

These have complete fine detail of spring leaves, Hangers, etc. Will fill in that blank look between Boiler and Frame.

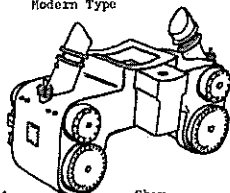
BRAKE SHOES

#23.1

All

STEAM CHEST All interchangeable with our frames

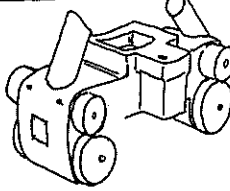
Modern Type



#25.1 Sber \$7.20

Full prototypical detail of rivets, nuts etc. We cannot possibly produce all possible variations. These are on most modern engines, or small changes for other engines, such as filling off rivets and/or nuts, or other details.

STEAM CHEST USRA Type



#25.5 Plain Front Plates 68pacMIKESmokHUD \$6.00

Used on all USRA Mikes, Pacifics, Mountains and a great many others. Probably the most popular. As with other Chest, changes can be made, such as barrel plates filed thinner or made thicker.

Running Gear Details

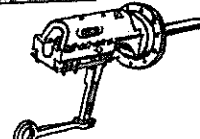
VALVE GUIDES



#26.1 68pacMIKESmokHUD pr. \$1.45

Sits on rear of Steam Chest for Valve Rod and Combination Lever. On a great many before and after the USRA, e.g.a. Sometimes mounted upside down.

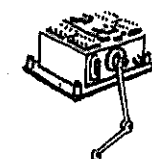
VALVE CROSSHEAD



#28.1 ber pr. \$1.80

Beautiful full detail. Sits on rear of Steam Chest to receive Valve Rod from Valve Gear and Combination Lever. Lubricator sits on top. Kit of a pair of Valve Crossheads, fluted Combination Levers, forked Union Links and pins.

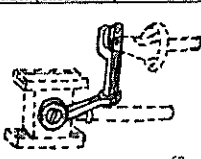
MECHANICAL LUBRICATOR



#29.1 cberHUD pr. \$1.50

Detroit B Sits on top of Valve Crosshead, (above), or other locations. A jewel of detail. Kit of 2 Lubricators, 4 rods, and assembly pins.

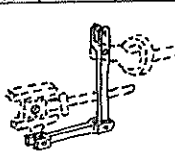
UNION(CROSSHEAD) LINKS & COMBINATION LEVER



#30.1 68pacMIKESmok pr. \$1.25

Possibly the most popular. Probably used since just before WWI. Used with #37.8 Crossheads. In nickel silver.

UNION(CROSSHEAD) LINKS & COMBINATION LEVER



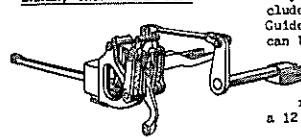
#30.2 Consol. pr. \$1.25

These are for Single or Double Crossheads with Lugs, #37.10 etc. Cast in nickel silver.

Valve Gears

All interchangeable. You should have #260.1 "Parts Installation Booklet"

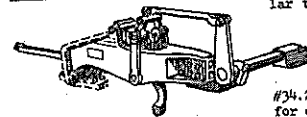
BAKER, TRIANGULAR TYPE



#32.1 68Sberk \$7.50

Very popular type. Includes Single Crosshead Guide Mount #34.1, That can be ground off for Inside or Outside Yoke installation. All rods and levers in a 12 piece kit.

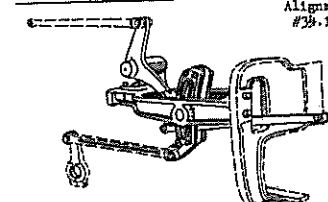
BAKER, LONG TYPE



#32.2 paKnoUD \$7.50

One of the most popular types also. Has all rods and alignment holes to receive interchangeable #34.1 #34.2 & #34.3 Yokes, for easier installation. 12 piece set.

WALCHERTS, LONG TYPE



#32.3 cMI \$7.50

Also very popular. Alignment holes for #38.1, #34.2 & #34.3 Yokes. (Broken lines not part of 7 piece kit.)

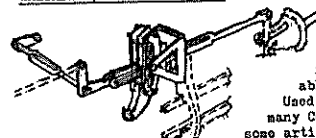
REVERSE LINKS



#32.4 cMO pr. \$1.00

Used in all Walcherts type Valve Gears.

WALCHERTS, TRIANGULAR TYPE



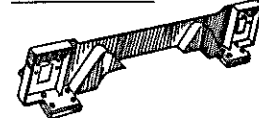
#32.5 \$7.50

Also Yokes #34.1, #34.2 and #34.3 interchangeable with it. Used on a great many Consolidations some articulators and others. All nickel silver.

Yokes

Mounting for Crosshead Guides. All have all Nut and rivet details and inter change with all Valve Gears except Triangular Baker.

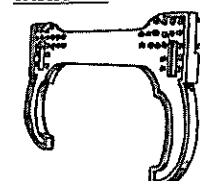
SINGLE GUIDE MOUNT



#34.1 Hber \$1.80

Generally used on the more modern engines. (Note: it is made onto our Triangular Baker Valve Gear).

OUTSIDE Yoke ALLIGATOR TYPE

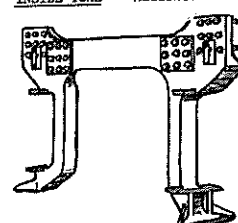


#34.2 68MIKESK \$2.00

This Yoke gives a very good, dignified appearance protruding out from the engine and Crosshead Guides, showing all the nut detail.

Alligator-Double

INSIDE Yoke ALLIGATOR TYPE

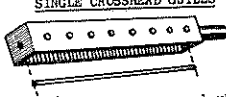


#34.3 pacmoUD \$2.20

Probably the most popular type. Includes bottom step for NYC engines or ground off for other engines. Lots of nut detail.

Crosshead Guides

SINGLE CROSSHEAD GUIDES



#36.1 berH pr. \$1.90

Nickel silver Front dowel fits into Steam Chest. Single Crosshead #37.1 slides inside on the piano wire.

ALLIGATOR TYPE (DOUBLE) Nickel Silver

This is by far the most popular type, used with #37.8 & #37.10 (crosshead). Also soldered right in to Steam Chest.

#36.4 68pacMIKESmokUD* 2 pr. \$1.90

Crossheads**SINGLE TYPE Nickel Silver**

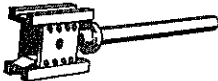
Drilled and tapped for 2-56 screw and screw, with operating tube.



#37.1 berH* pr. \$1.90
#37.2 Castings only, not tapped pr. \$1.30

ALLIGATOR TYPE Nickel Silver

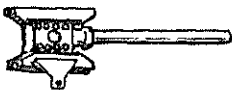
All nut detail. Drilled and tapped 2-56, with screws. The most popular type.



#37.8 68pacMIKESmokUD pr. \$1.90
#37.9 Castings only, not tapped pr. \$1.30

ALLIGATOR TYPE WITH LUGS

All nut detail. Drilled and tapped 2-56, with screws.



#37.10 Consol. pr. \$2.00
#37.11 Castings only, not tapped pr. \$1.60

MAIN RODS Modern style Fluted with Oiler

To fill flutes of all below rods, fill with solder and sand smooth. If natural metal color paint with lacquer.



#40.2 10'11" between hole centers berH* pr. \$2.00
#40.3 9'8" " " HUD* pr. \$2.00
#40.4 10'5" " " Consol. pr. \$2.00

MAIN RODS USRA Style Nickel Silver

Universal right-left. Cut off Oiler not needed. Fluted on both sides.



#40.7 10'6" between hole centers 6MIKEac* pr. \$2.00
#40.8 9'2" " " p* pr. \$2.00
#40.9 8'6" " " 8mo* pr.

ECCENTRIC CRANKS Nickel Silver

1'6 1/2" between hole centers and counter sunk for main Crank Pin. Can be filed narrower for older engines.



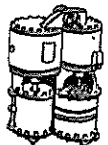
#41.1 Countersunk 68pacMIKESmoberkHUD* pr. .80
#41.2 Not Countersunk pr. .80

ECCENTRIC ROD Nickel Silver

Fluted on more modern engines, plain on older ones. Fluted-fluted one side, plain on the other for either. #42.2 forked on small end.



#42.1 7'5" between hole centers aSber* pr. \$1.60
#42.2 6'7" " " 6pMIKEmokHUD* pr. \$1.60
#42.3 5'6" " " 8c* pr.

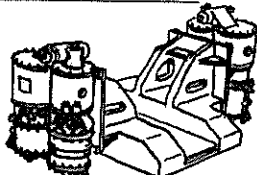
Air Pumps**CROSS COMPOUND AIR PUMP (COMPRESSOR, DUAL)**

Bag all out and contour detail. On most modern and semi-modern engines. Located on left side of boiler, or on Boiler Front, or 2 Pilot Deck, see below.

#45.1 68pacMIKESmo \$1.50

DUAL CROSS COMPOUND AIR PUMPS

Same as above, but 2 Pumps mounted on mounts which are on dummy front Frame, which then sit on #54 Deck (Beam Deck). All in one piece, no soldering. Beautiful part. Can be fitted to AF engines.



#45.2 berkHUD \$2.60

9 1/2" SINGLE COMPRESSOR

#45.9 \$1.50

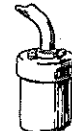
11" SINGLE COMPRESSOR

#45.10 \$1.50

Used on such older built engines, before WWI. Some engines used 2 before the newer Cross-compound Air Pumps came out.

COMPRESSOR FILTER N.Y. Air Brake

Exact duplicate for that added extra super detail, with pipe to reach Compressor. Used with most all Cross Compound Air Pumps to filter the air.



#47.1 68pacMIKESmoberkHUD* .40 #48.1 68pacMIKESmoberkHUD* .40

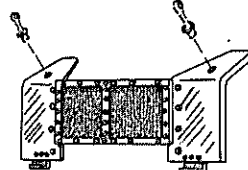
COMPRESSOR GOVERNOR

As with above, for that extra superdetailing that makes the difference. Exact duplicate with cored hole. One per engine.

Compressor Shields**INDIVIDUAL SHIELDS**

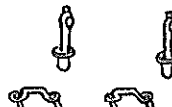
#50.1 berHUD* pr. \$1.75

All rivets, angled mounting brackets on the bottom and angle iron reinforcement in back. This type on most engines. (for Posts & Irons, see #52.1.)

DUAL SHIELDS

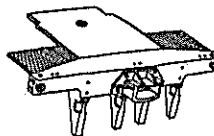
#50.4 \$1.75

Beautiful, with screen between shields, rivets, nuts and brackets. Gives massive appearance. Popular on modern C&O and their subsidiaries.

GRAB IRONS & POSTS FOR SHIELDS

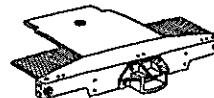
#52.1 berkH* pr. .60

Posts used on some Boiler Fronts for circular Hand Rail. Grab Irons used on Sand Domes, Shields etc.

PILOT BEAM, DECK & COUPLER POCKETS

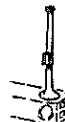
#54.1 With Knees SberH* \$3.90

Treaded Deck, Coupler Pocket, drilled & tapped for coupler shank. Starter holes for Flag-staffs, Uncoupler Brackets and Beam Steps. For modern engines. Knees, below Beam, to reinforce Pilot. Probably better for model use than those below. Drilled for Pilot alignment pins.

SAKE Semi-modern

#54.2 Without Knees pacMIKEmok* \$3.90

Used on semi-modern engines, such as USRA's etc. This one above designed to take Kadee couplers.

FLAGSTAFFS

#56.1 pacMIKESmoberkHUD* pr. .55

With dummy groove for flag attachment. On practically all engine's Pilot Beam. Shorten Staffs from top for some engines.

UNCOUPLER BAR BRACKETS



Uncoupler Bar. On most engines and Tenders.

#57.1

68pacMIKESnoberkHUD*

.55

For that fine, realistic detail on Pilot Beam and rear Tender Beam. Beautiful small detail, with rivets even, and holes for piano wire tenders.

AIR HOSES



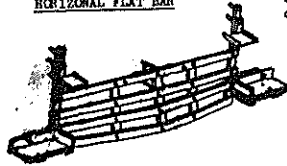
#58.1

All

Single one used on Pilot Beam of engines, double one on Tenders and cars.

Pilots

HORIZONTAL FLAT BAR



#60.1

b*

\$1.40

All interchangeable with pins to fit holes in Pilot Beam. Used on many engines, particularly MKF, NYC & Penn. RR if step is ground off.

PARTIAL CAST



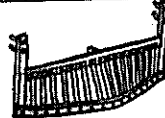
#60.2

r

\$1.55

Gives a beautiful massive look to front of modern engines. Popular on C&O, VGN and other C&O subsidiaries. A beautiful casting.

SHORT VERTICAL ROUND PIPE



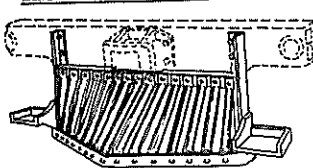
#60.3

pacMace*

\$1.40

Probably the one most popular type Pilot. On most USRA's. A real sharp casting.

LONG VERTICAL ROUND PIPE

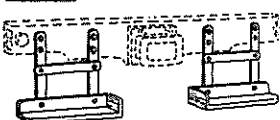


#60.4

c*

Used mostly on engines before WWII. Some roads used them even later.

STEP TYPE



Pacifics, also C&O. Also seen on articulators.

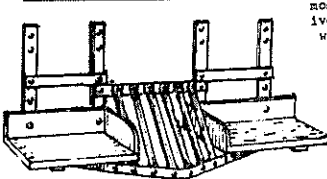
#60.5

68KE*

\$1.65

Typically used on Switchers, but many roads used them on such larger engines, such as NYC and Hikes and Pacifics.

STEP WITH SHORT VERTICAL PIPE



#60.6

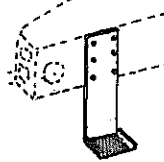
\$1.65

Probably our most attractive Pilot. Was widely used, especially on the C&O.

Steps

These give that real look, all treaded

BEAM END STEPS USRA type



#62.1

pacMace

.90

Wide treaded strap steps, placed at ends of Pilot Beam of most USRA's, as well as many others. Very popular. Of course USRA engines ran much after the USRA era, some with minor to major changes.

CENTER BEAM STEPS



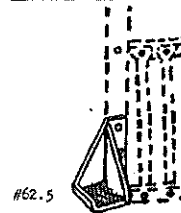
#62.2

eD*

.65

These mount under the beam, to stick out over the end of the Pilot. Very popular and gives that extra super detail.

PILOT STEP, TRIANGULAR



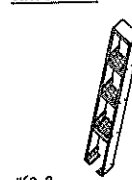
#62.5

eH

.65

More modern style, to mount on front of vertical member of the Pilot. Like the above it gives that extra detail that makes the difference between just an engine and one that looks prototypical.

FRONT STEPS (Ladder)



#62.8

pac MIKESnoberkD*

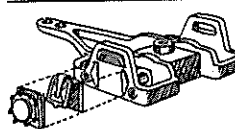
\$1.80

Treaded steps from Pilot Deck up to Running Boards. On a great many engines. Steps extra long so you can remove enough to fit your engine. If ground thinner from front to back, could be used few step ladder.

Pilot Trucks

All less wheel set. See #240.6, 33" most commonly used or #241.1, 36" sometimes used.

2 WHEEL OUTSIDE BEARING, COMMONWEALTH DELTA MODERN



#64.1 With Plain Journals e*

#64.2 " Roller " tr*

\$3.60

\$3.50

Used on many of the most modern engines. Very detailed Truck Journals (bearing). Sheet spring included. Extended pivot will make it work better.

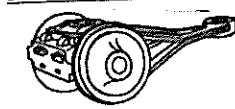
2 WHEEL INSIDE BEARING, COMMONWEALTH DELTA MODERN



#64.3

Same Truck as above, furnished without Journals, so Journal housing can be cut off for modern prototypical inside bearing.

2 WHEEL INSIDE BEARING, COMMONWEALTH USRA



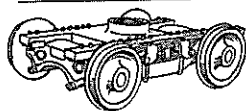
#64.6

MIKES*

\$2.50

Popular on most engines of the USRA era. Very well detailed. This and above Trucks furnished with leaf spring.

4 WHEEL INSIDE BEARING



#64.8

pacnoHUD

\$2.75

Probably the most popular of all Pilot Trucks. Heavy enough that springs are not needed. Excellent detail.

Trailing Trucks Less Wheels

For all these you should have Parts Booklet #260.1

4 WHEEL COMMONWEALTH DELTA SPRUNG



#65.1 Plain Journal, open lid

beHU

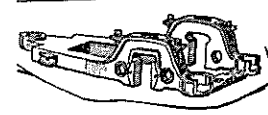
\$2.10

#65.2 Roller Journal

\$6.40

Very nice, well detailed. The most popular of many that practically like it. Use 36" and approx. 43". Top can be changed some.

2 WHEEL COMMONWEALTH DELTA SPRUNG



#65.7 Plain Journals, Opening Lid

HES

\$5.00

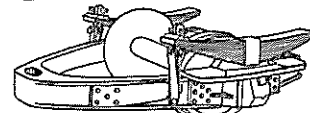
#65.8 Roller Journals

D

\$4.50

Very nice but difficult one piece casting. Usually used 43" or 45" spoke. Could be used on USRA's, as they replaced the Cole Hodges Truck.

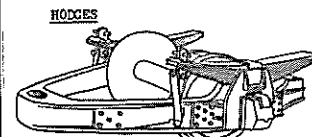
COLE USRA Type



#65.13

Ipaco

A super detailed Truck. Used on almost all USRA Trailing Trucks. Usually used 43", sometimes 48" (our 51" close enough). See our #243.



#65.13

Mc

\$5.60

Similar to Cole Truck. Both in same kit. Usually used 43" to 45" spoke. Heavy Pacific used 51". See #243.

JOURNALS Solder On

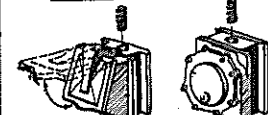


#67.1 (State whether Plain or Roller) pr.

.75

From Pilot Truck. Can file off other type Journals on other Trucks and solder or epoxy these on. Very fine detail of rivets and contour.

JOURNALS Sprung



Plain

Roller

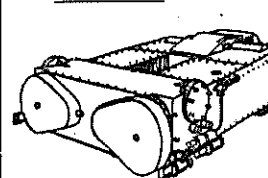
#67.2

From #65.1 and 65.2 Trailing Trucks for other uses, with Springs. On Plain Journals, state whether modern pyramidal or the older nearly flat surface as generally used on 65.7 Truck

Plain pr. \$1.50

Roller pr. .80

BOOSTER ENGINE



#70.1

KESerbHUD

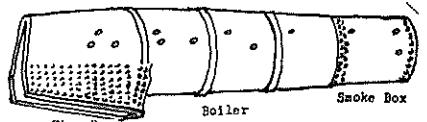
.75

Used on Commonwealth Delta Trailing Trucks and some others but not Hodges and Cole Trucks. Full rivet detail. Type manual for weight to hold Truck down and spring it. Used with #152.1 Booster Engine Pipes.

Boiler & Boiler Parts

BOILERS

These are sheet stock brass Boilers with unengraved rivets on Smoke and Fire Box and Boiler Bands. Also unengraved are locations of Handrail Posts and Washout Plugs, so they are easily drilled from the engraved indentations. Tremendously easier to torch solder parts on than our old cast Boilers, needing little to no wet swab heat sinks. Even such easier, that even a novice could easily build, with a Carbon Rod Resistance soldering outfit.



Fire Box

Boiler

Smoke Box

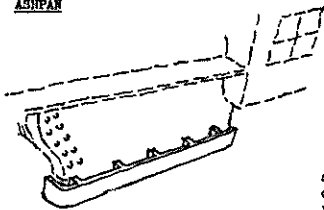
Sections of Complete Boiler

#72.1	0-6-0 Switcher	
#72.2	0-8-0 Switcher, 2-8-0 Consolidation	\$14.00
#72.3	4-6-2 Heavy Pacific	\$20.00
#72.4	4-6-2 Light Pacific	\$12.00
#72.5	2-8-2 Heavy Mike	\$20.00
#72.6	2-8-2 Light Mike	\$20.00
#72.7	2-8-4 Berkshire NKP Smoke Box smaller dia.	\$20.00
#72.8	2-8-4 Berkshire C&O, PH Smoke Box same dia.	\$20.00
#72.9	4-6-4 Hudson NYC & C&O	
#72.10	4-8-2 Heavy Mountain & NYC Mohawk	
#72.11	4-8-2 Light Mountain	

The following are so near the Berkshire Boilers that it is pointless to duplicate them, so only length changes are all that is needed.

- * The reference here is that on the NKP the Smoke Box is smaller diameter than the Boiler, a step, like the drawing. For the C&O and PH the Smoke Box is flush with the Boiler.
- # For C&O Hudson use the C&O Berkshire Boiler. For the NYC Hudson use the NKP Berkshire Boiler and remove 1' from the back.
- * For Heavy Mountain remove 1 1/2'-2' from the NKP Berkshire Smoke Box. No change for the Mohawk.
- * For the Light Mountain remove 1' from the Smoke Box and 1' from the back of the Boiler of the NKP Berkshire Boiler.

ASHPAN

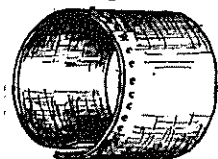


#73.1

These are soldered or epoxied under the Fire Box. This is another idea that gives that finished real appearance. Made extra long, cut to desired length. Used on a great many engines, especially in latter years.

pr. \$3.50

SMOKE BOX WRAPPER (DIE STAMPED)



- #74.1 Single row of rivets b* Cut off one row of double row.
 - #74.2 Double row of rivets c* pacHIXSmokeUD* \$1.00
 - #74.3 Plain, no rivets erik* .25
- Note: On some engines, part of the front row are to be filed off, usually from 'center line' of Smoke Box and over the top. Some engine's Smoke Box Wrappers do not have rivets. This Plain Wrapper could be used for other purposes

WEIGHT

5-8 oz.

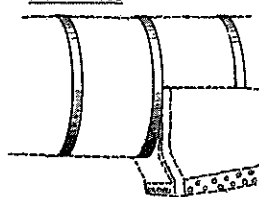


#75.1

(Postage ± cost) \$1.30

Can be used in round Boilers, Vanderbilt Tender tanks, flat side in rectangular Tenders, or sawed narrower and put in cars. For more weight, 2 can be epoxy or soldered together.

BOILER BANDS



#76.1

All engines

.25

Boiler Bands really make a big difference to an engine, tho are a bit difficult to install. All engines have them, tho all photos do not show them. A sheet of dead soft brass .012" X 1 1/2" X 7". So you can cut them any width your engine calls for. Best installed a bit wide, as they tend to go on crooked, and file with edge of file straight.

SHEET BRASS STRIP



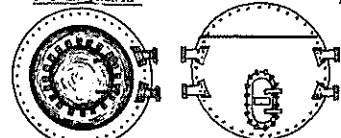
#77.1

.012" X 1 1/2" X any length

per foot .25

This can be used for above Boiler Bands, or build up sections of Boiler diameter. In dead soft, as good like paper. Can be used used almost anywhere cardboard is used and would not get accidentally bent, as Tender Coal Chutes, etc.

BOILER FRONTS



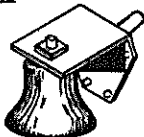
Modern to Semi-Modern

Ultra Modern

All for modern to semi-modern use. Full rivet, hinge, nut and strap detail and rear flange for mounting.

#78.2	98"-94"-	*	\$2.20
#78.3	94"-89"-	er	\$2.20
#78.4	92"-87"-	bHDKacS*	\$2.20
#78.5	87"-84"-	JE*	\$2.20
#78.6	84"-81"-	KK*	\$2.20
#78.7	80"-79"-	8IneConsol.*	\$2.00
#78.8	77"-75"-	a*	\$2.00
#78.9	75"-73"-	*	\$2.00
#78.10			
#78.12	91"-89" Penn. RR X-5, Same as above modern, except smaller front door and no Boiler hinge		\$2.20
#78.15	90"-85" Ultra Modern (above)	ES	\$2.20

BELL IN BACK



#80.1

br

.80

Used on the very latest engines. Steam operated.

BELL IN 45° Frame



#80.2

pacHIXSmokeH

1.10

A very beautiful, prototypical, two piece working Bell.

BELL, BOILER MOUNTED



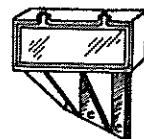
#80.5

EUD

1.10

Two piece working Bell for installation on top of Boiler.

NUMBER BOARDS (MODERN, VEINED)



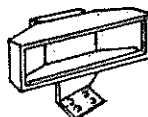
#82.1

Sber

pr. \$1.40

Real "eye catching", Hollow Number Boards, that can be illuminated with our #620.1 bulbs, for more realistic appearance.

NUMBER BOARDS Boiler Mounted, Angled



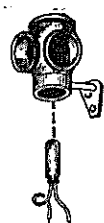
#82.2

Consol.

pr. \$1.40

These were very popular on Western and Southern roads, as well as two on the very top of some C&O Boilers that we know of. Probably others.

CLASSIFICATION LAMPS



#84.1

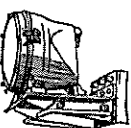
pacIKESaobarkH

pr. \$1.10

Full minute detail. Like above Number Boards, hollow for illumination. (How about that?) And not oversized either.

Headlights (All in two pieces for full detail and stands)

MARS LIGHT



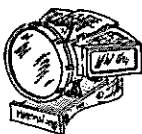
#86.1

b

1.00

These lights were used on the very latest engines, as warning lights, in addition to, and above regular Headlight. (Our coding may be incomplete, as their use was rather scattered thru many series and modernized engines.

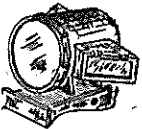
HEADLIGHT Pyle National



Minutely detailed and hollow for illumination of Side Boards even. Also used on some Modern Runners. Viscors easily soldered on. All these Headlights are little jewels.

#86.3 SterHUd \$1.15

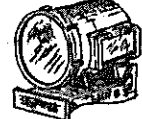
HEADLIGHT Sunbeam #4414 & 2618



Hollow for illumination of Number Boards. Used on most USRA engines. Also used on back of many Tenders.

#86.7 68pacMIKEsok \$1.15

HEADLIGHT Sunbeam #4414-B



Hollow for illumination of even the Number Boards.

#86.8 \$1.15

WASHOUT PLUGS CLOSED TYPE



Used on the more modern engines. These give that realistic appearance.

#92.1 cborH \$1.40

WASHOUT PLUGS Open Type



Used on the older engines and much more popular, even on some later models. Shows the Plug in the center.

#92.2 68pacMIKEsokUD \$1.40

STEPS Boiler & Boiler Front



Boiler Front
#94.1



Boiler
All

Probably all engines have these, 2-4 on each side and 1-2 on the Boiler Front. They add that bit of realism. Set of 6 \$1.20

Engine Plates All photoengraved

LIMA Builder's Plate



#96.1 68pacMIKEsokUD \$1.20

For all Builder's Plates, usually one on each side just above the corner line and in line with the Smoke Stack and Steam Chest pipe.

BALDWIN Builder's Plate



#96.2 68pacMIKEsokUD \$1.20

Often more than one builder built some engines, as you will note in our codes the 0-8-0's were built by all three builder's. This was not too unusual.

AMERICAN Builder's Plate



#96.4 68pacMIKEsokUD \$1.20

Also known as Alco. Later when they built diesels they went by Alco.

OWNER'S PLATE



#96.4 All \$1.20

These are usually located just above the Builder's Plate. Some times located on rear of the Frame and other places.

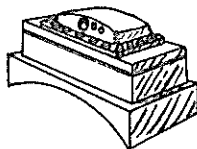
SUPER HEATER PLATE



#96.5 \$1.20

Generally recognized by the bump in the middle of the plate. Located just above the Driver's Plate on the right side only.

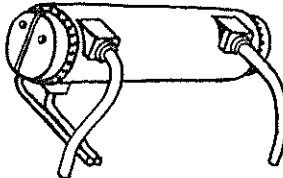
FEEDWATER HEATER Worthington Type S



#100.1 berHD \$1.10

These were used on the more modern engines to the end of steam. See #140.1 for the matching Pump.

FEEDWATER HEATER Elanco



#100.3 cKES \$1.65

These Heaters will really give and dress up your engine, giving them that robust powerful look. More detail than shown here. For the matching Pump see #144.2.

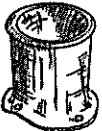
SMOKE STACK Modern & Semi-Modern



#102.1 2'2" dia., 1'6" hi. 68pacMIKEsokUD \$1.85

Used on some USRA's right on to modern times. Also used on modern engines.

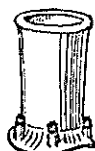
SMOKE STACK Semi-Modern



#102.3 2' dia., 2'1 1/2" hi. 68pacMIKEsokUD \$1.85

USRA and older engines. Tall style.

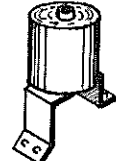
SMOKE STACK Pre USRA (WWI)



#102.4 \$1.85

This was a popular Stack in this era.

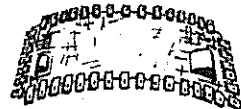
MILLER MUFFLER



#104.1 berH \$1.80

Full detail and stand. On Boiler just to the right or left of the Smoke Stack.

SUPERHEATER DOOR

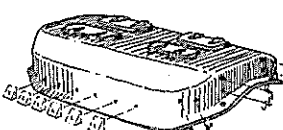


#106.1 6' wide, 2'10" long 68pacMIKEsokUD \$1.10

Full clamp details. On many modern engines. Located on the Smoke Box just forward of the Boiler.

Sand Domes All have nuts around the base, holes for Sanders or Sander Blocks and starter holes for Grab Irons #175.1

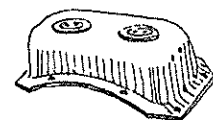
MODERN, RECTANGULAR



#108.1 9' long, 7' av. width 9 1/2" hi. berH \$2.75

With Hatches, Hatch Handles, Hinges and slightly narrower at one end. The top corners can be filled more rounded for some engines, such as many C&O engines.

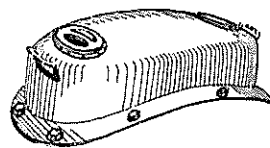
USRA 0-8-0 Switcher



#108.2 3' long, 5' wide, 1'4" hi. 8 \$1.80

Used on almost all 0-8-0 Switchers, besides the USRA. Other engines used two of them also.

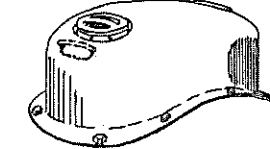
USRA HEAVY TYPE



#108.5 4' long, 6'2" wide, 11" hi. 68pacMIKEsokUD \$2.50

With Hatches, their hand holds, their Rivets. For all USRA Heavys and some Northern Very popular with great many others. Many other heavy engines used them with such more rounded corners that you would not ordinarily recognize.

USRA LIGHT TYPE



#108.6 4' long, 4'10" wide, 1'6" hi. 68pacMIKEsokUD \$2.50

All same as above but, for Lights. Done more rounded, not as wide and taller. Some engines used 2 of these. As with all Domes, holes cast for Sanders or Sander Blocks.

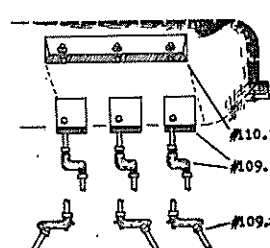
PRE-USRA



#108.7 2'6" high, 2'7" diameter \$1.50

Used on the pre-WWI engines, popular on Consolidations and others. Used with #112.7 Steam Dome, and smaller than the Steam Dome.

SANDERS (N.Y. AIR BRAKE) & SQUARE SANDER BLOCKS



#109.1 br pr. 35 doz. \$1.75

Mounting pins on the back. On modern engines. Often #109.2 Sanders used in these Sander Blocks. Start-holes in the Sanders.

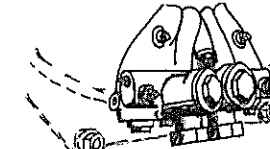
SANDERS (BREWSTER TYPE A or GRAM WHITE TYPE C)

Pictured above

#109.2 cSerk pr. 35 doz. \$1.75

Quite popular on modern and semi-modern engines. Often used with #110.1, #109.1 & #110.2. Were used on some up dated Heavy Mikes.

SANDERS 2 In 1



#109.3 pamo pr. 25

Was popular in the USRA era. Pins in the back to go into cast holes in Sand Domes and starter holes in the front for Piping

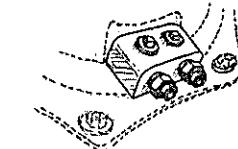
SANDER BLOCKS 3 in 1

Pictured above

#110.1 2'8" long Sek pr. 80

Pins in the back for mounting in cast holes in Sand Domes. Starter holes for Sanders. These were used mostly on the more modern engines.

SANDER BLOCKS



#110.2 8 1/2" long cMIS pr. 65

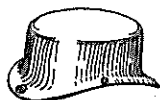
Pin on the back for mounting holes in the Sand Dome and starter holes for Piping. Used on many Mikes and others. Sometimes Sanders were not used with these.

Steam Domes

MODERN & SEMI-MODERN

(LIGHT)

Probably the most popular size.
3'3" dia. x 1'2" high,
above Boiler.



#112.1

8pcMKESmberKH

\$1.00

SEMI-MODERN

(HEAVY USRA's)

3'4" dia. x 10" above
Boiler.



#112.2

a1o

\$1.00

PRE USRA (WWI)



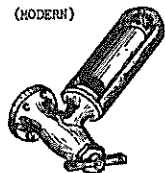
Some engines, such as
Consolidations, used
#108.7 with this. Some
engines, old ones, used
this dome as a Sand
Dome and #108.7 as a
Steam Dome.

#112.7 3'1" dia. 3'6" hi Consolidation

\$2.10

WHISTLE

(MODERN)



Fully detailed two piece
Whistle, so it can be
mounted in any manner.

#114.1

SberKH

.75

WHISTLE

(OLDER STYLE)



Its use was probably
discontinued about the
end of the USRA era.

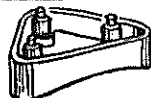
#114.2

pachIKEmo

.75

Pop Valves

TRIANGULAR, 3 UNIT



Used on more modern
engines.

#116.1

ber

.25

RECTANGULAR, # 3 UNIT



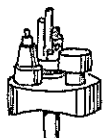
Used on both modern and
semi-modern engines.
Probably most popular
after the USRA era.

#116.2

KEK

.75

POP VALVE WHISTLE COMBINATION



These were used on
the older engines be-
fore the USRA era,
(WWI). Well detailed
part.

#116.5

Consol.

.80

UNITS ONLY



It appears single units
were used, without hous-
ing, up to just after
the USRA era. Usually
2 or 3 units.

#116.6

8pacHISmoH

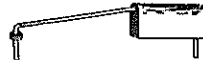
Pr.

.55

LOWER WATER ALARM CASING

(NATHAN)

Used on latter model
engines.



#118.1

cSber

.85

BLOW OFF MUFFLER

(OKADEE)

Also used on more modern
engines.



#120.1

borH

.40

TURBOGENERATOR

(PYIE NATIONAL)

This is the item that
furnishes electricity
for Headlights etc. Some
few engines had two of
them. This style used
on more modern engines.
You will hardly believe
the tiny detailing.



#122.1

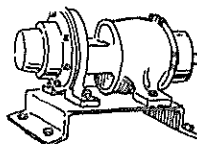
8NESmberHOD

.85

Turbogenerator

(SUNBEAM)

This or above on prac-
tically all engines.
This one generally on
the older ones.



#122.2

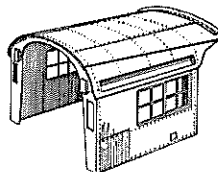
6pacIKok

.85

Cabs

(Cab fronts are a bit small for smaller engines)

LARGE, MODERN, RIVETED CAB



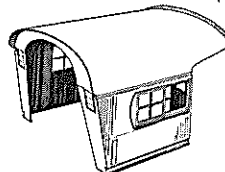
This is a very popular
Cab. All lost-wax cast,
including roof, window
beading, rivets, slotted
flat head screws, and
Grab Iron well above
the cast windows. Has
corner assembly lugs
with holes to solder
wire pins or tap for
00-90 screws. Rivets
can be filled off for
many welded Cabs.

#124.1 7'4" long x 10'8" wide x 8' hi. borD

\$7.00

LARGE, MODERN, WELDED, SLOPE FRONT CAB

For very modern engines.
Construction as above.

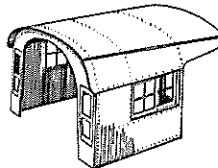


#124.2 7'6" long x 10'10" wide x 8'5" hi. H

\$7.00

MEDIUM SIZE USRA TYPE CAB

Used on all USRA engi-
nes. This and #124.1
seem to be the most pop-
ular Cabs.

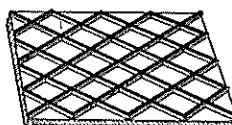


8pacHISmberHOD

#124.5 6'6" long x 10' wide x 7'8" high

\$7.00

CAB FLOOR Sunken Square



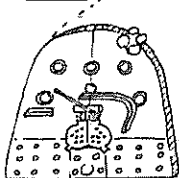
On most Cabs the
floor generally
extends past the
sides, front and
back 2"-3". Much
smaller squares
than drawing
indicates

#125.1 .020"x 3 1/2"x 2"

All

.75

BACKHEAD



Now you can add that last touch of real-
ism with this Backhead in the back of,
and flush with the back of the Boiler,
in the Cab, if you have clearance from
the motor. Made slightly smaller than
the largest Boiler, with angles that can
be soldered to any larger Boiler, or
diameter ground down to any smaller Boi-
ler size, which is not at all critical.
Paint the instruments black or white and
make some marks for numerals, then coat
with clear glue or epoxy--to look like
glass.

#125.2

all

\$4.25

TURRET

Covered Type.

This is actually Turret cover. Actual Turret below. These were used after the USRA era and below Turrets. So is the modern type. Located on top of Boiler, up against the Cab front.

#126.1

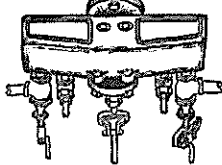
berH

\$1.20

TURRET

OPEN TYPE

Used on the USRA era engines. A Great deal of eye catching detail. This and above Turret located on the Boiler very close to the Roof of the Cab. Valves forward and above Turret, narrow end forward.



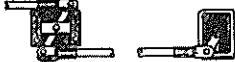
#126.4

68paMIKSmok*

.80

THROTTLE ROD LEVERS

On many engines after the USRA era. Gives nice detailing. Holes cast in the levers to take .020" piano wire between them.



#128.1

berHUD

.20

NOTE: Some parts we have noted were used during the USRA era, if you are modeling that era. For more modern engines, you can use more modern parts on USRA engines, as this is what was done to modernize USRA engines, part by part. Such as using Commonwealth Delta Trailing Trucks #65.7 & 8, 2 Compressors on the Beam-Deck #45.2, etc., etc.

CHECK VALVE

Nathan

Words fail to describe its full fine detail. A real eye catcher on each side of the Boiler. Cast in hole for the Piping.



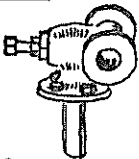
#130.1

68pacMIESoberkHUD

pr. \$1.00

CHECK VALVE

These were used on earlier engines than above #130.1. Were used as above on each side, or one on top of the Boiler. Hole cast all way thru for right-left installation.



#130.3

Consoll. *

pr. \$1.00

INSPECTION DOOR

Located on each side of the Smoke Box, close to the Boiler, about 10" above the center line (CL). Used in the semi-modern, USRA era. Of course these engines were used right up to the end of steam, some being modernized from none to a great deal.



#132.1

68pacMIKSmok

pr. .70

HANDRAIL POSTS

Cast in true shape. Plenty strong when Handrail is soldered in. Prototypically all Handrail Posts are not all the same length because of the Boiler contour.



#134.1

2-5 1/2", 6-8 1/2", 8-10 1/2" 8pacMIKSmoberkHUD*16\$1.85

HANDRAIL POSTS

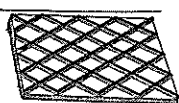
Same as above except more straight for straight Boilers, such as Consolidations, Vanderbilt Tenders and Diesels.

#134.2

12-8", 6-6" 18 \$1.85

RUNNING BOARDS

Uniken Square. All Photoengraved. Almost all engines need 2 tapered and one straight Boards. Tapered along Boiler and straight along the Smoke Box. Engines with straight Boilers of course use straight ones and Vanderbilts.



#136.1

Tapered .020"x 1/4"x 7 1/2" ea. .45

#136.2

Straight .020"x 5/16"x 7 1/2" ea. .45

RUNNING BOARD

Wood Engraved Brass. These are used on Vanderbilt Tender Foot Boards. Can be used anywhere wood boards are needed, such as a Foot



Reservoir Tanks

(With bands and holes for Piping) Less Studs

ROUND ON ONE END, CRIMPED ON OTHER END



#138.3

18 1/2" dia., 72" long b*

\$1.15

#138.4

18 1/2" dia., 108" long b*

\$1.15

CRIMPED ON BOTH ENDS



#138.5

18 1/2" dia., 24" long Consol.*

\$1.15

#138.6

18 1/2" dia., 72" long MIKSe*

\$1.15

#138.7

18 1/2" dia., 92" long k*

\$1.15

#138.8

18 1/2" dia., 108" long e*

\$1.15

#138.9

18 1/2" dia., 114" long D*

\$1.15

#138.11

18 1/2" dia., 120" long EJ*

\$1.15

#138.14

18 1/2" dia., 160" long k*

\$1.15

#138.18

20 1/2" dia., 66" long mo*

\$1.15

#138.21

20 1/2" dia., 84" long mol*

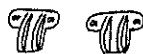
\$1.15

#138.23

20 1/2" dia., 100" long 8pac*

\$1.15

RESERVOIR TANK STUDS



#138.30

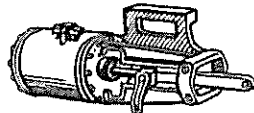
Starting with the USRA era to the end of steam these Studs were used on almost all Reservoir Tanks except those few in which the Tanks were not nestled up close to the Running Boards. On some, only the nuts show above the Running Board. Many plans do not show them, but never the less were used.

68pacMIsoberkHUD pr. .55

POWER REVERSE CYLINDER

Alco H

Almost indistinguishable from G type. Most popular type. Unbelievably super detailed.



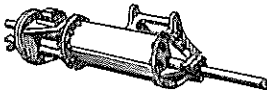
#142.1

68pacHSmorI

\$1.50

POWER REVERSE CYLINDER

Franklin F-2 Next in popularity to the above Alco. Unbelievable detail. Round and fork-rod included. It is parts like this that has made building engines popular, as all modeling.



#142.2

aKEberkHD

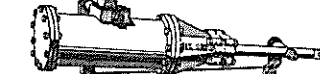
\$1.50

The following can be made by altering the Franklin F-2. Note rear section is removed, the square block there removed and soldered on top of other type Reverse Cylinders. Levers made and fitted according to picture.

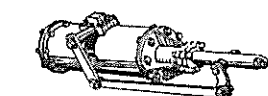
Franklin F-3 Ip



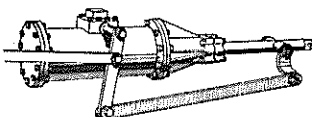
Alco K



Alco L

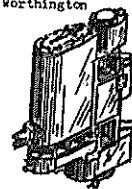


Baldwin T



BL PUMP

Worthington

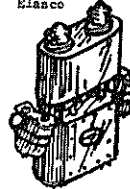


#144.1

\$1.65

WATER PUMP

Elaeco



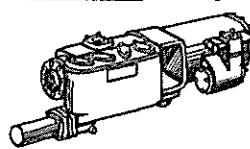
#144.2

cSk

\$1.50

HOT WATER PUMP

Worthington



#144.3

berH

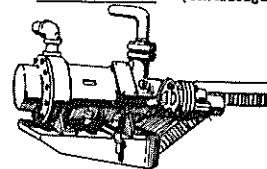
\$1.40

CROSS COMPOUND AIR PUMPS

See #45's

COLD WATER PUMP

(Centrifugal Pump)



You will not believe the detail of nuts, rivets and prototype intricate contour until you see it. Normally attached to the Frame, but for modeling, solder or epoxy to front top of #65.1 or .2 Truck, left side, with Piping running back along the Truck to near the Tender. A real eye catcher.

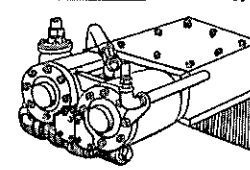
#144.6

berHUD

\$1.50

STOKER ENGINE

Double type



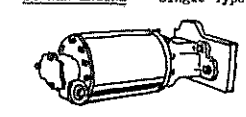
#148.1

cbeU

\$1.20

STOKER ENGINE

Single Type



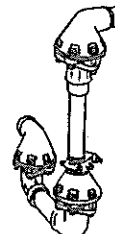
#148.2

paMIKSmok

.90

BOOSTER ENGINE PIPES

Beautiful detail that will really make an engine stand out. On all engines that had Booster Engines in their 2 or 4 wheel Trailing Trucks. Booster Engine #70.1. Used after the USRA era until the end of steam.



#152.1

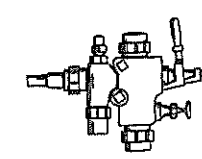
KEberkHUD

pr.

\$1.60

INJECTOR

Lifting Type



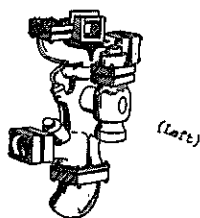
#154.1

8

.90

Used on engines before USRA(WVI) era. Usually one on left side, just in front of the Cab. Some times one in the Cab, sometimes 2 on an engine. Some C-8-0's had them and some did not.

INJECTOR NON-LIFTING TYPE



Used on semi-modern and modern engines, below cab, right side. Super detailed fittings and contours you will have to see. Some engines had them on both sides, a right and left.

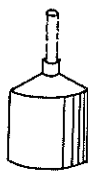
#154.2 68MIKESmoberkHD pa Right .95
#154.3 68MIKESmoberkHD pa Left .95

OVERFLOW FUNNEL

New Style
Pyramidal



#156.1
#156.2



#156.2

That added detail on the right side, behind rear driver. Can be used on Non-Lifting Injectors too.

Old Style
Cylindrical

ea. .35
#156.2 .35

Small Hardware Add these as desired for "Super Detailing"

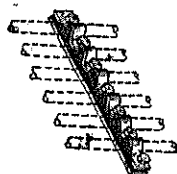
PIPING

Piping and Cooling Coils gives realism to your engine. Cooling Coils are bent made from .020" brass rod, or better but a bit more difficult to bend, piano wire. The following are soft brass for piping and generally will hold their shape from handling as they lay close to the Boiler. 2" and larger will hold their shape. 3" and larger will even hold parts in place, such as injectors. Even 2" for Over Flow Funnels.

#160.1 1", 2" or 3" in a 2 foot coil of soft brass .25
#160.2 5" in a 1 foot coil of soft brass .35

COOLING COIL PIPE CLAMPS

(Or cut up for single Pipe Clamps)



#162.1

68pacMIKESmark* ea. .45

Used on a great many engines for either Cooling (Condenser) Coils, or hold other parallel pipes. Each piece has 4-1" and 2-3" holes. Can be cut to single Pipe Clamps to fasten Piping to Boiler and other parts.

1" & 2" ANGLE & GLOBE VALVES



#164.1 Cluster of 2 Globe & 1 Angle per size. All* 6- \$1.00

Used on all engines. Very finely detailed in exact duplication. With starter holes for piping. The best and cheapest in any gauge. All gauges can use these.

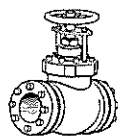
3" GLOBE VALVES

Even more detail than above. Starter holes to assist drilling deeper.

#164.2

All* ea. .40

4" TENDER GLOBE VALVE

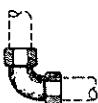


#164.6

All* ea. .55

Would you believe more detail than our 3" Valve, a real jewel. Cast with a hole thru it that you could put a round shoe string thru between engine and Tender, that is detail, really, next to having steam. Also large water valve. Valves of Pipes that comes out of the ground and back into the ground around industry. Many of these and 3" valves around refineries. Also could be glued over flexible wire to the tender as a water pipe.

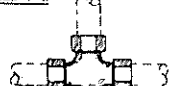
PIPE ELBOWS



#165.1 1" or #165.2 2" or #165.3 3" set of 4 \$1.65

Cast with starter holes for easier drilling deeper. For that minute detail you insist on, that your friend's engines do not have.

PIPE TEES 1"



#166.1 1" or #166.2 2" or #166.3 3" set of 4 \$1.85

Cast with cored holes. For minute detail you insist on, that your friend's engines do not have.

PIPE JOINTS



#167.1 1" or #167.2 2" or #167.3 3" set of 4 \$1.65

Cast with cored holes. For the minute details you insist on, that your friend's engines do not have.

GRAB IRONS



#175.1



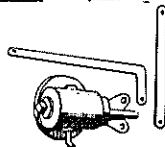
All*

Castings (with rivets on either side) for that "real" look on Sand Domes, Boilers etc. Pins on bottom to solder in holes. Small but sturdy.

pr. .35

BLOW OFF COCKS

(WILSON NCAB)



#178.4

berUD

That small super detailing that stands out and makes the difference on an otherwise bare Fire Box. One to four on each side. Mounting pin on the back. Extra handle included for varying installations.

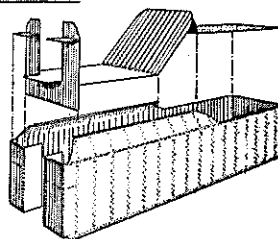
set .50

Tender Parts

(All these you should have "Parts Instruction Booklet" #260.1)

Tender Wrappers

MODERN STYLE



#200.1 40 1/4" long, 10 1/8" wide SberH

\$10.00

Beautiful die stamped one piece, pre-bent, shall. Rivets of actual size. Includes Coal Chute, false bottom and die stamped riveted Deck. This and USRA Tender probably the most popular two. With the below details you will have the best looking Tender going. For complete kit, see Berkshire Tender section. Use #211.1 Frame.

SAME

But seconds. Some do not have bottom row of rivets (as on some tenders) or other repairable flaw, such as small dent or small area of shallow rivets that can be punched back.

#200.2

\$6.00

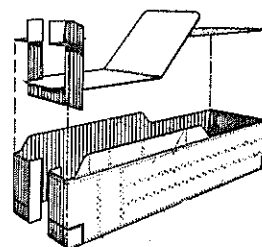
Same AS #200.1 But 4 sides cut in 2 pieces, so they can be cut down for shorter tenders, or spliced together for larger tenders. (Perfect stampings.)

#200.3

\$3.50

USRA TYPE

For Large Engines, Mikes, Pacifics and larger



#200.5 29 1/6" long, 10 1/4" wide paMIKESmark*

\$10.00

Used on most USRA engines. Die stamped prototype size rivets. Four sides pre-bent in one piece. Includes Coal Chute, false bottom, and die stamped riveted Deck. As with #200.1, when below details are added, you will have a fully detailed prototype in miniature. This is one of the most popular tenders. For complete kit, see USRA Tender section. Use #211.4 Frame.

SAME

But seconds. Same as #200.2 for description and uses.

#200.6

\$6.00

SAME AS #200.5

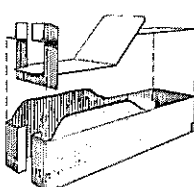
But 4 sides cut in 2 pieces for other tender uses

#200.7

\$3.50

USRA TYPE

For Small Engines, Consolidations, O-B-O, O-6-O

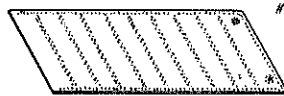


#200.8 25 1/6" long, 10 1/2" wide 68Connol.

\$14.00

As with the large USRA tenders above that were used on many engines that were not USRA, and were used on to the end of steam. These also were on a great many besides these noted, and on to the end of steam. Includes Coal Chute, false bottom material and die stamped Deck. This is a beautifully photographed wrapper. As with above, with below parts you will have a prototype in miniature. This the most popular of the small tenders. For complete tender kit see Consolidation Tender section. Use #211.6 Frame.

TENDER DECK (Top) (Or Oil Deck for Vanderbilt Tender)



#209.1

All*

From #200.1, #200.5 & #200.8 Tenders or for other uses where you need prototype rivets. Used on all Tenders. These are die stamped. Can be fitted over other decks.

\$1.50

Tender Frames

MODERN

For #200.1 Wrapper Good sand casting for rigidity, needed weight for electrical pick-up and made of brass for easy working of prototypes. Contoured underframe, Coupler and Draw Bar Pockets drilled and tapped, and milled to take wrapper prototypically. Little to no filing needed as prototype was also rough cast, therefore not smooth.

#211.1

10"8" wide, 42"8" long over Sills SberH \$10.00

#211.2

Same, not milled, drilled or tapped \$9.25

USRA HEAVY TYPE

Commonwealth Cast Open Frame Bottom view. Fine sand casting, so little to no filing needed as the prototype was rough sand cast. A little light, 2-4 oz. could be added. As above, drilled and tapped for Draw Bar and Trucks.

#211.4

8"8" wide, 30"11" long over Sills panMIKEmok \$7.00

#211.5

Same not drilled and tapped. \$6.50

USRA LIGHT TYPE

Commonwealth Cast Open Frame Bottom view. Cast as above Frame, but shorter. Also needs about 2-4 oz. added weight. Drilled & tapped for Trucks & Draw Bar. Use with #200.8 wrapper, for small engines

#211.6

9" wide, 27"4" long over Sills 68Consol. \$7.00

#211.7

Same not drilled and tapped \$6.50

TENDER END SILL, FRONT

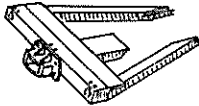


From Vanderbilt Tender. Probably could be used on some cars, especially Tank Cars, possibly logging. Tapped for Draw Bar, 2-56.

#211.8

\$1.75

TENDER END SILL, REAR



From Vanderbilt Tender Same uses as above, except if used for cars, such as Tank Cars, two of these instead of one above.

#211.9

\$1.60

TANK SADDLE, SMALL

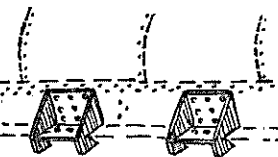


From Vanderbilt Tender These set on the Tender's 'Z' Frame, at bottom and supports the Tank in the large upper portion. Some were used on Tank Cars.

#211.10

ea. .55

TANK SADDLE, LARGE

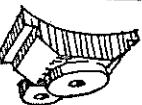


From Vanderbilt Tender Same as above.

#211.11

ea. .55

TENDER & CAR BOLSTER



From Vanderbilt Tender Can be filed, ground or machined thinner. In Vanderbilt Tender it sets on top of the 'Z' beam, soldered there, to take the Trucks. Drilled and tapped 2-56.

#212.1

pr. \$1.75

BOLSTER SCREWS

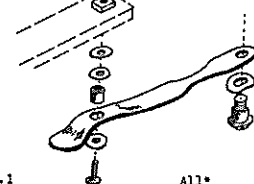


#213.1

For all Our Trucks Shouldered with steel sleeves .105" diameter and .075" long on 2-56 steel screws. For screwing all our Trucks to metal Frames.

pr. .90

DRAW BAR KIT

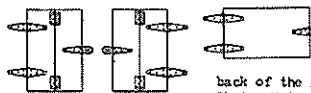


#214.1

All*

\$1.10

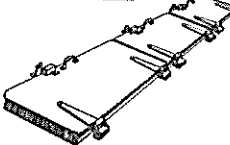
BUNKER DOORS



#216.1

Usually 2 in front of the Bunker at the Cab and one, the short one at back of the Bunker at Coal Chute. Note hinge and rivets SberH set \$1.20

TENDER HATCHES



#217.1 Each 4' x 1'8"

SberH set 3 \$1.60

TENDER HATCH

USRA Type



#217.2 3'6" x 1'6" x 1' hi

Used on all USRA engine's Tenders. Ends very rounded. Grab Iron cast on. Nice.

panMIKEmokUD* .90

REAR LIGHT

Recessed (Modern) Type

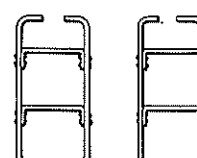


#220.1

SberHUD .60

TENDER STEPS

Strap Metal Type



#222.1 1'1" wide, 2'3" hi

Full detail of bent strap metal and Rivets as shown. On rear of practically all Tenders, and in front also of some. For shorter Steps cut off top portion. Be - fore or after cutting, top can be bent to another shape. Quite strong when a prototypical brace about 3/64" wide is soldered to bottom of Step to Frame.

SpacMIKESaoberkHUD pr. .65

TENDER STEPS

USRA Cast Type



#222.2

68pacMIKEmokUD* pr. .90

Ladders Full details of Rivets, round Rungs thru side of Ladder

LONG, SINGLE TOP RAIL



#224.2

SberH* \$1.10

MEDIUM, SINGLE TOP RAIL

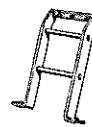
Pictured above

#224.2

68pacMIKEmokUD* \$1.10

Used on larger more modern Tenders. 6'8" between top of Tender and bottom rivets of Ladder. Could be used as regular carpenter's rung Ladder, or a couple soldered together for an extension Ladder around residences, or your industries and railroad buildings---as they are being painted??

BUNKER "HUNG" LADDER

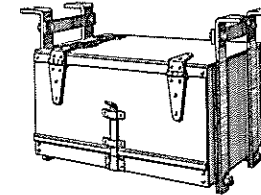


#225.1 2'4" high, 1'4" wide All*

Full detail as above.

.25

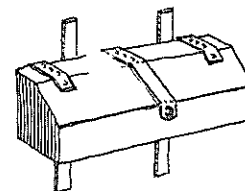
TOOL CHEST



#227.1 2'4" wide, 1'6" hi cSberH*

.80

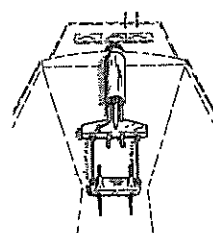
TOOL CHEST From Vanderbilt Tender



#227.2 6' wide, 1'4" hi, 1'2" deep \$1.00

Straps on it to mount on Vanderbilt Tender. Other uses such as Tool Chests in front of railroad buildings, such as passenger station tower or supervisors building where they want tools handy, of course straps removed.

COAL PUSHER



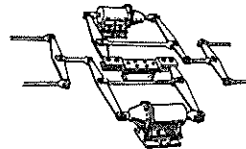
#229.1

68p

These were used on certain roads on older Tenders, and some Switchers.

Brake Systems You should have #260.1 "Parts Instruction Booklet" for these

FOR 12 WHEEL TENDERS



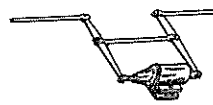
#231.1

SberHUD

For those who want the ultimate in detail. Two Cylinders 10 Rods and hanger. Used mostly on the newer, larger Tenders

10 pcs. \$3.20

FOR 8 WHEEL TENDERS



#231.2

68pacMIKEmok

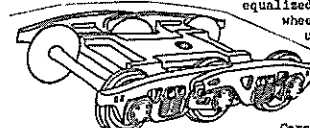
Most popular. Used on all USRA 8 wheeled Tenders and most other 8 wheel Tenders, as well as some old 12 wheeled Tenders.

5 pcs. \$1.85

Tender Trucks (All less wheels) All use #212.1

Bolster Screws. You should have "Parts Instruction Booklet" #260.1 for these.

BUCKEYE 6 WHEEL



#234.1

Roller Bearings Hr

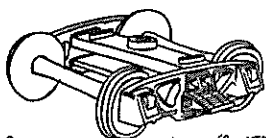
#234.2

Plain Bearings* be

Well detailed, sprung and equalized. Used 33" or 36" wheels, one side pick up. Very smooth operating. Also used on 125' ton flat and depressed-center Flat Cars. 4 pairs used on 250 ton depressed center Flat Cars. Very nice Truck, well detailed.

pr. \$10.00

4 WHEEL AXIEMES (LEAF SPRING)



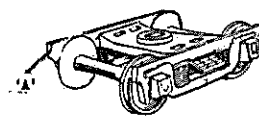
#234.3

68paNKK

\$2.90

Sprung and equalized. Used on many USRA's as well as a great many others. Very popular. One side pick-up wheels, of usually 33". See #240 and #241. (Less wheels.) Used on many cabooses.

4 WHEEL COMMONWEALTH DROP-EQUALIZER TYPE



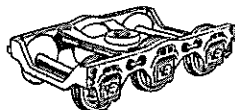
#234.4

Ex

\$8.20

Beautiful, sprung and equalized. Some passenger, reefer and Mail Cars used these. If extension of about 1' soldered or epoxied at 'A' can be used on many passenger cars.

6 WHEEL COMMONWEALTH CAST STEEL



#234.5

Roller Journals UD
Plain Journals CS

UD

CS

This is a beautiful Truck, used on N.Y.C. Hudson J3-A with Roller Journals. Earlier models used Plain Journals. Used on 200,000 ton Wrecking Crane, also heavy duty depressed Flat Cars. Has 12 sprung Journals. Very popular Tender Truck. (Plain Journals have opening lids)

\$10.00

11.00

TRUCK BRAKES



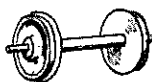
#234.12

pr. .60

Made for #234.5 & .6's Brake fittings. 6 pairs needed, one on each side of Wheel. Can be used on other Trucks. Some Trucks have Brakes only on inside next to Wheel, others on outside of Wheels, others on both sides of wheels. These add a lot of detail to a Truck

Wheel Sets

Scale flanges only, NWSA Standards, RP-25 Contour



We try to get steel wheel sets for those that like the metallic dull clicking thru turnouts and rail joints, that sound prototypical. We cannot always get them as the manufacturers do not want to make them. When ordering them, give an alternate. The nickel silver gives much better pick-up than steel and brass, as they oxidize very little. Possibly steel is next best, if you are not in humid area or humid lay out, as its oxide, rust, does conduct electricity, and rust quickly wears off. Oxides of brass does not conduct electricity well and it also picks up oil to mix with the oxide. Brass is most popular.

33" For Freight Cars, Most Tenders and Pilot Trucks

#240.1	Steel, one side pick-up	ea. .85
#240.2	Brass, " " " "	ea. .85
#240.3	Brass, " " " "	ea. .85
**#240.6	Brass or Steel, what ever in stock,	ea. .85
36" For Passenger cars, Some Pilot Trucks & Tenders		
#241.1	Steel, one side pick-up	ea. .85
#241.2	Brass, both side pick-up	ea. .85
#241.3	Brass, one side pick-up	ea. .85
#241.4	Nickel silver, one side pick-up	ea. .85
#241.5	" " two " " "	ea. \$1.05
**#241.6	Brass or steel, what ever in stock	ea. .85

NOTE: On both side pick-up, axle is insulated on the center so there is not a short between wheels. These are the best for our #400 Passenger Trucks or others with insulated Bolster. When ordering nickel silver, give an alternate, in case they are sold out.

** Wheel sets without stiffener (on axle) and Spindles for Inside Bearing Pilot Trucks #241's. 1/16" axle, one side pick-up.

TRAILING TRUCK WHEEL SETS

All One Side Pick-Up. NWSA RP-25



#243.3

#243.4

#243.5

#243.6

43"-45" Spoke
51" Disc

MIKESpmoberkHD
Ua

ea. \$2.75
ea. \$1.25

These are available without axle stiffener for special purposes, such as for use with Booster Engines, upon request.

Note

Parts Installation Booklet

Individual instructions will not be sent for any parts, Trucks, Boilers, Valve Gears, Tenders etc. Future new parts instructions sent with order. This booklet will save you money in a short time, as cost is borne by this booklet (not added to parts cost), saves us tremendous instruction looking up time, and your instructions are

all together by part numbers, not a hundred loose ones, or extra cost of packaging each part with instructions, and that printing cost. So for the first part ordered this booklet "IS A MUST". This booklet would be particularly useful for the novice to read and determine if he could build an engine. Do not allow the length of the booklet to confuse your ability tho. Even to the non-expert it would be useful, giving step by step instruction. It also gives dimensions of pins cast on parts and size of drill to tap these assembly pins into Boiler, as they do not fall off when soldering near by. These instructions are included in engine kits and "Basic Running Gear" section only, along with engine plans and "Kit Booklet". So if you order only other sections, such as "Boiler Parts" or "Tender Section", order this booklet, it gives you step by step assembly

#260.1

\$1.00

TWO BACKS TO THIS CATALOG To hang each side over your work bench.

If not also ordering catalog or Instruction Booklets, or #260.2 plans, add for postage and large mailing envelope. 45 .40

ENGINE PLANS Engine only, Tender in #260.1 above booklet.

2-8-4 Berkshire--NKP, C&O and Perre Marquette on one plan

2-8-2 Mikas--USRA Heavy Mike or Light Mike

4-6-2 Pacifics--USRA Heavy Pacific or Light Pacific

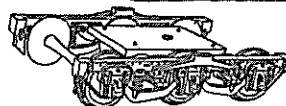
For postage and large envelope add .45, unless it has been added for #260.2 above, or catalog or #260.1 has been ordered.

#276.1

add .45 ea. .45

Passenger Car Equipment

COMMONWEALTH (PULLMAN STANDARD) 6 WHEEL TRUCKS



Very good sprung and equalized Trucks, with rigid insulated fibre Bolster to prevent skew and use all wheel pick-up to prevent light flicker. These Trucks were chosen for use on last of light cars, or file off side frame rivets and remove end braces at the Brake Shoes for use as cast steel Trucks, as used on heavy cars,--right on up to modern cars. So it is an extremely versatile Truck, with every nut and rivet detail. (Let us know if you want to use both side Pick-up, using our #241.2 wheel sets, we will include flexible wire.) You will have to see this Truck in operation to appreciate it's beauty and extreme smooth operation, gliding over the rails. (Less Wheels, One or both side pick-up. See #241's for choices.) Below are the weight of cars to use with Trucks that are available

#400.1 7-16 oz. #400.2 16-22 oz. #400.3 22-50 oz. pr. \$8.50

Miscellaneous Equipment

Springs



Sprung Trucks are no better than rigid ones if the spring tension is not matched to the vehicle's weight. Usually they are too stiff. Now various springs are available to match up the weight of your car, Engine or Tender, (or other uses). Just divide the weight of the vehicle by the number of its springs to find the ounces per spring. Use next lighter spring from below tables, to provide normal compression. The choice is not critical but if in doubt, use a lighter spring, as the spring can be stretched, and it takes proportionally more weight to compress past the normal compression.

Check your rolling stock by lifting one end off the rail, then set slowly back on the rail. The springs should barely, but noticeably compress. If they do not compress, they are too stiff, so you do not have a sprung Truck, but have a rigid frame Truck, unless equalized by looseness of Truck parts, which is not as efficient or look as well going thru switches and over uneven rail.

These springs were designed for those who insist on more prototypical appearance, by using larger wire size and closer coils than heretofore available. Try them out, and keep some on hand.

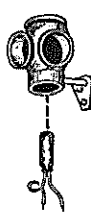
FREIGHT, TENDER & ENGINE TRUCKS (5" diameter, 10" high)

(Interchangeable with Kingsman springs)			
#500.3	.5 oz.,	#500.4	2.5 oz.,
#500.6	7 oz.,	#500.7	4 oz.,
			doz. .40

PASSENGER CARS, TENDERS & ENGINE FRAMES (8" diameter, 12" high)

#500.14	2 oz.,	#500.15	2.7 oz.,	#500.16	4.4 oz.,
#500.17		#500.18		#500.19	
#500.21		#500.22			doz. .40

MICRO-MINATURE RULES (1 1/2 Volt)



#605.1 .052" dia., .150" long

These use so little current they were used in wrist watches, so are ideally suited for constant lighting. They have a lens at the tip for headlights or shine down on tables, street lights, Signal or Switch Lights or on the side for Marker, Caboose or Number Boards. Can you believe this, and also a smaller diameter than our old bulbs? Smallest bulbs you have ever seen. No insulation at the base, so less chance of breaking off while installing, like old bulbs. After installed, place small bead of epoxy on base wires coat the others well for insulation.

10 \$6.25 ea. .70

SOLDER IN PASTE In Squat Bottle



Solder and flux together in a thick liquid like honey, that indicates when melted by flux turning black. The black washes away with water. Squat bottle allows you to mix to desired thickness by taking thick solder settled to the bottom with liquid on the surface, using a pointed probe or wire to mix a drop on outside top of lid or other plastic, and close bottle so flux will not dry out. Of course the whole bottle could be mixed, but generally you will want a thick mix to fill cracks. Apply to parts with probe as only a very small amount is needed. Differently than other solders and fluxes, the brass can be quite discolored and still solder well, so little to no cleaning is necessary. With the use of a propane torch from the hardware store, or better yet a "Carbon Rod Resistance Soldering" outfit (see "General Engine Building Tips") soldering and engine building can be made easy and fun that you expect from building and no big blobs of solder as with a soldering iron. So this flux is a must, very little is used and if lid is kept on and tight will last a very long time, probably will not buy any more. We used one bottle for many patterns and 4 engines.

#612.1

2 oz. \$3.50

57 FIGURES WITH A PERSONALITY

Not straight stiff figures, but in various natural stances, standing walking and sitting. In exact 3 scale. Full clothing detail in unpainted lead, with small, less obvious bases than most other figures. Not difficult to paint, a lick and a promise is good enough, as they are viewed from too far to see intricate painting. They are fun to paint, paint all figures for each color then go on to the next color and paint all that takes that color. So any rank novice can paint them, with clothing outline lines cast on to make it easy. With this variety of stances, you can fit them to any need. They are of soft lead, so the arms and legs can be bent for variety or needs. Tools can be cut from hands of farmers for other uses, or notches can be cut in hands and tools made to fit in them for special workmen or trainmen. Stands can be cut off of feet and feet cemented to layout with a rubber base cement like God-year's "Pilebond" (from hardware store). It is not brittle and easy to pull them loose if you want relocate them. Use HO figures for children. Order whole set, group or each. For individuals, give part number and name.

WHOLE SET (ONE EACH) 57 Figures, -\$1.00, \$16.70

4 TRAINMEN \$1.20 Engineer #700.1 .30 Fireman #700.2 .30 Oil Can #700.3 .30 Porter #700.4 .30				12 WORKMEN \$3.60 Hands Over Head #700.8 .30 Hands-Shoulder #700.9 .30 Bent, Coveralls #700.10 .30			
 Bent Short Coat #700.11 .30 Drinking #700.12 .30 Sledge #700.13 .30 Shoveling #700.14 .30 Trip Hammer #700.15 .30 Man & Sack #700.16 .30				6 SITTING \$1.80 Sweeping #700.17 .30 Squatted #700.18 .30 Kneeling #700.19 .30 Sitting Man #700.25 (2) .30 Sitting Woman #700.26 .30 Old Man #700.27 .30 Boy #700.28 .30			
10 PEDESTRIANS \$3.00 Stump #700.29 .30 Short Coat & Cap #700.33 .30 Short Coat & Bareheaded #700.34 .30 Short Coat & Hat #700.35 .30 Walking Coveralls #700.36 .30 Standing #700.37 .30							
 Long Coat #700.38 .30 Satchel #700.39 .30 Coat-Arm #700.40 .30 Woman Walking #700.41 .30 Woman Standing #700.42 .30							

2 FARMERS \$2.10 (Put in fields along your track right of way) Hoe Up #700.45 .30 Hoe, Ground #700.46 .30 Syth #700.47 .30 Shepherd #700.48 .30 Man-Chicken #700.49 .30 Bucket-Hand #700.50 .30 Bucket-Arm #700.51 .30					
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11 ANIMALS \$3.90 Dog #700.54 .30 Horse #700.55 .60 Horse & Man #700.56 .60 Cow #700.57 .30			
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 Calf #700.58 .30 Sheep #700.59 .30 Hog Walking #700.60 .30 Hog Sitting #700.61 .30 Pig #700.62 .30 2 Geese #700.63 2-.30					
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2 EQUIPMENT \$2.10 Goat #700.64 .30 55 Gal. Drum #700.68 2-.30 Barrel #700.69 2-.30 2x2x3 Box #700.70 .30 3x3x3 Box #700.71 .30 Sacks (Fertilizer, Cement, Feed Etc.) #700.72 6-.30					
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 Mail Box #700.73 .30 Fire Plug #700.74 .30		File sacks and drums smooth, paint and add decals of Dupont, Gulf, gasoline, fertilizer, seed, sand etc., and attach on hooks or in flat cars. Animals in cattle cars, stock yards and in fields along trucks. Some of the farmers can be made into work-bys cutting off their tools, or adding other tools.
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Still More From Other Suppliers

THE FOLLOWING LISTINGS ARE ESPECIALLY INTERESTED IN HELPING AND ASSISTING YOU IN YOUR MODELING, SO HAVE PAID FOR THIS SPACE. THEREFORE, SO THEY KNOW IT HAS BEEN WORTH WHILE TO HELP YOU, LET THEM KNOW WHEN YOU WRITE THEM, YOU SAW THEIR AD HERE---IT IS MOST IMPORTANT AND WILL NOT COST YOU ANY MORE (MAYBE LESS). SEVERAL ADVERTISERS DID NOT REMIND THEIR ADS BECAUSE YOU DID NOT TELL THEM YOU SAW THEIR AD HERE. YOU HAVE NO REMOTE IDEA HOW MUCH WORK IT HAS BEEN GETTING THESE ADVERTISERS ON THIS LIST FOR YOU!!

LOCOMOTIVE KITS & LOST-WAX CASTINGS

- Complete line of all brass lost-wax castings, fittings, Boilers, Frames, Trucks, wheel sets, figures, 15 engine and 4 Tender kits, AF Hudson conversion to full scale, etc. This catalog at cost \$2.00
S Scale Locomotive & Supply--7120 Queen Dr., St. Louis, Mo. 63121 (314-383-4132)
- Locomotive Workshop specializes in short runs of kits in a number of scales, including S. Almost everything is metal, with the majority in brass. A variety of diesels: FA2, RS-1, E7, SW1200, 44 Tonner is available, along with other specialities. Send long self addressed, stamped envelope for current "Newsletter".
Locomotive Workshop--RFD 3, Box 211-Del, Englishtown, NJ 07726 (201-536-6873)
- Brass engravings and white metal castings of the GE U25B. White metal and brass castings for detailing the AF Baldwin switcher. Decal sets for diesel locomotives including BN, FL, & RI. Send a LSASE for current listings of available products.
G&W Models--115 Upland Road, Syracuse, NY 13207 (315-479-5879)
- An easy to build steam engine kit of die cast Dockside, Mogul, Switcher, Suburban or Pennsylvania conversion kit of Mogul or Switcher. Scale or Hi-rail blackened steel oxidized tires. (Hi-rail surcharge of \$5.00 per set.) Die cast low side Gondolas in Hi-rail, showing all rivet detail. For brochure, send long SASE to:
Rex "S" Gauge Models--90 Lucy Ln., Northfield, Ohio 44067 (216-467-5763)

FREIGHT CARS & PARTS

- After 10 years manufacturing HO and O scale rolling stock, we are producing rolling stock for the "S" scale modeler. We will have craftsman type kits featuring hardwood floor and roof, scribed wood sides and metal detail parts. "S" scale scratchbuilding parts and accessories. We purchased the original patterns and molds for the following parts from Stewart Products: metal castings for car ends, end sills, bolsters, reefer details etc., plus brass stampings for ladders, brake platforms, steps etc. Please send SASE for list to:
Yo Oldie Huff n Puff--PO Box 53, Dept S-1, Penn. Furnace, PA.16865 (814-692-8412)
- Freight cars, ACF Hoppers, eventually 1/64 vehicles. Decals and trestles.
DKS Scale Models--112 N. 3rd St., Rogers, Ark. 72756 (501-636-1428)

PASSENGER CARS & FREIGHT

- Heavy weight passenger cars and freight car kits. Also Bettendorf, Andrews, Fox, 8' Commonwealth passenger and interurban trucks. Over 100 freight, passenger and diesel parts. Track gages to NASC standards for code 70, 83, 100, and 125 rail. Send LSASE for listings to:
1/8" S71 Trainstuff--2 Roberts Rd., New Brunswick, NJ 08901 (201-545-9306)

COUPLERS, CAR VENTS, DECALS

8- Kadee couplers converted to S scale. MKD-4, 5, 6, 8. Kadee uncoupling ramps B-12, B-21 and #308. Truck, 4 wheel equalized for passenger and Express Reefers. Passenger roof vents, Box Globe and Carland. Decals, large assortment in stock, also decal catalogs. Send for brochure and price list 50¢.

Delaware Valley S Scale Supply--3377 Papermill Rd., Huntingdon Valley, Pa. 19006

TURNOUTS, RAIL & COMPONENTS

9- Standard items for "S" scale equipment; turnouts, point & frog assy's, crossings, slip switches, crossovers, in rail codes .100, and .125 nickel silver, steel or brass. Custom building for "S", Sn3, Sn2 and multigauge. Closed frog turnouts for scale/hirrail/AF wheelsets, in .100, .125, .148 and .172 adapted for AF or CarCraves track systems. Rail, joiners, ties, spikes, tie plates, switch machines, TURNOUT SWITCH POINT LINK for operating switch points by under layout operators, including electric, pneumatic, and manual. Send long SASE & ask for "S" gauge.

Earl R. Eshleman, 53-5 Maytown Ave., Elizabethtown, Pa. 17022

10- "S scale" Flex-Track--code 100 rail in brown Delrin ties realistically "grained" Sold in bundles of 6-3 ft. lengths only. Also many superdetailed locomotive & car fittings in "lost wax" brass, unequaled in amount of detail & fidelity to scale, mostly in Sn3. Send long SASE and 2 stamps for catalog to:

Tomalco--Box 158, McCracken, KS 67556

(913-394-2310)

11- .125 nickel silver(152-155#), .081(80-100#), .070(60-70#). TURNOUTS investment cast in MS. All nut-bolt detail and joiners cast on frogs; straps, rivets, bolts, transit clips cast on points. No filing of stock rails necessary. JOINERS investment cast MS and plastic, insulating and cement-on. RAIL BRACES cast in MS-Plastic tie plates, regular and turnout. RIGHT-O-WAY, first with accurately scaled rail....1963. Send long SASE for price list and data sheet to: (For "S" scale).

PO Box 25735, Los Angeles, CA 90025

ROADBED

12- S scale INSTANT ROADBED(AAR-30)is an uncured Butyl rubber that holds itself, the track and ballast in place without spikes or adhesive. Realistic and sound deadening. It comes in a 2" x 30 foot roll and is flexible and will bond to any track curvature. INSTANT ROADBED can be painted and scored to resemble brick or planking and also may be used as highway pavement. Tested and reviewed favorably by all model railroad magazines and there is enough INSTANT ROADBED in use to span the continent 8 times in S scale miles.(Sounds perfect) See INSTANT ROADBED at your Hobby Shop or send a LSASE to:

AMT, PO Box 11861, Clayton, Mo. 63105

(314-872-6146)

HANDHELD THROTTLE & SWITCH MACHINE BRACKETS

13- Up to 8 aaps., for all scales, automatic pulse power, one hand operation. Hand-held, never gets hot in your hand, 12' cord equipped with male and female cord connectors. \$49.95 (\$-81)

Rix Rax under layout mounting bracket for twin coil switch machines, works with Weston, KTM, MJ, Hallmark and others. Unique Pat. Pending design, completely adjustable. Comes with nuts, bolts, screws and throw rods, all you need is twin coil switch machine. For all scales. \$1.99(\$-81)

Rix Powerplus Products--5221 Hogue Rd., Evansville, IN 47712 (812-422-6810)

STRUCTURES

14- A quality line of highly detailed 3/16" scale models of various railroad structures--branchline station, 50,000 gal. watertank, 100 ton coaling station, gantry crane, croning gates, utility poles, caming company, track bumper, water column, etc. Northeastern wood parts, castings, easy to read printed instructions and full size drawings comprise LVM Kits. Send 25¢ for illustrated brochure and price list of complete line.

Lehigh Valley Models--1225 N. Arch St., Allentown, Pa. 18104

15- The Monon Shop offers the widest range of structure kits that are available anywhere. Almost 30 kits and small items, such as trees and billboard frames. Others are a roundhouse, sawmill, pickle plant, store front, barber shop, warehouse, chain link fence and others. Send LSASE for up to date list.

The Monon Shop--RR 1, Battle Ground, Ind. 47920

(317-567-2755)

WEATHERING

16- BLACKEN--IT instantly blackens most metals thru chemical reaction. Treated Surface conducts electricity. WEATHER-IT instantly ages unpainted wood models. For old paint effect, use felt pen colors over the aged wood. Makes realistic concrete from plaster castings. Not a paint or stain, WEATHER-IT creates a chemical reaction within the wood itself.

A-West--552 North LaCadena Dr., Colton, CA 92324

SCRATCH MATERIALS & EQUIPMENT

17- Complete stock of basic scratch building materials. Brass sheet, wire, shapes, nickel silver sheet and wire, phosphor bronze sheet and wire, drill rod, plexiglas, acetate, Micarta, styrene sheet and strip, Lucite rod, Northeastern wood including S scale car parts, Sandusky, Grand Line, Rio Grande Models, cements and glues. All soldering supplies, Unimats, HG-0X, etc. Send LSASE for our list or write for quotation on your specific requirements.

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General Engine Building Tips

CARBON ROD RESISTANCE SOLDERING

The article "Soft Soldering For Engines" refers to soldering and pinning on cast Boilers. We are now using sheet stock photoengraved Boilers, which does not require near the heat and no pinning, so much simpler to even easy to build an engine using a torch--a revolution to a soldering iron.

Carbon Rod soldering is a revolution compared to torch soldering, so cannot understand why it has failed to become popular, and rarely are wet swab heat sinks needed, as only the part and that spot on the boiler gets hot, not all around it as with a torch, so the part is inch away does not get hot. Now the rank novice with a hand full of timbals can easily solder--really! Along with our #612.1 "Solder In Paste" (SIP), which needs little or no cleaning of parts, unless very dark, corroded or oily, which none of our parts are. Now the time worn song of "I cannot solder" no excuse. If you cannot solder with this, you need another hobby. Just put some SIP (Solder In Paste) on the part, sit it on the boiler, clip one terminal anywhere on boiler. With the other clip holding the carbon rod, hold the rod on the part, holding the part in place if necessary, then turn on foot switch (to prevent light pitting), in 3-5 seconds it is soldered, yes seconds, when you see a little black flux run out or shining solder, then hold the rod on the part a couple seconds after switch turned off to let solder harden. Now could it be simpler! Even much simpler than gluing--and that is simple for a 10 year old. The basic preparation same as in "Soft Soldering For Engines", so read that. Very large soldering like Sand Dunes, just tack solder at about 4 points. Tinning sheet stock is much simpler than torch or iron. Spread thin coat of SIP over stock, put one clip on a corner and slowly slide the rod over the sheet, no problems, simple.

A--Is a foot switch, such to be recommended to free the hands, from the Singer company. Dremel and electronics supply. We made ours from a plunger on-off switch.

B--Is a 110 volt bulb, to tell you visually the outfit is on. Sometimes the rod will get a coating of flux and will not pass current to the part, seemingly not operating. Light filing will remove it. We used an old outside 110 volt Christmas light bulb.

C--A 6.3 volt, 20 amp.(120VA) transformer. A bell, radio or TV transformer will not work, too low ampage. Phone your TV electronic supply, especially wholesale supply, who will usually sell to you, not Radio Shack. For your past business, your TV repair man may help. A "Stancor P6309" or Triad P22A will fill the bill and at this time should sell for about \$32.00. Olive Electronics Inc., 9910 Page, St. Louis, Mo. 63132, pho. 314-426-4500, say they will mail a Stancor. Should all these fail, write a friend in a large city to try their Suppliers.

D--Terminals between transformer and lead wires E. All wire solderings and contact with other parts must be very good and as much surface contact of clamps on rods as possible to reduce heat loss, soldering loss.

E--High current lead wires, made from ordinary lamp cord by twisting the two leads at each end together, making a single conductor--make 2 about 2 feet long, connected to terminals and clamps F. You probably have these in your junk box.

F--Clips from electronic supply--we used #25 Mueller, 80¢ each. One could be smaller, with teeth ground off to clamp on the engine. The other large one to hold the carbon rod at the throat of the clamp where it is flat.

G--Go to a welding supply shop, look up in phone book and phone first for a 12" long 1/4" diameter rod for about \$0.50. Some shops will want to sell a quantity, others a single rod. They are copper coated for good contact. Break in half and with bench grinder, grind a dull point on one end, other rod a spare. Some shops will have larger rods, but these smaller ones work best. The rod needs heat insulation covering made from wood. Take about 7/8" square wood (you can make this) as long as you can drill a 1/4" hole thru the length. You will have to file the hole out a little with a rat tailed file to a snug fit on the rod. Cover the rod back from the tip 1", same for the top for the clip. Or make the wood half this thickness, but cut a deep groove the length on one side of each. Lay one on each side of a rod, wrap wire around each end, twist tight and bend the twist between the wood.

The current can be lowered in a couple ways for lighter work. The easiest is to put the rod on the part securely, then close the switch for a couple seconds and off, and see if any black flux runs out or shiny solder shows, if not repeat, adding a couple more seconds, etc., rather than heating until flux shows normally. A Variac or Powerstat could be added in the 110 volt section (from Arco, advertised in Model Railroaders, see their watt rheostat could be used in series with the 110 volt line, or even a fixed wire wound resistor of same wattage, or course higher ratings should be used, about 120 watts. The soldering, like piping, valves, joints and very small parts. A switch could be installed to switch from center tap to 6 volts.

All but transformer and carbon, you probably have in the junk box or surplus store.



Soft Soldering For Engines (Torch)

A Bernz-O-Matic propane torch from the hardware store is by far the best for building a brass engine because it produces quick, variable heat from candle heat to 2,200° F., able to melt small brass wire and not enough for silver soldering. It should be understood that these torches, properly handled, are quite safe. These torches do not have a large hollowing flame such as a gasoline torch, but a small, quiet pencil-size flame. They require no pumping nor can the fuel be spilled. You just turn the valve until you hear the hiss of the gas and instantly light the flame with the friction lighter supplied with the torch, or with a match. Adjust the valve for desired flame. Before attaching nozzles or lighting the torch, carefully read the instructions on the torch kit and follow them.

To attach pieces such as domes and stacks, lightly file both pieces to be joined together, to clean them and to provide a good fit. It is sometimes helpful to tin both pieces with a soldering iron so that the excess solder will fill the cracks and form a fillet when the torch is applied. Otherwise, put Solder In Paste on both surfaces to be joined, put the parts together and apply heat from the torch. Generally apply a good amount of heat to solder quickly before the heat travels to another part.

Use Solder In Paste almost exclusively. Not only is the solder and flux together in a thick liquid for convenient use, but the flux acts as an indicator by turning black when the solder has melted. This is particularly useful when soldering very small items such as 1" piping in valves. When a joint cannot be seen, it is helpful to apply a spot of Solder In Paste on a visible surface of the part as an indicator of when the solder has melted at the joint. The resulting thin coat is invisible when painted. Solder In Paste is also much cleaner than solder applied with an iron. With an iron, solder must be bridged between the iron and the part, to transfer the heat from the iron to the part. This always leaves a blob of solder. If the part has small detail, rivets, nuts, etc., these can be covered with solder, requiring a great deal of filing for removal. This does not happen with Solder In Paste. The black indicator residue is quickly dissolved with water and a brush.

The solder in Solder In Paste settles to the bottom of the jar. The instructions recommend vigorous stirring before use. I prefer instead to mix a drop of the sediment with a drop of the top liquid using the top as the mixing bowl to get the thickness of solder I want for a particular job. A drop or two is all that is needed for joining several parts. A medium-thin coat works well for most well fitting parts; medium-thick is best for most general soldering and very thick where cracks are to be filled. If fillets are needed, a second application of very thick solder should be used with adequate heat. Do not be afraid to use a fairly thick mixture as it thins and spreads when melted.

Generally, you will want to put the heavier, larger parts on the boiler first, such as stacks, domes, etc., since these require the most heat for soldering. Then the smaller parts and gradually the smallest parts should be added, in each case requiring less heat, preferably not enough to unsolder the parts already fastened. For example, attach pumps, domes, stacks, heaters, cab to the boiler first. Then add the sander blocks to the sand dome, fitting in all at once, then add Solder In Paste. Solder them all at once with a quick application of heat which should not loosen the dome. Similarly, put all sanders in the blocks, propped or held in place with scrap metal if necessary. Put wet swabs on the sander blocks at the dome so that they will not come loose, and solder all the sanders at once. Alternatively, the sanders could be soldered one at a time by applying wet swabs successively to each sander after it has been soldered before moving on to the next one. Similarly, put wet swabs on the sanders at the sander blocks and add the piping. It is quite simple to add several pipings to a part, such as the injector, by the similar treatment of putting a wet swab on each soldered pipe or by wrapping it with wet string before soldering the next piping.

To free hands of torch, sit bottom of cylinder in your lap, with side resting against work bench, or lay cylinder flat on work bench with nozzle sticking up or to the side, or out over the edge of the work bench.

Those wet swabs of cotton, Kleenex or even toilet tissue are the key to fairly easy engine assembly, as they will fit readily around any part to keep it cool while soldering is being done nearby. It is important to be sure that the wet swab covers any exposed solder joint. They may steam but if they start to smoke or burn it is an indication that they have dried out and are no longer cooling. At this point they should be removed and resoaked. Before they are completely dried out, an eye dropper can be used to squirt in a few drops of water. Once they have thoroughly dried, they will not readily absorb water in this manner. Any time you want to solder when there is another part nearby which would come loose, use the wet swabs on the nearby part. If you want to add a part which is surrounded by a number of other parts which might loosen, surround the whole area and these parts with wet swabs, leaving only the small area exposed for the part to be attached.

Whenever attaching small parts, such as a pipe clamp and its piping to a boiler, to heat the part and the boiler at the same time sufficiently to melt the solder on the boiler would undoubtedly melt the piping and/or clamp. In this case, put some soldering paste on the boiler at the proper spot, possibly also tinning the underside of the part with an iron. Then preheat the boiler until the soldering paste there turns black, wipe off the black, add more soldering paste, very thin, put the part in place and hold there with an ice pick, adding the heat of the torch around the part, preferably not on it. The stray heat will heat the part sufficiently. Here, as with other situations near other parts, you will want to use a lot of heat from the torch to heat the area quickly before the heat has time to travel to other parts. This quick heating and pre-heating technique is probably not used generally to its fullest advantage. Remember, as soon as the paint on the part turns black, remove the torch immediately.

Adopting these methods, piping can even be soldered to both ends of small pipe valves easily. Put soldering paste on both ends of the starter holes of the valves, put piping in one end, hold one or the other with tweezers (preferably stainless steel with locking rivet) and solder with a very small flame of the torch, just until the paint turns black. Then wrap this end with wet string and holding the valve with the tweezers, add solder paste to the other piping and the valve hole again. Put the piping in the valve hole, apply a small flame again just until the paste turns black and quickly remove the heat. It is often easier to do an assembly of this kind separately on the bench and then add the entire assembly to the engine.

There are varying methods for holding parts together while soldering. When possible, position the boiler so that the part to be added just rests in place on the boiler by itself while soldering. Some pieces have to be held in place with an ice pick while soldering because of the odd shape or because the vapor formed by the melting solder from the soldering paste causes the part to move. If parts move after soldering, the tip of an ice pick can be used while the solder is still melted to reposition the parts. Some parts have pins on them. With these, slightly undersized holes can be drilled in the boiler, and the part, after applying soldering paste can be tapped lightly in place or thumb-pressed in place and then soldered. These parts should of course be installed first of all. Other parts without pins could be fitted with pins (wire) pressed into the part and then similarly fitted to the boiler or to another part as required.

An example of this would be the boiler front. You would first attach the parts with pins in them. Center punch locations of the holes to be drilled in the boiler front so the drill will more easily start in the right spot. Drill hole one drill size smaller than the pins. After applying Solder In Paste, push the part into the hole. Lay the boiler front flat on the bench and put the loose parts, such as stacks, in place. Then solder these all at once. Next, position one number board in the proper place and hold it with an ice pick while torch soldering it on. Cover this one with a wet swab and similarly solder the other one. On the first trial you will no doubt see that they are not quite square so you will have to reheat one or the other. Hold in place with an ice pick and reposition with another ice pick or strong wire held in the same hand as the torch, or using the tip of the torch to move the part when the solder is melted. If you should drill a hole for a pin which is a bit too large you can push the pin to flat on it and make it wider or you can pean around the hole to make the hole smaller.

Some very small parts which are under some strain or which do not have enough surface for a permanent hold, such as a small pipe clamp on the boiler, or the ends of the boiler bands, can be pinned on after attaching them temporarily with solder. You can drill a hole an appropriate size for the part, through the part and into the boiler a

depth of three or four diameters of the drill used. The top of the hole in the part should be beveled with a center drill or a drill five sizes larger than the hole. This permits the pin to be mached out. For very thin sheet stock, with the edge of a small screwdriver or similar tool, mash down the edges of the sheet stock around the hole in several places, then push in a tight fitting copper wire as a rivet, leaving it sticking up above the part about one or two drill diameters, then rivet it down with a small ball peen hammer. This will work better than a flat hammer. Copper is used rather than brass as it is softer and peens down easier. Brass tends to bend over. Surplus material which cannot be mached down into the hole can be filed off smooth.

When using the torch close to the running boards, coat them with swabs. With any heat they will tend to arch, but unless covered with swabs, they will warp so much that they will have to be removed from the studs and resoldered. With proper swabbing they should return to normal shape when cool.

For certain jobs Solder In Paste will not provide sufficient solder, such as at cab and tender corners. In this case drop small beads of solder into the corners. It is usually best to first tin the corners with a soldering iron. This is one of the few uses of a soldering iron. The torch can be used for tinning an area but it is harder than with a good heavy iron. When using a torch for tinning, a sliver of wood is used as a spreader of the solder after applying flux and heating with the torch. Pine wood is the best. A better method yet is to preheat with the torch and then use the iron for spreading the solder. This technique can also be used for tinning larger parts when your iron is too light, such as the Tender and engine frame, the Cabs, bottom of dome, etc.

Always be sure that parts fit well together, with no burrs in between, before soldering. Also, after a good cleaning, be sure the parts are well soldered and not just flimsy together. Otherwise, they may come loose later after painting and be more difficult to repair.

If torch soldering is new to you, it may be a good idea to read these instructions several times over a period of time so that you will not forget some particular technique. We are considering purchasing a soldering iron tip for our Berns-O-Matic for all wire soldering since any amount of heat can be applied quickly without a long delay for heating. Also, there is no long cord trailing to get tangled up. Considering the cost of electric iron and the cost of Berns-O-Matic fuel cylinders, torch soldering is probably the only extra investment would be the torch itself as the fuel lasts forever when not in use. We made a soldering iron tip for our torch. We had to set the flame so that it would just barely burn, and had the heating capacity of about a 250 watt soldering iron, also part being soldered did not quickly absorb the heat from the iron, as flame replaced the heat quicker than electric iron. No flame coming out around the iron.

Silver Soldering

Silver soldering may have a place for some of you died-in-the-wool scratch builders and pattern makers. One big advantage to silver solder is that once soldered, you can silver solder other parts very near or even on top of the silver soldered part and unless you are very rough, the first part will not move easily as it would with soft soldering. After a joint has been heated several times it is difficult to remove the part, and for drilling and tapping procedures, you have the equivalent of a one-piece part as contrasted with normal soft soldering.

Silver solder is available at many welding supply houses. I prefer to use the lowest or near lowest melting point solder of 1.0419, of either .010" thick sheet cut in 1/16" squares, or 1/32" wide strips or .032" wire cut about 1/16" to 1/8" long. About \$1.00 worth of solder and \$1.00 worth of flux will last you probably forever. This is also available in a soldering paste although I have not used it.

With your Berns-O-Matic propane torch you are restricted to using silver solder on smaller parts of such sizes as the Miller muffler, valve gear parts, heaters, small domes, etc., since the parts must be heated red hot. The torch cannot heat to red hot larger parts such as large domes, boilers, trucks, etc. For the larger parts within these limits, do not lay them on a metal plate for soldering as the plate will absorb too much of the heat. Put a piece of asbestos, available from a hardware store, between the part and the metal plate. Alternatively, a part can be held with stainless steel lock tweezers (steel tweezers will bend), the latter laid on a brick and a piece of metal laid on top to hold it down with the part on which soldering is to be done sticking out. Then the part to be added can be laid in place on this and soldered.

To avoid cracks after soldering, parts should fit together with no more than .005" spacing, as silver solder melts as thin as water and will not fill a larger crack. If a crack has to be filled, it will have to be filled with soft solder as a later step. Both parts must be filed shiny clean, with flux on both pieces. Flux can almost be water thin, with no lumps. Put the pieces together, then lay several small pieces of solder (described above) around the joints at the cracks. I prefer this method to putting the solder between the parts as sometimes the parts will not go completely together. When the solder melts, it will run into the cracks by capillary action. Heat the parts with a torch to a dull red heat, preferably rather quickly so the flux is not burned up. First play the torch slowly over the flux to remove water so that the silver solder will not pop off, or you can hold the solder in place with the burned end of an ice pick (if the point is burned, the solder will not stick to the point later when it melts). The flux will first form little balls and then suddenly spread like water. This is the point at which the solder melts. Since the solder melts to the thickness of water, it will quickly spread to nearby cracks, concave corners and rivets. Sometimes the solder will not spread but will form into a ball when melted, so use the end of the ice pick or the solder might stick there instead. Silver solder is very poor for forming fillets since it thins so much and quite a bit would have to be used. For fillets I usually file the corners clean, fit in a piece of scrap brass and silver solder it in, and then file the fillet, or use soft solder for a fillet if it would hold up for later use. If you heat too long, silver solder gets quite hard and difficult for later filing smooth, so make the joint quickly. If you do not get a good joint as a result of too long heating, usually the addition of more flux and reheating with more silver solder will cure the problem. If not, you will have to refile both surfaces and start all over again.

After soldering, the joint will be clean from the flux, but around the joint it will be a dull, dirt color. While cleaning is unnecessary, you can brighten it by dipping the whole piece in the flux and heating again until a dull red. However, if the joint is close to some other crack, concave corner, nut or rivets and you use quite a bit of solder for the joint, you had better forego this procedure as the solder is likely to run. Sometimes there is a crust, probably from incomplete burning up of the flux. This can be removed in a solution of 15% hydrochloric acid in water, soaked about an hour, and then chipped off.

If you have an area near the joint you are soldering which you do not want the solder to spread to, try coating the area with a thin coat of grease containing a lot of graphite (from a hardware store) or with a thin coat of dirt or clay in water (a thick mixture) or scribble over the area well with a pencil.

Notes: If there is soft solder on a joint to be silver soldered, the silver solder will mix very readily with it. Some experimentation here may reveal a lower melting point for the silver solder preparation, still well above the soft solder melting point. Also a soft soldered joint when heated almost red hot will make the soft solder very hard and difficult to file. This may be a clue for something to do.

When you get proficient, you might try small fillets, it is a very tedious job. After part has been soldered on, place a bead or 1/32" silver solder wire along proposed fillet area. Then with torch flame set just to barely melt the solder, play flame over solder, fillet area and tip of ice pick to heat it. When solder starts to melt a little, prod the solder down into the fillet area, at the same time pulling back torch to just hold even temperature on work. Prod solder over area to fill in, maintaining solder in steady consistency. Do not expect a smooth fillet, file the shape. Do not allow the solder to melt, or solder will run everywhere. Try to work a bit cool, prodding solder in place.

Epoxy

Epoxy can be very useful in engine building and repairing, even for use on cars after painting. It is particularly useful for upgrading American Flyer engines or other engines with Zamac (die cast) boilers that cannot be soldered, using first class detailed parts that cannot be cast on. In building a brass engine, you can practically attach all parts to the boiler with epoxy if you wish, or at least some of the last pieces where soldering would loosen pieces previously attached. For general use of epoxy, the manufacturer's instructions are good but the following will greatly improve results.

Epoxy is not difficult to use nor does it have to be mixed in exactly the proportions stated. Most epoxies call for equal parts of resin and hardener for average use. However, for harder epoxy use a bit less hardener. For flexible joints, use a bit more hardener such as for use on sheet stock, plastic, leather, etc. Mix the resin and hardener thoroughly, then rub the mixture into each surface for a couple of seconds. For best results, the entire area of both surfaces should be 1/32 of an inch or less apart, and the mix should be used within one-half hour. Some parts may not want to stay put and may slide or fall off because of their position. However, when the epoxy on the parts gets tacky it will hold the part in place. If fillets are wanted, allow the epoxy to get putty-like, then apply. Save what is left over so you will know how hard the epoxy used has gotten. Any epoxy that is squeezed out around a joint can be removed with alcohol and a cloth.

As with soldering, surfaces must be clean. They should be freshly filed with a coarse file or preferably ground with a rough, oil-free grinding wheel, the rougher the wheel the better, such as the grinders supplied with your Dremel Moto-Tool. Filed surfaces can be scratched rough with a scribe. In any case, do not touch the surfaces with your fingers. A joint can be made stronger where the cementing surfaces are small by drilling a hole through both pieces and pressing a rod through both pieces and epoxied. Alternatively, fill the holes with epoxy, which acts like a rivet and creates a greater cemented surface area.

After use, wash hands thoroughly with soap and water if you have sensitive skin. There is plenty of time to come back and do more, as epoxy does not dry but sets gradually, taking a long time. Because it does not shrink, it is good for making fillets and for filling cracks and crevices, and forming shapes as it starts to set. We have not found any to get as hard as glass, so it can be drilled, tapped, machined and carved and used for a coating against oil, water or acid, insulation on metal and wires. A drop or two of alcohol per 2-3oz sized mix can make a paint (use a bit less resin) experiment.

It seems to set upstairs more quickly than in the basement, unless set over the furnace. Best setting for us has been over the refrigerator where the air is warmer and possibly drier. For best results, after the first hour of pre-setting, put it in an oven at about 130° for three to four hours if the objects being cemented will tolerate that heat. At room temperature it will start to stiffen in about one-half to one hour sufficiently for you to do additional work. Hardness is reached in 24 to 48 hours and peak hardness in about a week. Experiment with the conditions of temperature and humidity in your own home for peak results. As you have gathered, nothing is critical.

Epoxy is not a complete substitute for soldering, but it is the next best thing, particularly when working with Zamac. Zamac to Zamac joints can hardly be pulled apart unless there is great leverage. Zamac to brass is not quite as good, nor is brass to brass, but adhesion is acceptable. We have had number boards epoxied on one of our engines for a long time with very satisfactory results, and these have a rather small joint area and stick out quite a bit.

Epoxy can be used not only for engine joints, but also for anything else where glue is normally used but where you want a stronger joint, such as in attaching coupler pockets, replacing tires on drivers, loose axles on drivers and wheels. You can clean both surfaces with alcohol or lacquer thinner. It can be used for replacing parts on engines and cars where heat would make a mess or for joining dissimilar materials, such as plastic to brass or Zamac, or wood to brass, or add more detail after the engine is painted.

Whether soldering or epoxing, now is the time to build your engine. Nothing ventured, nothing gained.

Attaching Parts To Locomotives And Riveting

Riveting and pinning parts on our new sheet stock boilers not needed, just soldering, but we are leaving this information for scratch builders and others that want it.

Besides soldering parts on and using wet swabs (cotton or tissue) on nearby parts, the latter will not come off if kept wet with an eye dropper once and a while, see article "Soft Soldering." Now we also have a no mix Cyanoacrylate adhesive which sets in 3-10 minutes. Now you can solder parts as far as you can, then use the adhesive, preferably solder on parts that are very small and/or small contact area to engine, such as Coupler Bar Brackets, Cooling Coil Clamps and backs of pins thru various Rods. Also there is epoxy, see article "Epoxy."

There are also other ways experienced modelers use. Some few parts can be soldered on with torch, then drill and tap 2-56 or 00-90 and screwed on. If you ever think you may want to take that one part off later, you can unsolder it, file all solder off of part and boiler and screw back on. Sometimes you may have to screw a strap (bracket) on the part, solder strap to the boiler, such as Hot Water Pumps, BL Pumps, Air Pumps, Crosscompound or single, Power Reverse Cylinder and on Tanks. Then drill and tap holes and screw on. On Tanks use flat head screw in counter sunk hole, file head round to Tank curvature and fill slot with solder or epoxy.

Many experienced modelers pin most parts on, large and small. It is best to have an inexpensive micrometer for this, 0-1" (or sometimes from a pawn shop). Get some ordinary brass straight pins from department or dime store. These pins are very hard and usually about .025" diameter. Drill first hole one drill size under size, then redrill .025". Practise a couple times on scrap, particularly if you do not have a micrometer. Cut the end of the pin off just as it starts to round to the point. If same pin cut off and used again, file flat on the end and round the corners so it will not dig into metal while driving it in next hole. The part pinned to, the hole in it should be at least 3 diameters (.075"), better 4-5 deep. The proper fit when driven in with a small hammer is when the pin can readily be driven with slight resistance to moderate pressure. Most parts probably should have 2 pins to secure them. After driven in it can be cut off as close as dykes will allow, then ground down further with cut-off disc, then file smooth. Many of our parts have pins on them for this purpose, and "Parts Installation Booklet" gives diameters of holes to use, or you can determine with micrometer.

While you will have little trouble with parts on top of engine coming off, but they can be pinned on, one on opposite sides of part, such as Steam and Sand Domes, Smoke Stack, Miller Muffler, Blow Off Muffler, Power Reverser, Pumps, Valve Cross Head, Tokos to Valve Gear Frame after soldered, Shields, Pilots, Steps on Pilot Rods, Boiler and Boiler Front steps, Triangular and Rectangular Pop Valves, Generators, Inspection Doors, Tank Studs, etc., etc. Now you will not have to worry about nearby parts coming off when soldering. One thing to remember, do not drill holes with a hand grinder as their high RPM will ruin the drill soon, also keep the hole wet with coolant or saliva so drill will not over heat or grab and break. Drill a couple seconds at a time, raise drill and repeat the process. A drill press is good for this or a hand grinder with variable speed control. If you have to pin in an area where hammer cannot get close enough, make a small punch with about 1/16" diameter punch from nail or drill rod or back of old drill. On pinning parts together with straight pins (add solder first) where total depth thru both parts is about 7 diameters or more, extra slow drilling needed and lubricate raising drill to remove chips. For deeper holes, larger pins should be used, such as hard brass wire, in which case a flat hammer is used to drive it in square so it will spread all way down the hole, to give at least a thumb pressure fit, which is all that is needed to keep it from coming loose when soldering near by part. After pinning, heat the part again to melt the solder and lightly probe it to be sure the pinning really took. This and below techniques are used in making parts where several parts have to be soldered together to make the complete part. Hand grinder with variable speed control is best for this drilling, as you have more feel of when you are really drilling. Pins can be filed box shaped if they are to stick above part. Put a little soldering paste around each on driven in and cut as close as above will cut. Torch them to melt solder or then all can be ground down with flat side of cut-off disc, a trifle long, then file

a little with fine file. The grinding will cause burrs all around nut, so lightly scrape all around each nut. On nuts .025" or smaller we use 5 sided nuts, as they show the flat side more. Hexes tend to look round. Filing a 5 side held in pin vise, lathe or drill press chuck is not to hard. We have our lathe chuck marked 5 & 6. On a 5 side first file a flat side 'A'. Then 'B'-B' filed so points on each side are about center of pin crosswise. Then filed from center of pin to point opposite flat side 'A'. This is similar for hex. Here file 2 flat sides 'A'-A', 'C'-C'. Then file 'B'-B' where their points are to center of pin crosswise. Same for 'C'-C'. We file a length of a pin sticking out from pin vise or chuck about 1/2". Of course these takes practice like anything else, and you will have to file one side or another where flat side looks narrower than other sides. On diameters less than .020" there is little need to make nuts as they do not show up. Magnifying glass should be used for this, especially binocular type, which is a tremendous aid for all model making, including cars and decals, WELL worth their price. We would recommend a focal length of 6", and would not be without them.

Another method for particularly thin parts such as sheet stock to something else, or to another sheet stock. This requires making 3 female punches. Best to use 1/8" drill rod for these or a nail, the latter will not hold up long. We will use the term diameters here rather than dimensions so the rule will fit any size punch. We have 3 sets of punches, .013", .016" & .020". Sizes of punches you make may depend on size of copper wire you can get from old TV power transformer. Get 3 pieces of above stock and grind one end round like a nail set, flat at the end and about 3/32" in diameter. Drill a hole in #1 punch 3 diameters deep, #2 drill 2 diameters deep, and #3 1 diameter deep. Heat these to a bright red color and immediately immerse in water to harden the metal, so they last. Now suppose you need about a .025" rivet to hold the pieces together, say .016" to about .050" sheet stock together or to another larger piece. Best to solder parts together, then drill hole 1 drill size undersize, then re-drill .025". Best to take a much larger drill and with the fingers barely re-drill the hole to form a slight bevel, countersink. Take a small piece of copper (brass too hard) wire and stick down into hole with only 4 diameters sticking up. Put #1 punch over the wire, this should make the punch 1 diameter above your work, if more, file or cut down so there is only one diameter between punch and work. If more, the wire will bend, not drive straight into the hole. Now tap the punch down, driving the wire into the hole until punch is level with the work. Sometimes the wire will bend, so tilt the punch to direction of bend and tap more, which should straighten it up again. Now use #2 punch and drive wire in more until punch level with work. Lastly the #1 punch is similarly used. Sometimes this punch will not go all the way down, which indicates no more wire can be driven into the hole. If this is a pinning job, pean the rest of wire down filling the bevel made, filling off the rest. Or for a rivet, left unfilled. This also takes some practice on scrap metal. Occasionally the #1 punch when lifted from work, the wire will stick in the punch, so either push the wire back into the hole and rotate the punch around several times while pulling up a bit until wire sticks in work, or pull wire out of punch and put in the hole. Sometimes this is a bit difficult, so take a knife blade and hold it right next to punch on the wire, adding a little pressure to the wire and twist knife blade away from the punch until wire comes out. Replace wire in the hole and go on with #2 and #3 punches. (Before hardening punch break opening hole corners).

There are occasions when an assembly pin on a part is a little too small for the hole you have drilled for a press fit. You can use a center punch to punch around the pin every 45°. This makes metal rise at the punches. Or with them and pins, you can lay the pin on a piece of metal and tap it a few times lightly, making pin larger diameter on 2 sides. Repeat the tapping until you get a good tight thumb pressure fit, which is enough with solder added and torched on. Or for these parts pin holes, you can lightly pean around the hole to close it up a bit. (Of course this will not work when pinning two parts together, as you cannot make the hole on the bottom piece smaller unless you drilled thru both parts to be pinned together, then you can pean the bottom hole too). A small flat and punch of appropriate size can be used instead of hammer in small places.

Weighting or Leading A Painted Boiler

Probably all engines should be partially "loaded" for better traction and less derailment. In practice, the word is: "the more the better", up to the point that handling becomes dangerous to the small parts on the engine. It is better to weight enough that when hauling the engine the drivers slip when drawing max. rated motor current.

In general, smaller engine boilers should be fully "loaded". For drawbar pulling contests, larger engines such as Berkshires, Pacifics, Mikos, etc. are sometimes fully "loaded". Usually, larger engines are "loaded" only from the middle drivers forward to concentrate weight on the front drivers. This arrangement seems to make the locomotive less prone to derailment. Or engine should balance half way between first and last axle.

"Leading" can be done very simply without blistering the lacquer or loosening the soldered castings. It is best done after the engine is finished so that less heat is needed to attach boiler parts and to minimize destruction from extreme handling during building.

Construction:

The following procedure is used for "leading" cast boilers which are rough inside. The interior surface of boilers constructed of smooth tubing should be crated so that the lead will adhere, either by deeply scratching with a large file or by using the end of a large drill. Actually, pins from parts sticking thru boiler should be enough.

After determining the portion of the boiler you wish to "lead", cut a piece of corrugated cardboard and adjust it to fit tightly in the opening at the appropriate angle and location.

If wiring for a headlight, install a brass or aluminum tube as a conduit for the wires. Insert the tube through the cardboard, holding clear of the motor, and extend it to the boiler front. Excess tubing can be ground away with a Bressel hand tool after the "leading" process is complete. Insert paper plugs in each end of the tube to keep out the lead.

Remove the cardboard and wet well, but do not soak so that the rigidity is lost. Then replace in the desired position. When the entire boiler is to be "loaded", assemble the frame, motor and boiler and adjust the cardboard so that it fits snugly against the motor. The thickness of the cardboard provides ample clearance between the motor and lead.

Remove boiler from the frame and wrap with several layers of very wet terry cloth (Turkish) toweling. Plain cloth or hand towel does not work well as it transmits heat to the hand much too quickly. A towel draped over your arm and hand will afford added protection. Hold the boiler at eye level and at arm's length to guard against splattering. The boiler should be tilted at a 20° angle when pouring, thus breaking the weight of the falling lead and allowing it to splatter onto the wet cardboard and solidify. Pour about two tablespoons of lead into the boiler front at a time. When the lead has solidified, repeat the process until the cardboard and the cracks between the cardboard and boiler are completely covered with lead. Do not pour more than one-half inch of lead into the boiler at one time (one-quarter inch for sheet stock boilers).

To speed up the "leading", squirt two eye-droppers full of water on the hot lead. The water turns to steam and quickly causes the lead to solidify. DO NOT add a third dropper of water as it won't evaporate and will cause the next pour to splatter wildly.

Continue the one-half inch of lead and two droppers of water until enough lead has been added, leaving ample space for boiler front and wiring. If the boiler should get too hot, lay it on the towel until cool and then continue as before. DO NOT LAY BOILER IN WATER.

Remove cardboard, and finish assembly of engine.

Wheels and Drivers

There has been much discussion as to which metals are best for "electrical pick-up" in engines, tenders and cars. We will not go into this too deeply, but rather, pass on some thoughts, facts and opinions which you may adapt to your own conditions. First, one common problem has to be understood and a comparison made between net-

als. All metals pick up well when wheels and rails are very clean, but arcing still occurs between rolling wheels (even though you cannot see it) and this creates an oxide deposit on the wheels. Aluminum oxide does not conduct electricity and is therefore an insulator. Brass creates some oxide (a poor conductor too), but not nearly as bad and it generally wears away. Nickel silver and steel oxides are conductive so continue to pick up current. We do not know much about the characteristics of MS. All of these oxides keep building up, but steel powders and roadways wear off unless some oil is present. Steel probably creates the least oxide since it is the hardest metal.

The most important factors are dust, oil and the oxides that form, and probably few of us can keep the dust and oxide low. Dust between the wheel and rail compounds the arcing so that you can see it, accelerates the oxidation process and creates the problem of burning and pitting wheels. Burning and pitting aggravates the already bad oxide problem by making the treads rough and more susceptible to dirt and oil than smooth treads. The formation of gunk (mixture of oil, dirt and oxide that forms soft scale) becomes an insulator which must be scraped off. If journals are oiled too much, snake units run over or you get the engine wet with oil, the fluid will spread to drivers and rail. This becomes a vehicle that holds dust and oxide to the treads.

It is our opinion that MS is best for car and tender wheels since it gives the most positive pickup under all conditions, does not rust and the oxide is a conductor. Therefore, pitting that is conducive to oxide and gunk formation will be reduced. NS is probably one of the worst metals for locomotive driving wheels since tractive effort is important and NS will polish smooth.

Steel would be our second choice if the layout area is dry and equipment used regularly. The oxide (rust) is conductive and quickly wears off. Steel, being the hardest metal, does not pit, get rough or pick up dirt and gunk. Some say that steel runs cleanest, and they like the sound of steel wheels best (both for freight and passenger service) over switches and rail joints. Regular use of all equipment and proper journal lubrication will spread a very light oil film over the wheels. This prevents rust, but is not enough to effect the formation of gunk. Moth balls or an oil-dampened cloth reduces or prevents rust on equipment in storage. Axle oil spreading will generally take care of rust on operating rolling stock, as the amount needed is extremely minute.

Brass becomes a good choice if your conditions completely exclude steel. Steel tires are no doubt the best for engines and tractive effort, best on brass rail (probably good on NS too). Brass is the all-time favorite as it does not rust, although its oxide will accumulate with minute amounts of oil to form gunk. The oxide is a poor conductor, but the engine weight will cause driving wheels to clean themselves. Pitting is not much of a problem except where excessive current causes arcing. This produces flicker in car lights and aids the build-up of gunk. The tractive effort of brass is fair to good, although it polishes like MS, the not as much.

Aluminum and Zamac tie for being the poorest conductors. The build-up of dirt and gunk which causes arcing and pitting is due in part to the softness of aluminum and the insulating quality of the oxide. The wheel is further insulated by picking up more dirt, thus more arcing. Zamac operates in much the same fashion, although it is a harder metal composed of zinc, aluminum, magnesium, antimony and copper. A problem not fully understood with aluminum, particularly on engines and tenders, is that clean wheels may operate perfectly if run every day, but if allowed to sit about a week, will hardly run until the oxide is worn off. There is apparently not enough current draw through the wheels involved to create heavy oxide, but gets worse as it sits for a time. We do not know this effect on cars, but some say that aluminum for passenger cars with low current draw is O.K. Of course they should never be used for engines or tenders. Aluminum and Zamac could be used for Pilot and Trailing Trucks, but we feel the lower the current drawn through each wheel the better. This reduces oxide formation partially caused by the medium to bad dust conditions of our rails. The trucks can spread the current over two or more wheels. For example, if an engine and tender has 15 pick-up wheels, it would probably run well even on a dusty layout because some of the wheels would be making good contact with the rail. With so many wheels there is less current per wheel, consequently less arcing and pitting. The same is true for passenger cars where all-wheel pick-up trucks are designed to reduce the flicker in lamps. Remember, too much current is as bad as dust. One side pick-up is best for tenders because the heavy current drawn through the journals and spindles will burn the spindles and lubricant. This does not happen in passenger car journals with their low current, even for all-wheel pick-up.

On one locomotive traction experiment, we deeply scratched all clean driver treads from side to side. We latter ran the engine back and forth over a section of rail containing oil, dirt and brass filings until gunk had built up on the tires. This gave considerably more traction than the scratches (Note: conductive brass filings were used in the gunk and on a heavy engine). This shows that gunk does increase tractive effort. Steel or MS oxide would probably give similar results to brass filings.

This dissertation is probably not final as some will agree and others will not, but it is food for thought. Your home conditions, cost and availability will predetermine performance. You at least have a choice.

As previously mentioned, you should learn to build engines, not only because you are a modeler, but the reward is great. Not only are 'Ready to Run' engines always much more limited, but by being able to build engines from parts, you have a much, much wider range of engines that you can have in your stalls, and at a much cheaper cost for the same quality. (NOTE: Building engines from parts is tremendously easier than from scratch, or the riveting and pinning methods previously mentioned. From parts is more like building models with a lot of small plastic parts, the a bit more difficult, of course.

Pattern Making

We are always interested in adding new castings to our line that there is a demand for, to give 5 gaugers more of a selection, or in many cases a modeler can make a pattern for many of them that he wants rather than the work and time of making each one then free and make a monument to himself. So you help other 5 gaugers and yourself.

Pattern making is no different than making a part for yourself, with a few exceptions. These are, they have to be made of brass, copper or nickel-silver, usually hardened 10%, and accurate prototype dimensions, which will require a micrometer, vernier or dial caliper. If several pieces are needed to make a pattern, they must be silver or soft soldered together (preferably "Solder In Paste" so less solder clean up needed), then pinned or riveted together, or if one piece fits into another, add "Solder In Paste" and a good thumb press fit. When part is all done, heat to melt solder and lightly probe each part to see that they do not move. If they move, put in another pin. The pattern has to be vulcanized in rubber at about solder melting temperature, so loose parts may float off into the rubber, see articles, "Soft Soldering", "Silver Soldering" and "Attaching Parts To Locomotives and Riveting". File smooth. Soft solder can be used to fill small cracks between parts, but not large fill or fillets. To maintain fine casting details like rivets, do not make the part thicker than .040" where possible and rivets and nuts about 30% too long. Do not use epoxy or other adhesives.

If you cannot pin or make rivets, we can add these, but give us a sketch showing where various subassemblies are located, and where soft soldered and silver soldered.

Do not be backward in trying, some novices have made none, and practically no patterns have been refused, as we have done some work on most patterns or made changes, even from veterans.

We will give 6 free castings for your pattern or cash and/or credit to equal the retail of these 6 castings.

Before making a pattern, let us know first, to be sure someone else isn't making it and other details that may show up.

NWRA will allow you scratch building credit for your pattern.

NOTHING TRIED IS NOTHING ACCOMPLISHED. LEARNING IS RECEIVED ONLY BY TRYING

Words of Wisdom

We feel the following items are so good that they would be of great benefit to most of you. Items followed by "mr" are wholly or partially through the courtesy of Model Railroader magazine.

$$\begin{aligned} \text{1.) Gear Ratio} &= \frac{\text{RPM x Driver Dia. x .003}}{\text{Scale MPH}} & \text{RPM} &= \frac{\text{Gear Ratio x Scale MPH}}{\text{Driver Dia. x .003}} \\ \text{Scale MPH} &= \frac{\text{RPM x Driver Dia. x .003}}{\text{Gear Ratio}} & \text{Approx. Steam Engine Speed} &= \text{Driver Dia. x 1.1} \end{aligned}$$

2.) **Rust-Proofing** --- Place moth balls or a lightly-soaked cloth with new, clean motor oil (do not use a dripping wet cloth or used oil) in tool and parts drawers or with equipment stored in boxes and bottles. Used oil may cause rust on a part. A kerosene soaked cloth may be used in bottles. All of the above methods are better than emersing parts in oil. Brass parts may be kept brighter longer by putting them in small bottles. Plastic boxes or bags. Parts and engines could be sealed in the bags described above. A very thin coat of epoxy rubbed on steel, then almost completely rubbed off helps too.

3.) **Light Lath** --- For very small turnings, particularly in brass, or turning smaller and flatter heads on screws, place an electric hand drill in a vise and chuck up the small stock. Then use a file to turn down the desired shape.

4.) **Tie Dye** --- Two tablespoons of instant coffee per cup of boiling water makes an excellent dye for ties or other creosoted timbers. Allow about two hours for soaking. Color darkens as timbers dry. Vary shades of the ties to duplicate aging. mr

5.) **Unknown Dimensions** of a part on a locomotive or car can be very accurately determined if the picture or plan is perpendicular (square) as you view it. By "picking up a dimension" from a part whose measurements are known, construct a scale from it on the edge of a piece of paper. An 8x10 size is almost a necessity when using photos. On plans there are other dimensions which may be used to make a scale when particular dimensions are not given. When using photos, references may be made to plans that have one of the photo parts on it (with dimensions), and a scale made from this.

Some common constant dimensions are: freight car wheel tread diameters, 33"; passenger tread, 36"; normal height of coupler center line above rail head, 2'-10"; ladder rungs and grab irons on freight cars are generally about 18" apart and 16"-18" wide (for 1890 cars, 24" wide). Modern box car floors, 44" above rail head (1900 era, 40"); flat car floors, with metal underframe, 42"; roof floor, old and modern, 48"; brake wheels on modern equipment are usually 22" diameter and set 18"-19" to the left of the car's center line. If the photo is clear enough, you can see the car dimensions stencilled on the side over the truck. If the following symbols are shown, they mean: II, inside length; W inside width; H, inside height. Since all are inside dimensions, you must add 12" for outside dimensions. In addition to some of the above data, you will generally know the coupler height and driver diameter of locomotives. If one end of the vehicle pictured is nearer to you than the other (that is, in perspective), a more complicated method is needed to determine dimensions. mr

6.) **Making Rocks** --- Sometimes it is easier and more realistic to make large sheets of rock on the workbench. Desirable types might include shale, broken or blasted rock and rock mortared together for wall use. Whenever needed, they can be saved in the necessary shape, such as for chimneys, tunnel portals, stone buildings, retaining walls, stone fences or pieces inserted into the layout as random protruding rock with scraps for showing thru grass.

7.) **Making of Lost-Wax Castings** --- This process is the cheapest method of casting small, detailed, hard metal parts in small quantities. A pattern, usually brass, must be made to duplicate some part. This pattern is cast and vulcanized in a rubber mold, the mold cut open and the pattern removed. With the pattern removed and the mold put back together, there is a cavity in the rubber mold like the pattern. Wax is poured into this cavity, which when removed, provides a duplicate in wax of the original pattern. These wax duplicates (waxes) are then cast in investment plaster. When the plaster is set and comparatively dry, it is placed in an oven to burn out the wax (lost wax) and completely dry the plaster, leaving another cavity identical to the original pattern. This plaster mold is then placed in a centrifuge and molten metal poured into it. When cool, the plaster is broken off and the metal castings cleaned, giving you a duplicate of the original pattern. When you receive a casting that is thin and intricate, and it is bent, generally the cause is in the removal of the wax duplicate from the rubber mold. Since wax is such a fragile material, bending may go unnoticed by the workman.

8.) **Removal of Very Thin, Even Layers of Metal**, as is necessary when the dia. of driver treads are slightly reduced or where two surfaces are to fit together quite accurately. First, scribe lines over the surface with even pressure (even heavy and light pressure will not vary the depth of the scratched more than .001 or .002 of an inch, so this is not too critical). Now file out the scribed marks which serve as an indication of when to quit filing in a certain area, such as one corner or another. This procedure can be repeated several times.

If you are accurately fitting two pieces of metal together (particularly if shiny), such as a cylinder or peg in a hole, or surfaces of irregular contour, paint one surface with dark lacquer or blue dycum and then rub the pieces together. File the spots where the color has rubbed off on the unpainted piece, or file the painted piece where color rubbed off, or both. Repeat the process until desired fit is obtained.

9.) **Filling Cracks, Holes and Corners** --- The following procedure is applicable when solder never seems to fill a void or is pulled out by nearby solder due to capillary action. A machining "goof" may remove a corner where solder will not hold. Remove as much of the old solder as possible from the crack or hole and fill with very fine copper or brass filings (saved for the purpose) along with Flux or Solder In Paint, preferably piling the filings above the crack. A torch is much preferred for heating as filings will stick to a soldering iron. Use the tip of an ice pick to keep the filings packed down and in the proper location (it is easiest to mix filings with Solder In Paint). This method of filling is also very useful on very small parts where fitting is difficult or in areas that are too small for shim stock or small shavers. It is advisable to use this procedure as the last soldering step on a piece, as sometimes, particularly on corners, the solder will drain out a bit on the next heating if the filings are not small enough or have not been packed down sufficiently. If silver solder is used, the brass serves to build up an area which silver soldering is difficult to do. Either way always overbuild with filings to get more compactness and then file smooth later, preferably after the part has been installed on the engine.

10.) **Cutting 1/32" to 3/16" Wide Brass Strips** from even .016 thin brass sheet stock without curling, being crooked and with a clean cut is at best a difficult job. Use a small circular saw such as Dremel's or one from a tool supply house (1" to 3" in diameter with about 24 teeth per inch, the smaller diameter preferred) in a lathe with a milling attachment, vertical mill or a drill press with a milling table. Hold the sheet stock vertically in the vise, sticking out as little as possible in order to clear the mandrel nut. The mandrel shank should protrude from the chuck just enough to let the saw teeth cut through the stock. If the mandrel is heavy enough, wider pieces and much thicker stock can also be cut. Find and correct any vibration which may indicate that something is loose. Cut material slowly and keep hands away from the saw.

11.) **Reduce Breakage of Very Small Drills** --- a. Be sure the drill continues at the same angle as when started. If it is necessary to drill at an angle, first use a center punch and then drill straight in until the point is well into the metal. Then turn

drill angle slowly to the desired angle by applying a little pressure, allowing the flutes to start cutting into the metal. When the flutes are cutting well into the metal, you can then apply normal pressure on the drill. b. If a drill press is used, start the drill slowly so that it stays on the drill axis rather than running off-center. Sharp, straight drill bits help prevent this. c. Use sharp drills. d. Do not run drills at too high a speed as the cutting edge is worn by scraping out the metal rather than cutting it, thus requiring frequent sharpening of bits. 5000-8000 rpm is best for most uses. #60-#80. The foot rheostat for the Dremel Moto-Tool extends the life of your drills and makes for easier drilling too. Regular hand drills are generally too slow and requires a very small secondary chuck, or cut off pin vise. g. Keep bits cool with water, saliva or a lubricant such as beeswax compound (if not too thick to prevent chips from coming out), but better yet, use "Tap Magic" (see their listing) as it not only cools as a thin liquid, but contains chemicals that prevent seizure from weldment of the cutting edge to the metal. Motor oils do cool somewhat but are poor lubricants as they prevent cutting and do not dissipate heat as well as water, a lathe coolant or "Tap Magic" when using larger drills. f. Drill a couple of seconds at a time with light pressure, then withdraw the drill to cool and clear any chips that might wedge and cause breakage. If the drill does break, it might not be stuck so tightly that removal is difficult. g. Wobbly bits are sure to get broken so correct the condition with a better chuck, or if drill bits are slightly bent (a rare occurrence), they can be straightened by applying light pressure on side of drill. Some Dremel drill chucks (50¢) are not perfectly true for #60-#80 drills. With chuck in Dremel, straighten same as drills above. h. When re-sharpening drills, be sure the cutting point is ground in the center (best to use a stone), otherwise the bit will drill oversized holes or break.

12.) **Removal of Broken Drills and Taps** from brass, copper, nickel silver and lead only may be accomplished by the following methods. Put the part in a 15-50% solution of hydrochloric acid in water and allow it to set from 6 hours to overnight in a bottle. Then pull out the stub with tweezers or apply pressure with a pointed object. Do not get solution on your clothes or hand, but if you do, wash immediately. Another method is to dissolve 4 oz. of alum in a Pyrex dish and add water to cover the part. Bring to boil, then cut the heat just enough that the water steams for approximately eight hours. Add water as it evaporates (We have not tried this method, but the previous one is very good). If you do not have the time to wait on the above procedure for removing drills, you can often locate the exact spot on the opposite side of the metal by sighting and scribing lines or by measuring carefully, then drill slowly until you hear the clicking of the drill against the broken bit. Then use an old broken drill, or better yet, use the proper size of piano wire cut rather short so that it will not readily bend. You might have to hold the wire with long-nosed pliers. Then insert into the hole and tap with a hammer until the drill comes out. You may have to try this procedure several times before success is achieved. It is usually better to drill an undersized hole and use piano wire, to prevent getting an oversized hole from the procedure.

13.) **Variable Elevation Working Block** --- This block is used to get small parts, a car or an engine up closer to eye level for much easier work and as an arm rest. Take an ordinary house brick and wrap it with heavy kraft paper from a grocery bag, then tape it on with paper or masking tape. This gives you four different elevations - the table top, and the brick laid flat, on it's side and on end which is right at eye level.

14.) **Scale Drawings** --- Plans in magazines and books are usually shown in HO scale because the size is readily adoptable. This is no problem to us, however, as you can use an HO scale rule to get the dimensions not shown, then use an S scale rule to lay the plan out, or use our multiple rule #161.1. The same procedure is applicable for O scale drawings.

15.) **Layout Plan** --- Out switches, curved and straight roadbed to full size from cardboard. Lay these on the floor in the area of your layout. When satisfied that this is the way that you want the layout, draw around them with chalk or colored pencil. Do not worry about marring the floor, as the lines will have to be redrawn several times and will finally be worn away while wiring the layout. Build the grid and then re-lay your cardboard layout on the floor again for proper fitting of all parts. Remove from the floor and lightly tack it in place on the grid, to be replaced gradually as roadbed base is installed.

16.) **Ballast** --- If you want to make your own ballast it is a fairly simple matter to crush stone (preferably limestone) or a brown river rock if this color is satisfactory. It is a fair amount of work using a hammer and a frame with regular house screen tacked over the bottom. A cigar box with the bottom removed can also be used. For smaller, mixed ballast, the screen can be pulled at diagonal corners so that the holes in the screen are diamond-shaped rather than square, making smaller holes. Varying amounts of pulling will make varying sized holes in the screen. Tack the screen to the frame when the desired shape is reached, and cut off the surplus around the frame. Coffee grounds can also be mixed in with the white stone in small quantities, or in greater proportion with the brown stone to reduce the amount of crushed stone necessary. Varying sizes of ballast should be used but bulk of material should be larger pieces.

17.) **Trays** for small parts drawers can be made from those very light cookie and candy plastic trays. Add a thick coat of plaster of paris on the back to stiffen them. Since milk cartons are now plastic coated, they too make excellent drawer compartments, and are white on the inside with the drawer sides hiding the lettering on them. Insert driver in a hole in the bottom to pry out the inside assembly, or cut around the cube between the clear plastic and black base with a knife to release the mechanism. If the cube is too tall for your use and it is hard to get your fingers in to remove parts, hold the cube against a grinding wheel and grind down to a more desirable height. A dozen or so of these can be put in an appropriate sized box to hold them together, using glue or Pliebond if desired, or imbed in a thin layer of plaster of paris in the bottom of the box.

18.) **Car and Building Window Screens** --- Fabric silk screen, such as that used in a silk screen process, can be used. Look in the Yellow Pages of the phone book under "Silk Screen Printing". They may give some old or used ones. mr

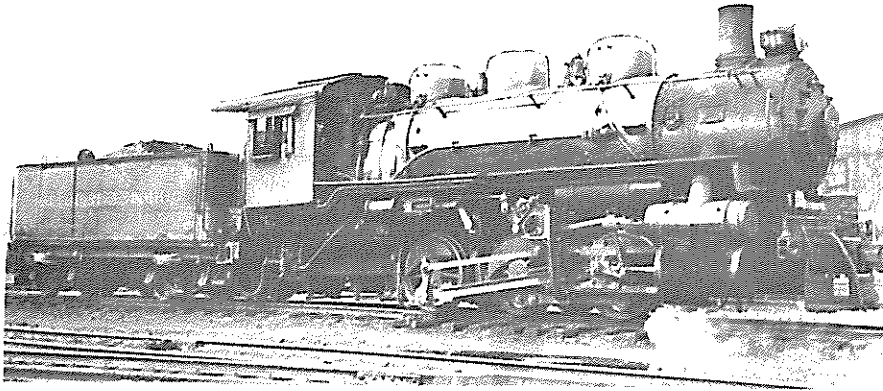
19.) **S Scale Buildings** can easily be made from O scale buildings since few if any industrial buildings have any set dimensions; even houses and window sizes vary greatly. A few changes will be necessary. The bottom of the building can be removed between the ground and the windows to a more accurate S dimension, necessitating new thresholds for the doors. Also remove a bit of the material between the roof and the top of the windows. This would not apply to O scale buildings, such as watch towers, stations, etc.

20.) **Pulse Power** --- The best and easiest source we know of is to simply put a 6 volt, 10 amp transformer winding (secondary winding) in series with either of the D.C. leads of your D.C. power pack. Of course, the primary A.C. leads to the 110 volts. The 6 volt secondary may be about 10 amps or more to pass the current your engines will draw from the D.C. power pack thru this transformer's windings without it heating up and burning out. The secondary could be two 3 volt windings in series of 10 amps each, or two 12 volt windings of 5 amps each in parallel. They have to be wired in proper phase, so check the results with a voltmeter before final installation--or TV man check it.

21.) **Cut-Off Discs** --- We cannot too strongly recommend the use of cut-off discs in your Moto-Tool to save many extra hours of rough filing, cut off gatings, rough cutting, and out small pieces or rods in half. Disc edge cuts fast. Then use side of disc or file to smooth down. Even more useful if binocular magnifiers are used. (Always wear glasses, as discs break rather easily, until you learn to hold them very straight.)

22.) **Accomplishment** --- If you have a very large or difficult undertaking to be done, break it down into a number of small, simpler tasks. Knocking these off one at a time as singular objectives in a game-like way (if possible) greatly reduces the strain and pain of a seemingly monumental task.

Engine Photos Parts Codes

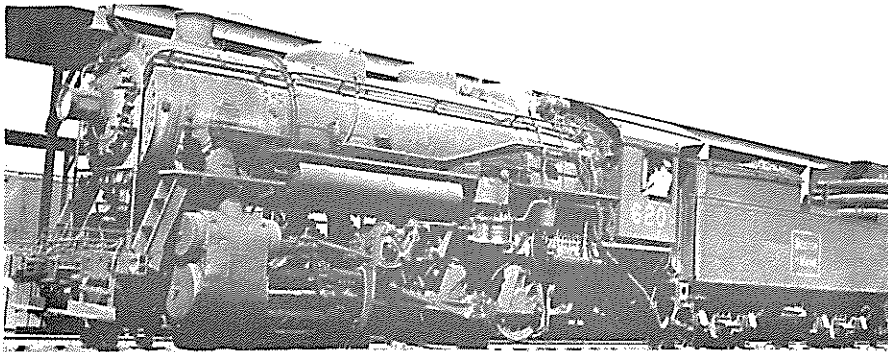


Caption Parts Code

USRA 0-6-0 Switcher (B&O #385) 6

Alco, Baldwin

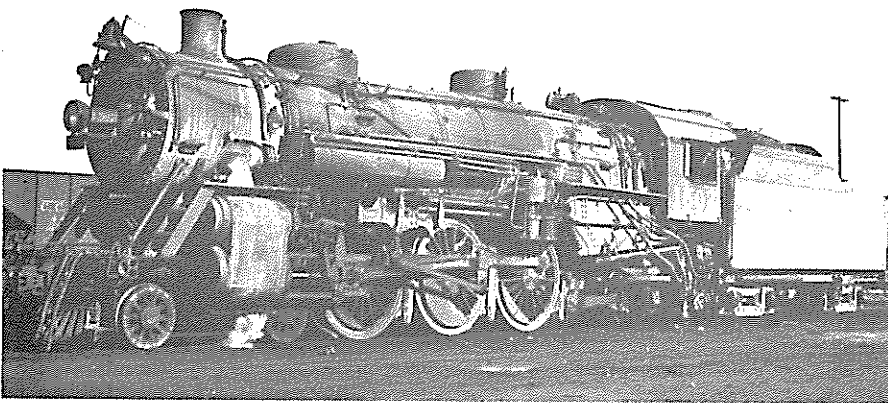
Courtesy of H.K. Vollrath



USRA 0-8-0 Switcher (B&M H2a, #620) 8

Alco, Baldwin, Lima

Courtesy of H.K. Vollrath



USRA Light Pacific (ACL P-5a, #1502) p

Alco

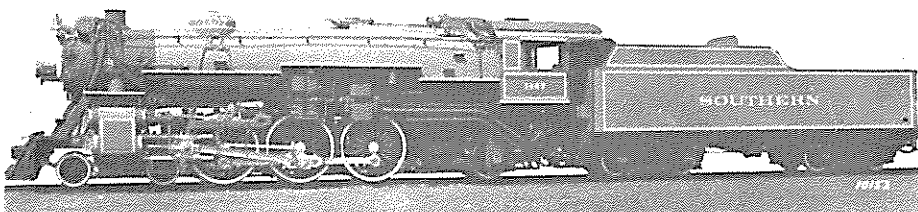
Courtesy of H.K. Vollrath



USRA Heavy Pacific (Erie K-5, #2924) a

Alco, Baldwin

Courtesy of H.L. Broadbelt



Southern P₂ Heavy Pacific (#1393-1407) c

Alco, Baldwin

Courtesy of H.L. Broadbelt

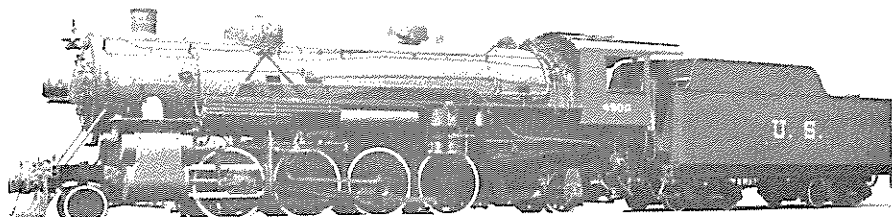
Caption Parts Code

USRA Light Mike

M

Alco, Baldwin, Lima

Courtesy of H.L. Broadbelt



USRA Heavy Mike (Mil. L-3, #8690)

I

Alco

Courtesy of H.K. Vollrath

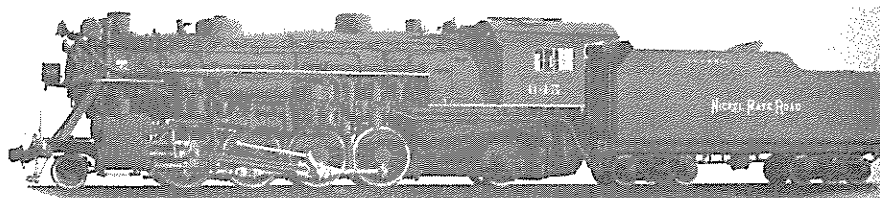


NKP Light Mike H-6-E (#632-661)

K

Lima

Courtesy of P.E. Percy



NYC and Mich. Central Heavy Mike H10a

E

NYC #1-65 renumbered #2101-2165, Lima

NYC #2166-2222, Alco

MC #123-132 renumbered #2223-2232, Lima

Courtesy of P.E. Percy

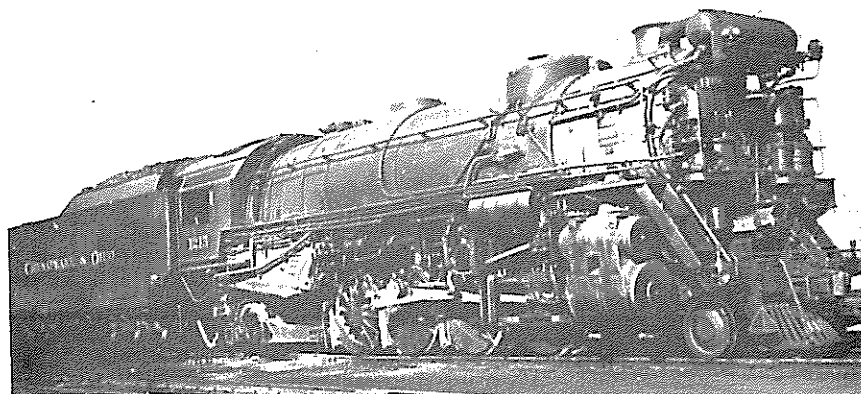


CSO Heavy Mike K-3 (#A210-1259)

S

Alco

Courtesy of H.K. Vollrath

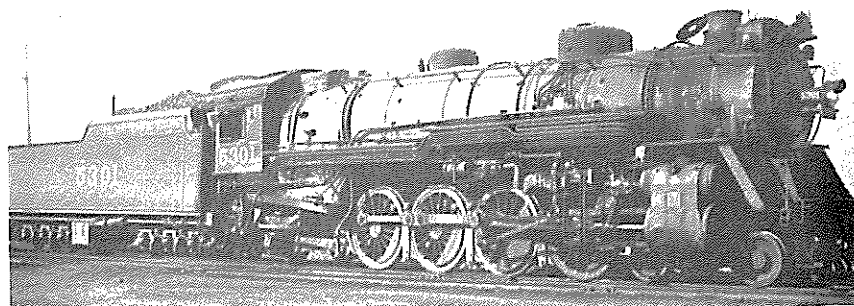


USRA Light Mountain

n

Alco, Baldwin

Courtesy of H.K. Vollrath

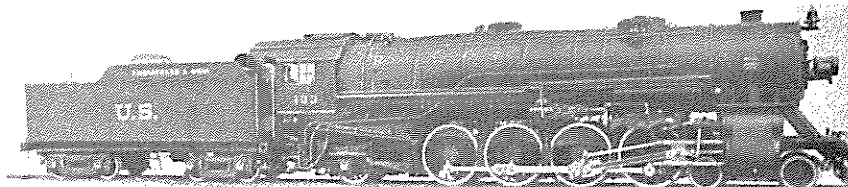


USRA Heavy Mountain

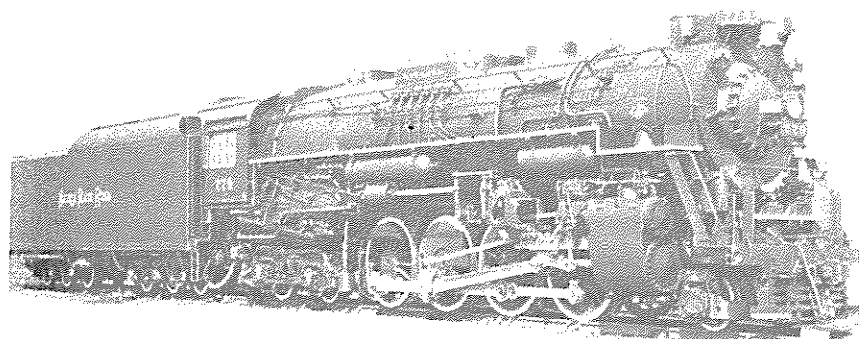
o

Alco, Baldwin

Courtesy of J. Stefan



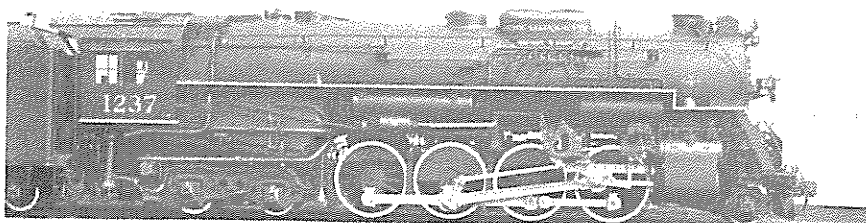
Caption Parts Code



NKP Berkshire S-3 (#770-779) b

Lima

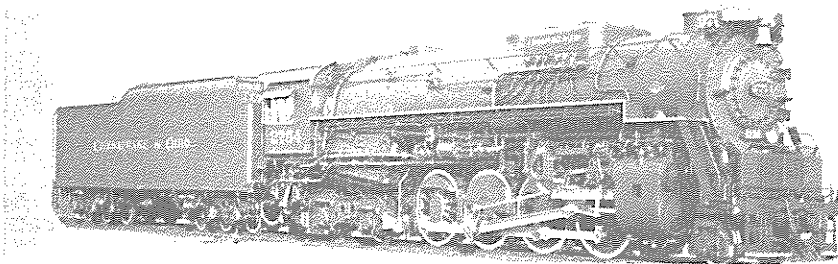
Courtesy of P.E. Percy



Pere Marquette Berkshire N-2 (#2135-2139) e

Lima

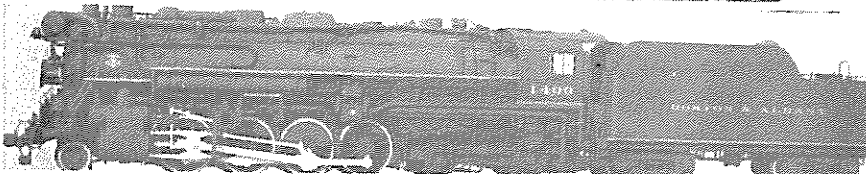
Courtesy of P.E. Percy



C&O Berkshire K-4 (Kanawha #2750-2759) r

Alco, Lima

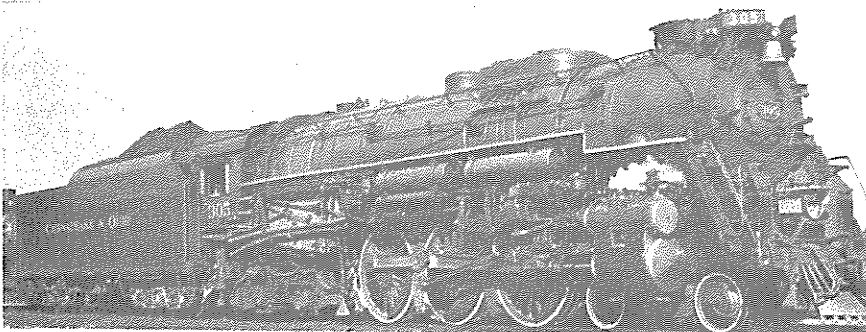
Courtesy of P.E. Percy



B&A (NYC) Berkshire A1-a (1400-1424) k

Lima

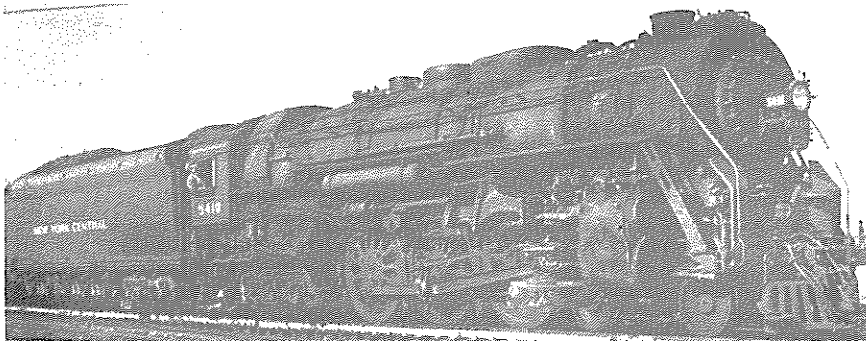
Courtesy of P.E. Percy



C&O Hudson L-2 (#300-307) H

Baldwin

Courtesy of H.K. Vollrath



NYC Hudson J-3a (#5405-5434) U
(25 engines built with Scullin Disc drivers, 25 Box-Pok)
(Earlier engines used spoke, all were 79")
Alco

Courtesy of H.K. Vollrath



NYC "Mohawk" L-3b (#3035-349) D

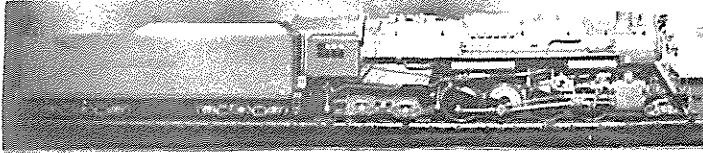
Alco, Lima

Courtesy of P.E. Percy

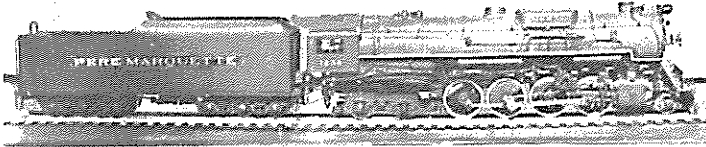
Many useable in other gauges, particularly "OH3"

3 FAMOUS BERKSHIRE KITS

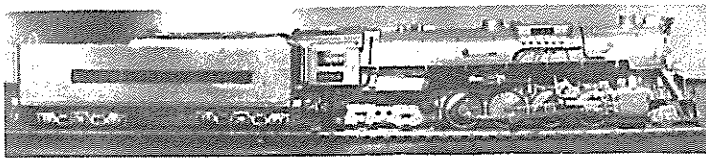
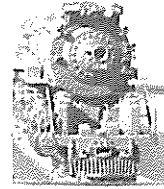
These are the "overgrown" Hikes that diesels almost did not beat
All parts "superdetailed" lost-wax castings



Nickel Plate S-3, #770-779. Last steam engine made. May 13, 1949, from Lima.



Pere Marquette N-2, #1228-1239. (PM a subsidiary of C&O.)



Chesapeake & Ohio K-4, #2750-2759(Kanawha). Next to last steam engine made.



Those who have built these engines say they run as slow and smooth as any engine they have seen. To back this up, they have won the following "Draw Bar and Performance Evaluation" contests at the National NRE conventions; 2nd place with all gauges in 1963, 1st place for S in 1964, 3rd place in 1966 and 1st place for steam in all gauges in 1970. As far as we know were not entered for the inbetween years. All parts of highest quality and detail as available in any gauge.

For the price of many good brass HO engines, you can have a brass engine kit in S scale. So for the building you can have a larger engine, easier operating larger engine, less track and turnout problems, and still not take much more space to operate than HO, with the large bonus of having more parts detail than HO and even O that has the size that they could but do not. Should you want to scratch build from our castings, they are much cheaper than HO parts. Note too that many engines can be built from our parts from the rail up to completion and can be run. Scarcely any one in any other gauge, if any can furnish all parts for a running engine. So you can build many complete engines from us.

It is to your benefit to learn to build engines, which not all that hard. More like the apprehension of is not all that hard. More like the apprehension of going on your first job. See our article on "Carbon Rod Resistance Soldering", which makes engine building simpler than gluing parts on. Then too, you will never have all the "ready to run engines" you will want, but you can build them. There is great enjoyment and pride in building the engine you are running, that most cannot boast of.

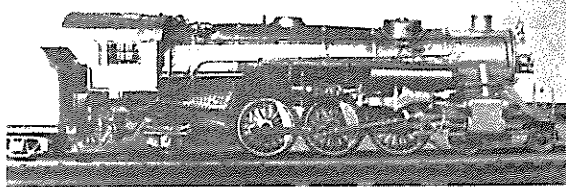
What was formerly a separate section for "Superdetail", is now included in each of the other sections. Of the few parts listed below for Berkshires are the same for other engine kits. Our #612.1 "Solder In Paste" a must.

Additional close up pictures of these engines on following pages.

BERKSHIRES

Available in Sections Or Whole Kit

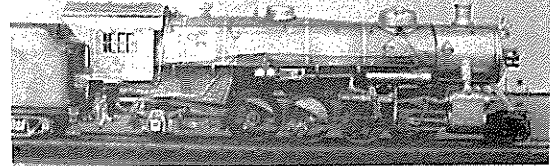
Basic Running Gear--Motor, Fly Wheel, Drivers, Crank Pins, Counterbalances, Steam Chest, Instructions, Frame, Side Rods.	\$73.00
Running Gear Details-- Trucks, Valve Gear, Springs, Crosshead, Crosshead Guides, Yoke, Beam-Deck, Rods, Pilot, Steps, Wheels, etc.	56.00
Boiler Section--Sheet .020" brass Boiler photoengraved rivets, Bands and location of Washout Plugs and Handrail Posts. Boiler Front, Bell, Domes, Cab, Lamps, Stack Whistle, Generators, Turret, etc.	75.00
Tender--Die stamped, preformed wrapper. Trucks, Wheels, Deck, Chute, Frame, Draw Bar, Hatches, etc.	49.00
Total	\$253.00



Heavy Pacific
(Heavy Hike same except 8 Drivers and 2 wheel Pilot Truck)

USRA

These are basic engines which most railroads used during the USRA era. Dozens of other engines were changed by the railroads after the USRA era with minor to major changes, such as different Headlights, Trailing Trucks, Piping and Tanks, location of Compressors, addition of Elasco Heaters and Pumps, different Pilots, etc., etc. Therefore almost an endless variety of engines can be made to fit into any layout.



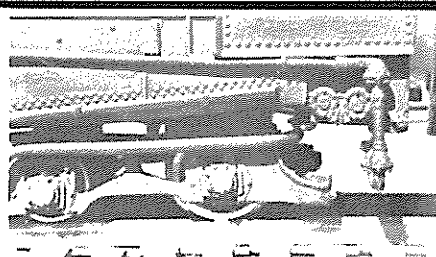
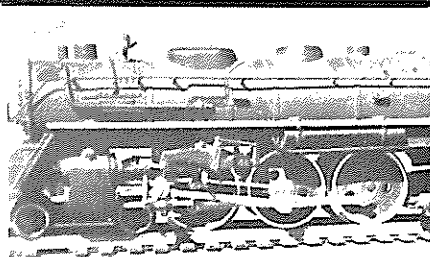
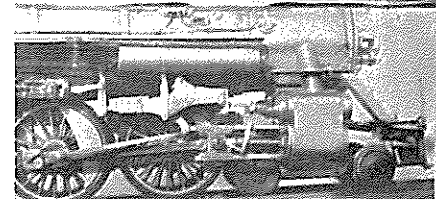
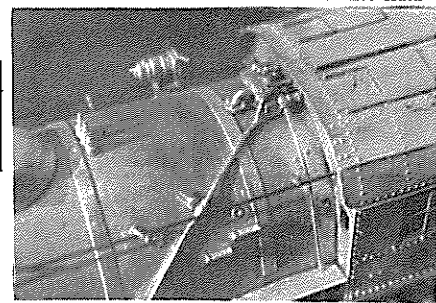
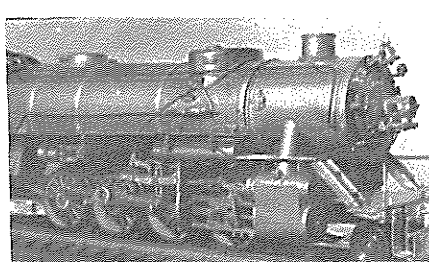
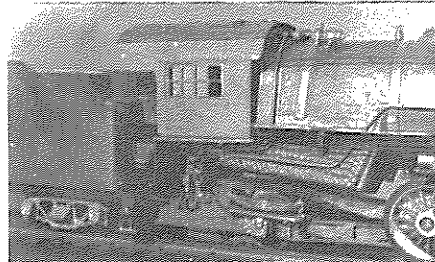
LIGHT HIKE
(Light Pacific same except 6 Drivers and 4 wheel Pilot Truck)



Available in section or whole kit.	Light Hike	Light Pac.
Basic Running Gear	\$72.00	\$65.00
Running Gear Details	47.00	47.00
Boiler and Parts	62.00	62.00
Tender Section	35.00	35.00
Total	\$216.00	\$209.00

See "Carbon Rod Resistance Soldering" p.14

Our #612.1 "Solder In Paste" a must.

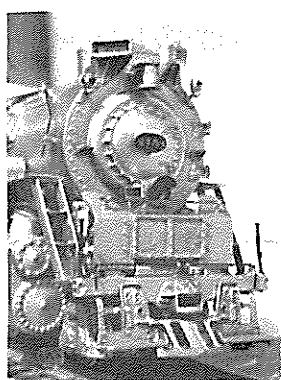
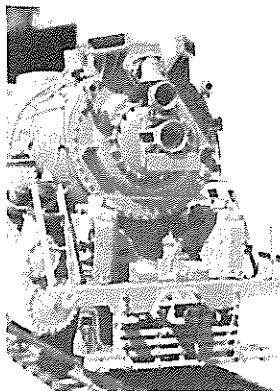
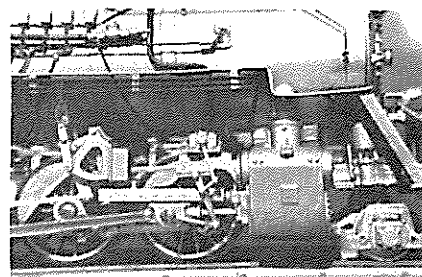
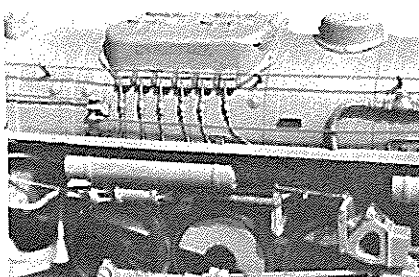
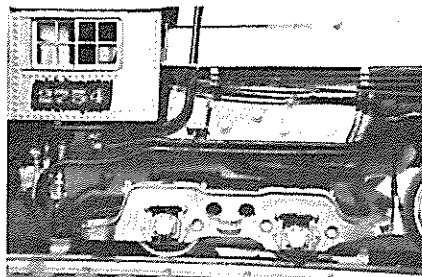


NYC HUDSON J-3a (Conversion from AF Hudson)	
Basic Running Gear-Spoke or Box For Drivers etc.	\$62.00
Running Gear Details-Trucks, Wheels, Valve Gear, etc.	41.00
Boiler Section-Bell, Head Light, Washout Plugs, Etc.	11.00
Tender Section--6 Wheel Comm. Truck, Wheels	16.00
Total	\$130.00

SEND YOUR AF STEAM CHEST FOR REBRILLING

You can use a junk engine, needing only the AF Boiler, Boiler Front, Steam Chest, Pilot, Tender less Trucks. This engine will then be perfect scale and look as good as any brass engine.

A Closer Look At 3 Berkshires and —

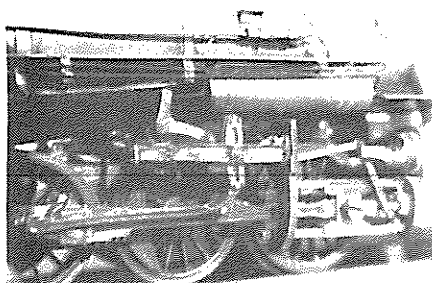


Nickel Plate (These are our models, not real) Chesapeake & Ohio

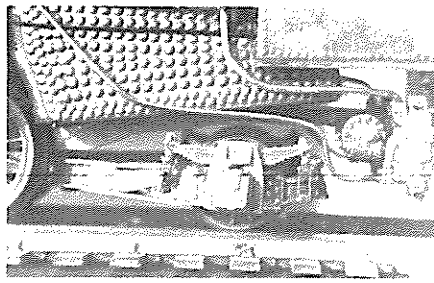


How would you like to have a stable of engines like these, all USRA's, Or perhaps a Berkshire or converted AF Hudson added—above and below.

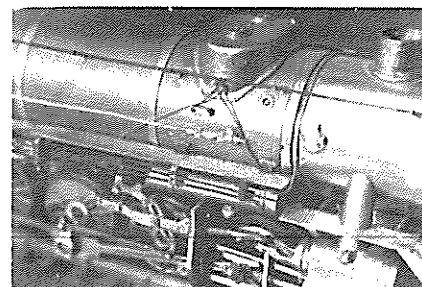
4 USRA's and —



USRA Heavy and Light Mike Valve Gear and Crossheads



Hodges Trailing Truck, Stoker Engine & Non-Lifting Injector

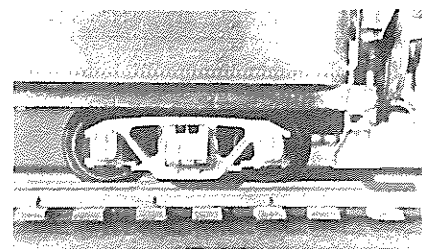


We believe few modelers realize many USRA's were used up to almost the end of steam. Certainly many were only changed by minor to major changes such as using 2 wheel Commonwealth Delta Trailing Trucks, or putting 2 Compressors on the the Deck or Boiler Front instead of on left side. Some even used Elasco Pumps and Heaters, or an added Sand Dome. Different Headlights, Valve Gear or more or less piping and Tanks. But basically USRA and these used to the end of steam era.

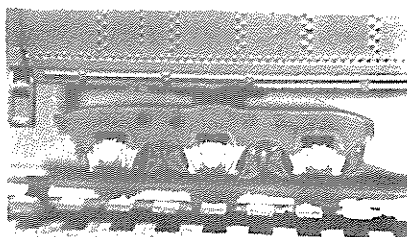
So you can see on these 4 engines only, H. & L. Pacifics and H. & L. Mikes, there are dozens of engines that can be made, all quite different.

Hudson Conversion

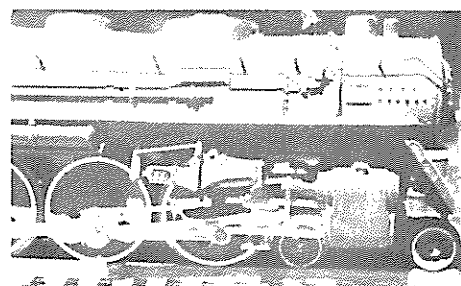
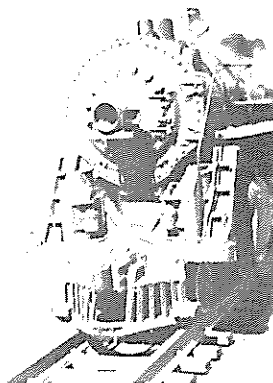
With Split Brass Frame



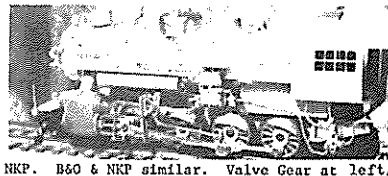
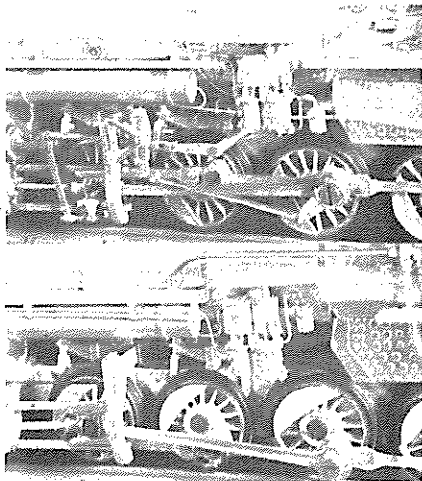
Sprung and Equalised Andrews with Leaf Springs



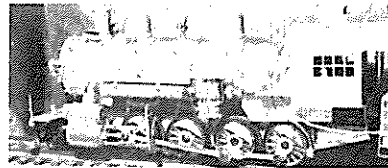
#234.5 6 Wheel Tender on Hudson



Note Throttle Rods and Levers, Working Bell, Prototypical Valve Gear and all Rods.



NKP. B&O & NKP similar. Valve Gear at left.

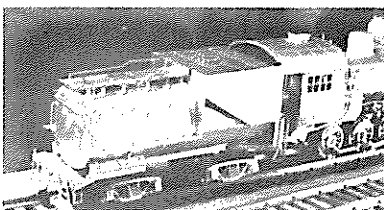


SP, UP similar, no Valve Gear as at left. MoPac, C&O & B&M similar, except have Valve Gear as above.

S Scale Locomotive & Supply

7120 Orion Dr.

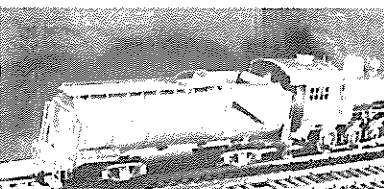
St. Louis, Mo. 63121



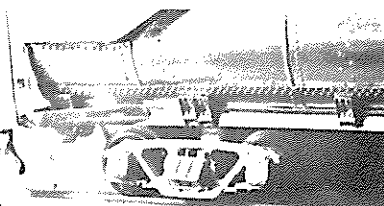
23'6" Shortie used mostly on 2-3 axle engines, older than our kits. Note oil Deck added. SP Tender same as this but 28'6" long tank, length of Tender below.



This 28'6" UP, above 28'6" SP and below 32'6" Tenders are all part of same kit. A 40' tank is currently furnished.



This 32'6" long tank is probably the longest Vanderbilt with 10'8" Bunker.



This shows the beautiful rivet detail of all and Saddles on longer Tenders and some shorter ones, furnished only with 28'6" kits.

CONSOLIDATION ENGINES (2-8-0, Scale only)						
	UP, SP	MoPac	B&O	C&O	NKP	NYC, B&M
Basic Running Gear	\$74.00	\$74.00	\$74.00	\$74.00	\$74.00	\$74.00
Running Gear Details	21.00	33.00	35.00	35.00	33.00	33.00
Boiler Section	56.00	55.00	56.00	57.00	53.00	54.00
25'8" Rectangular Tender	-----	-----	42.00	42.00	42.00	42.00
28'6" Vanderbilt Tender	58.00	58.00	-----	-----	-----	-----
TOTAL	151.00	162.00	165.00	166.00	160.00	161.00
Optional Extras						
#234.4 Drop Equalizer Tr.	2.60	2.60	-----	-----	-----	-----
#232.2 8 Wheel Brake	1.85	1.85	1.85	1.85	1.85	1.85
#209.1 Oil Deck	1.50	-----	-----	-----	-----	-----
YOUR TOTAL						

Our #612.1 "Solder In Paste" a must for ease of soldering.

Vanderbilt 23'6" "Shortie" Tender available, pictured top left. **\$48.00**

The Vanderbilt Tender tank, Boiler and rectangular Tender wrapper are pre-formed. These engines and Tenders are exact duplicates of the prototype. The engraved rivet detail on all of these are beautifully extensive. We have made the instructions very detailed for the rank beginner, so here is your chance to build your first engine. See our article on "Carbon Rod Resistance Soldering". As noted there, "all thumbs" can build with it. The small rectangular Tender goes together easier than its big brother the USRA Tender, partially because of better instructions (that could be used for the USRA) and being small-----even the Vanderbilt is not difficult---believe it or not. Both Tenders include #234.3 Andrews, sprung, Trucks, wheel sets and Draw Bar kit. The small rectangular Tender was used on many small, older engines as well as USRA 0-6-0 and 0-8-0 and others, a nice small petite Tender, well engraved.



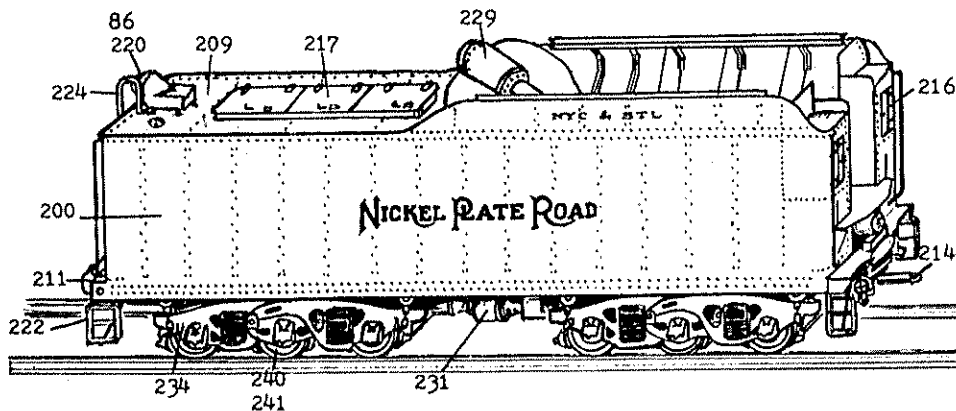
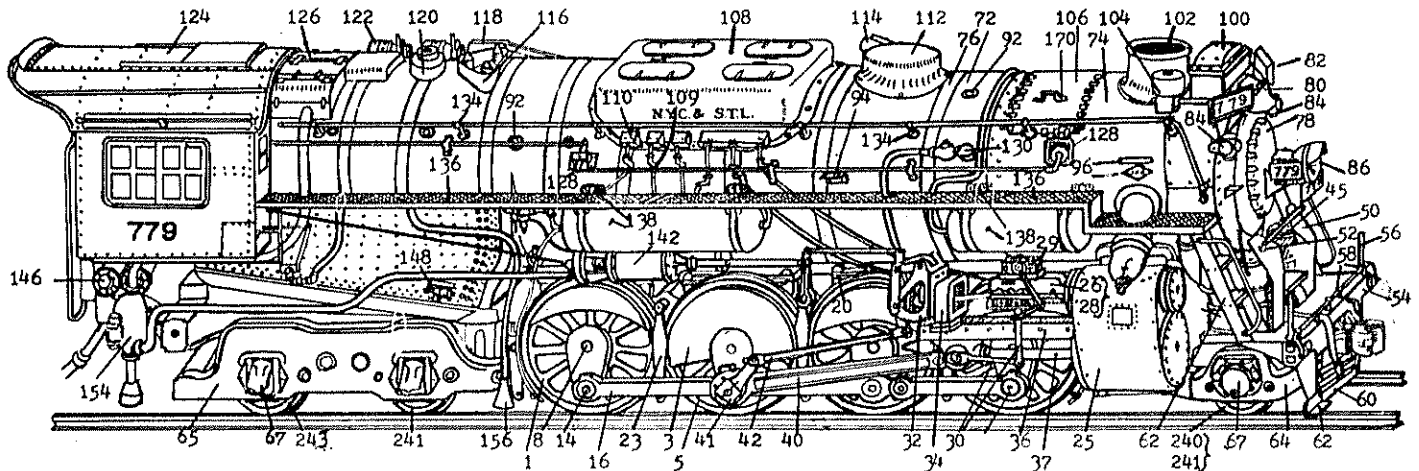
We believe these engines can be built by the very rank beginner if he is not absolutely all thumbs, with the help of our 18 pages of point by point instructions to install each and every part. Photoengraved sheet stock Boiler with all Boiler Bands, rivets and locations of Handrail Posts and Washout Plugs etched on. Soldering parts to this sheet stock Boiler is extremely easy, shooting down the old time-worn excuses of "I cannot build an engine" or "I do not have the experience". Experience does not happen like a broken leg; you have to do it like you did your job. It has to start somewhere. These are about the simplest brass engines you can build----"to start somewhere", with the UP and SP being the easiest, without a Valve Gear (some series did have them if you want to add it later). More important, you will really have a great modeler's enjoyment building these engines, seeing them take shape, part by part, and itch to build another, possibly a larger one. Possibly the most important is the pride you have in yourself that you "built it", not taken out of a box. Now you have the experience to do some more difficult and larger. These are about the smallest road engines, fitting about any layout.

See "Carbon Rod Resistance Soldering" article, page

NOTE: You will have parts left over from each of the above kits which can be returned for credit on your next order, reducing the cost of your kits.

Prototype Measure	S Measure	Nearest Fraction	Nearest # Drill	Wheel Diameter	S Scale Diameter	Used On	Usual Spoke #
1/16"	.001	-----	-----	28"	.438	Pilot Truck	
1/8"	.002	-----	-----	30"	.469		
1/4"	.004	-----	-----	33"	.516	Freight Cars, Pilot Trucks	
3/4"	.012	-----	#80	34"	.532		
1"	.016	1/64"	#78	36"	.562	Pass. Cars, Diesel, Pilot Tr.	
1 1/4"	.020	-----	#73	37"	.578		
1 3/4"	.028	9/32"	#70	39"	.594		
2"	.032	1/32	#67	40"	.625	Diesel	
2 1/2	.040	-----	#60	43	.672	Trail. Trucks	
2 3/4	.044	-----	#57	45	.704	" "	
3	.047	3/64	#56	48	.750	" "	
3 1/2	.055	-----	#54	51	.797	" & Steam Eng.	
3 3/4	.059	-----	#53	53	.829	" " "	
4	.063	1/16	#52	56	.875	A.F. " "	13
4 1/2	.071	-----	#50	57	.890	" "	
4 3/4	.075	-----	#48	58	.906	A.F. " "	
5	.078	5/64	#47	61	.953	" "	
5 1/2	.087	-----	#44	63	.984	" "	15
6	.094	3/32	#42	65	1.015	" "	
6 1/2	.102	-----	#38	67	1.047	" "	
7	.109	7/64	---	68	1.062	" "	15
7 1/2	.118	-----	#32	69	1.078	" "	15
8	.125	1/8	---	70	1.094	" "	
9	.142	9/64	#28	71	1.110	" "	
10	.156	5/32	#22	72	1.125	" "	17
11	.172	11/64	#11	73	1.141	" "	
12 (1')	.1875	3/16	#12	74	1.157	" "	
1 1/2'	.281	9/32	K	75	1.172	A.F. " "	
2'	.375	3/8	V	78	1.219	" "	17-19
2 1/2'	.469	15/32		79	1.234	" Should Be " "	" "
3'	.562	9/16		80	1.250	" "	" "
3 1/2'	.656	21/32		84	1.312	" "	" "
4'	.750	3/4		Engine Piping			
5'	.937	15/16		Prototype	S Scale	B&S Wire	
6'	1.125	1 1/8		I.D. Size	O.D. Size	Size	
7'	1.312	1 5/16		1/2"	.010	#30	
8'	1.500	1 1/2		1"	.020	#24	
9'	1.687	1 11/16		2"	.036	#19	
10'	1.875	1 7/8		3"	.055	#15	
11'	2.062	2 1/16		4"	.070	#13	
12	2.250	2 1/4		5"	.086-.091	#11-#12	
13	2.437	2 7/16		6"	.106	#10 Approx.	
14	2.625	2 5/8		Note: When ordering brass wire from local suppliers, order by size rather than gauge, as sometimes brass wire varies in gauge and corresponding size.			
15	2.811	2 13/16					
20	3.750	3 --		Screw Thread	Tap Drill	Clearance Drill	
25	4.687	4 11/16		00-90	#60	#55	
30	5.625	5 5/8		0-80	#56	3/64	
35	6.562	6 9/16		2-56	#50	#42	
40	7.500	7 1/2		4-40	#43	#31	
45	8.437	8 7/16		6-32	#36	#27	
50	9.375	9 3/8		8-32	#29	#18	
60	11.250	11 1/4					
70	13.125	13 1/8					
75	14.062	14 1/16					
80	15.000	15 ---					
90	16.875	16 7/8					
100	18.750	18 3/4					

Visual Index



Many catalog parts cannot be indexed, above, as they are from different type engines. But you can find a similar part.

Recap of Engine -- Parts -- Photos -- Plans Codes

Parts Code Engine The Part Goes On

6	USRA	0-6-0 Switcher	m	USRA	Light Mountain
8	USRA	0-8-0 Switcher	o	USRA	Heavy Mountain
p	USRA	Light Pacific	b	NKP	Berkshire #770-779
a	USRA	Heavy Pacific	e	PM	Berkshire #2135-2139
c	Southern	PS-4	r	C&O	Berkshire #2750-2759
			k	B&A	Berkshire #1400-1424, A1-a
M	USRA	Light Mike			
I	USRA	Heavy Mike	H	C&O	Hudson #300-307
K	N.K.P	Light Mike #632-661	U	NYC	Hudson #5405-5434
E	N.Y.C	Heavy Mike H10-a	D	NYC	Mohawk #3035-3049, L-3b
S	C&O	Heavy Mike #1210-1259	*		Useable in other gauges.

For our old customers, you will be interested, quickly, the new parts in this catalog

#1.1 & 1.2 51" & 56" Drivers will have

the new #10.4a 23 tooth gear to

take the new #10.4b worm.

#10.4a Gear. Interchangeable with

#10.2a gear, Gears and Worms

same course teeth as 10.2's.

#10.4b Worm. Same as #10.2b worm, but

smaller hole, for Mishima motor.

#12.6 Mashima Flat Can Motor that

sets between the drivers for

small engines, perfect and

powerful.

#12.7 Same with #10.4b worm attached

#13.3 Fly Wheel, same as others, but

with .078" hole.

#18.11 0-8-0 Frame

#42.3 Eccentric Rod--5'4" for small

engines.

#78.13 Ultra Modern Boiler Front--87"-84"

KITS

0-8-0 Switcher

Geo Hudson

Geo Heavy Mike

Modern, large Vanderbilt

#73.1 Ashpans

#83.1 Oblong Number Plates for

Boiler Front

#112.3 Steam Dome For 0-8-0 etc.

#124.3 Cab, photoengraved for

smaller engines.

#138.21 Resevoir Tank--20 1/2x84

#155.1 Starter(Operating) Valve

#166 Pipe Joints--1", 2" & 3"

#217.3 Tank Hatch

#234.7 Heading Tender Truck, 4

Wheel. Equalized.

#400.6 4 Wheel Streamlined

Passenger Truck, equal-

ized.

and AF

PHOTOENGRAVED BOILERS--SERVICES--MAKES--FACTICS--CONSOLIDATIONS

While these boilers are tremendously easier and quicker to build an engine than our former cast boilers, there are a few differences. These take less heat and less swabs as wet sinks. The following in order in the "Parts Installation Booklet"(PIB).

It probably will not be necessary to place wet swabs around boiler joints when soldering parts on, but to be on the safe side, place a ring of wet swabs around the part being torched--not larger than 1" in diameter--unless the part is larger. Do not torch parts on from inside the boilers as on cast boiler or the straight consolidation boiler. For larger parts, such as Cab, domes, stack, compressors etc., torch mostly on the cast-
ing, stray heat will be enough on the boiler--especially careful with the Cab, which you can tack solder in several places, then come back and solder in between, which is not really necessary to be soldered all the way around. Do not tap the domes down on the boiler to fit, but file the domes to fit and bend edges with long nosed pliers.

You will find a very small engraved mark at the front and rear of the boiler, on top and each side. Scribe a line between these for reference of parts location later, as

(center lines). Handrail Post holes are engraved on the boiler, very small. Drill these in building order of the PIB. Some of these will be slightly out of line, but the Handrails can be bent so the Handrail will be straight, to the hole misalignment will not be noticed. If over 1/8" relocate. The larger holes are for the Washout Plugs. For the CEO and PM, you will have to locate the Handrail Posts from the drawing. For the Light Pacific, several of these will have to be relocated from drawing(we did not engrave or design these). (Above reference on CEO and PM, on the Smoke Box Handrails).

All of the above torch soldering would be much easier if a "Carbon Rod Resistance Soldering" outfit is built according to instructions in our Catalog p14 Practically no wet sink swabs have to be used, and much faster assembly.

INSTALLING BOILER TO FRAME--Installation is the same as for cast boiler, except the hole