

# LocoGear

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## Technical Bulletin - 13

April 3, 2004

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An Introduction to the  
**Pacific Coast Shays**  
 Class 3-PC-13 and Class 3-PC-15  
 and a  
**List of All Known Prototype Drawings**

Among the many Shay locomotives that the Lima Locomotive Works built, the **Pacific Coast Shays** are probably the most widely recognized. The two dozen **Pacific Coast Shays** were among the last 41 of the 2,770 Shay locomotives built by Lima over the years. Their notoriety also has probably played a roll in their survival. There are five **Pacific Coast Shays** still in existence. A rather high percentage compared to just about any other class of steam locomotive! Three **Pacific Coast Shays** are static displays and two are operational.

For the live steam Shay model builder wanting to build a **Pacific Coast Shay**, a thorough understanding of this class of Shay locomotive will be helpful. Since the level of detail produced on a live steam model locomotive can be right down to the individual bolts and rivets,

a detail examination of the mechanical designs and specifications of these Shay locomotives is necessary.

First of all, one should understand that the **Pacific Coast Shays** were not all designed and built alike. There were both minor and major changes made to the **Pacific Coast Shay** design. These differences may affect the way a live steam model of these Shay locomotives is built. If one were going to build a model of a particular **Pacific Coast Shay**, it would be important to know what characteristics it had and how it may have differed from the other **Pacific Coast Shays**. For example, if one were going to build a live steam model of the Cass Scenic Railroad #2, (S/N 3320), it would be important to know that it is a **Phase I Pacific Coast Shay**. It also had some unique features such as a wood

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## Contact Information for ACHS and CSRM

### Allen County Historical Society

620 West Market Street  
Lima, OH 45801  
(419) 222-9426

### California State Railroad Museum Library

111 I Street  
Sacramento, CA 95814  
(916) 323-8073

burning smoke stack because it was originally built to burn wood. It was quickly converted to oil and then finally coal, but that wood burning smoke stack is still on it today as it runs up the hill at Cass, West Virginia.

Also of special interest for the model builder looking for a challenge, are the three **Pacific Coast Shay** locomotives that Lima designed but never built. These are included in this document because Lima intended to expand their product line of **Pacific Coast Shays** with larger locomotives. There are many components that these three larger Shay designs shared with the original 24 **Pacific Coast Shays**. Thus they can and are considered to be **Pacific Coast Shays**.

Fortunately, nearly all of the original prototype construction drawings still exist. This includes not only the drawings for those twenty-four **Pacific Coast Shays** that Lima actually built, but also for the three that never got off the drawing boards. These drawings can be found at the Allen County Historical Society and the California State Railroad Museum (see box on page 2 for contact information). The **Pacific Coast Shay** drawings held by these two museums not only include their general arrangement drawings, but nearly all of the individual components as well (see pages 12 through 22 for a list of these drawings). On the following pages, the similarities and differences found among these twenty-seven **Pacific Coast Shays** will be explored.

This *LocoGear Technical Bulletin*, however, will not detail the operational histories of the **Pacific Coast Shays**. For more information on their successive ownerships, operating locations, and fi-

nal dispositions, please consult both the web site [www.shaylocomotives.com](http://www.shaylocomotives.com) and the book *Pacific Coast Shay, Strong Man of the Woods*, by Dan Ranger, Jr. (published in 1964 by Golden West Books, now out of print). Both of these sources have documented well those aspects of the **Pacific Coast Shays**.

This publication, on the other hand, is intended to focus on the technical similarities and differences of their design and production specifications. This document will also focus on the **Pacific Coast Shays** as designed and built, rather than attempt to chronicle the history of their repairs and modifications. For the live steam Shay locomotive builder, this *LocoGear Technical Bulletin-13* is merely a beginning for the research necessary to build a model faithful to a particular prototype **Pacific Coast Shay**.

### **Class 3-PC-13** **Class 70-3** **Class C**

Lima built the twenty-four **Pacific Coast Shays, Class 3-PC-13**, between 1927 and 1940. The class designation stands for **3** trucks - **Pacific Coast - 13** inch diameter cylinder bore. This class designation was a break from tradition at Lima which previously identified their Shay locomotives by weight and number of trucks. The **Pacific Coast Shays** were also classified as **70-3**, which means **70**-tons - **3** trucks. In fact, all of the earlier **Pacific Coast Shays** up through **Shop Number (S/N) 3343** were given this **70-3** traditional classification as well as the new **3-PC-13**. The tonnage number used in this class system was not strictly adhered to as evidenced by the fact that the **Pacific Coast Shays** weighed closer to 80-tons empty and over 90-tons when operational. Lima also had another class system, **A, B, C, and D**. This system classifies the **Pacific Coast Shays** as **Class C**, which means they were three cylinder, three truck Shays.

The **Pacific Coast Shays** were intended to compete with the similarly designed geared Willamette locomotives that had taken away sales from Lima among the western logging companies between 1922 and 1929. The Willamette Iron and Steel Works built thirty-three geared locomotives during that time period at its facilities in Portland,

Oregon. The **Pacific Coast Shays** incorporated all of the most successful Shay design features that Lima had developed over the years. These features included the piston valve cylinders, fabricated girder frame, cast side frame trucks, superheated boilers, and all steel cabs. These were the same features that Willamette offered as “standard” on their locomotives. Prior to the **Pacific Coast Shays**, such features were considered “extras” by Lima, but on the **Pacific Coast Shays**, they were now included as “standard.”

The first **Pacific Coast Shay** was exhibited at the Pacific Logging Congress during November 1927 in Tacoma, Washington. It was well received there and twenty of the twenty-four **Pacific Coast Shays** were built over the next two and a half years. After the introduction of the **Pacific Coast Shay**, Willamette only sold five more of their geared locomotives, ending production in 1929.

It is also well documented that Lima intended to expand it’s offering of **Pacific Coast Shays** with additional larger Shay locomotives. A modified **Class 3-PC-13** and two **Class 3-PC-15** (15-inch diameter cylinder bore) Shay locomotives were developed but never built. By the time these larger **Pacific Coast Shays** were designed in 1929 and 1931, Lima’s Shay locomotive production was nearly at an end. The Great Depression of the 1930’s swept away the hopes of increased Shay locomotive sales that Lima had pinned on the **Pacific Coast Shays**. Also much of the logging industry was converting their operations at that time from railroads to trucking. The last three **Pacific Coast Shays** were built over an extended period of time, one each in 1931, 1936 and 1940.

## ***Design / Production Phases I – VII***

A close examination of the **Master Indexes** for each of the **Pacific Coast Shays** shows that not all of the two dozen **Class 3-PC-13**’s were built to identical specifications. (See the box on page three describing the **Master Indexes**.) Their general appearance is very similar, however, the **Pacific Coast Shays** that were built went through four distinctive design/production phases over the years. These are identified as **Phase I, II, III, and IV**. For the live steam Shay model builder, these differences may be important if a particular prototype

## ***Lima’s Master Indexes***

When the Lima Locomotive Works built a locomotive, they created a 30-page document, called a **Master Index**, listing specifications and the **Card Numbers** of all the drawings of all the components to be used for that individual locomotive. The **Master Indexes** are pre-printed workbooks into which the Drawing Room staff would hand write these specifications. Thus, the **Master Indexes** are the most accurate source of specification information about any particular locomotive built by Lima. For some **Construction Order Numbers** a single **Master Index** may cover more than one locomotive.

For anyone researching a particular locomotive, the **Master Indexes** are also a source of information about modifications and repairs made to that particular locomotive. Lima added notes in the **Master Indexes** with dates and **Repair Order Numbers** for components that were later sold to the locomotive’s owners for repairs and modifications. In some cases, the sales documents and sketches for such repair parts are tucked into the **Master Index**.

The **Master Indexes** for the **Pacific Coast Shays**, including the three Shay designs that were never built, are located at the California State Railroad Museum Library. However, the one for **S/N 3322** is missing. Photo copies of the **Master Indexes** for the **Pacific Coast Shays** can be ordered from CSRM at a cost of about \$28.00 each. Contact information is provided on page three.

It is recommended that the live steam Shay model builder acquire the **Master Index** for the particular **Pacific Coast Shay** to be built, as the specifications will vary from one **Pacific Coast Shay** locomotive to another. Each of the **Pacific Coast Shays** has an individual **Master Index** except for two pairs that shared the same one (the **S/N 3316 - S/N 3317** and the **S/N 3326 - S/N 3327**).

When ordering a **Master Index**, you should indicate both the **Shop Number (S/N)** and the **Order Number (O/N)**. The California State Railroad Museum Library also has other **Master Indexes** for many of the other locomotives built by Lima.

## Pacific Coast Shay Roster

Shop Number (S/N)	Order Number (O/N)	Design /Prod. Phase	Road Number	First Operator	Class	Empty Weight	Date Shipped	Survivors
3312	472	I	11	Bloedel, Stewart & Welch Ltd.	3-PC-13	155,000	10/26/27	
3316	476	II	5	Weyerhaeuser Timber Co.	3-PC-13	158,400	2/16/28	
3317	476	II	2	Chiloquin Lumber Co.	3-PC-13	158,400	2/16/28	
3318	477	II	15	Bloedel Donovan Lumber Mills	3-PC-13	156,600	4/9/28	
3319	478	II	109	Cascade Timber Co.	3-PC-13	160,000	5/5/28	
3320	478	II	4	Mayo Lumber Co.	3-PC-13	160,000	7/26/28	*
3322	478	II	91	Polson Logging Co.	3-PC-13	160,200	10/1/28	
3326	483	II	6	Hedlund Lumber & Manufacturing Co.	3-PC-13	160,500	12/3/28	
3327	483	II	5	Forest Lumber Co.	3-PC-13	161,600	1/10/29	*
3328	484	III	9	Victoria Lumber & Manufacturing Co.	3-PC-13	157,900	1/29/29	
3329	484	III	2	Cathels & Sorenson	3-PC-13	157,900	1/19/29	
3330	485	III	11	St. Paul & Tacoma Lumber Co.	3-PC-13	161,000	2/15/29	
3331	486	III	4	Shaw Bertram Lumber Co.	3-PC-13	161,500	3/22/29	
3332	487	VI		Design Only	3-PC-15			
3332	505	VII		Design Only	3-PC-15			
3334	489	III	1	Tideport Logging Co.	3-PC-13	161,000	4/26/29	
3335	490	III	3	Shawnigan Lake Lumber Co.	3-PC-13	161,000	7/19/29	
3340	495	III	4	Island Logging Co.	3-PC-13	161,000	9/12/29	
3343	498	III	191	Polson Logging Co.	3-PC-13	160,600	10/3/29	
3344	499	III	4	Merrill-Ring & Wilson Ltd.	3-PC-13	160,600	2/17/30	
3346	501	III	2	Somers Lumber Co.	3-PC-13	162,000	11/29/29	*
3347	502	III	1	Mason County Logging Co.	3-PC-13	162,400	4/5/30	
3348	503	III	10	Ozette Timber Co.	3-PC-13	162,000	4/28/30	*
3349	504	III	4	Dolbeer & Carson Lumber Co.	3-PC-13	162,200	4/2/31	
3350	506	IV	5	Merrill, Ring & Wilson Ltd.	3-PC-13	162,200	4/4/36	*
3351	507	V		Cancelled Order	3-PC-13		4/4/31	
3352	508	IV	19	Bloedel, Stewart & Welch Ltd.	3-PC-13	162,200	1/11/40	

**Pacific Coast Shay** is modeled.

The roster on page four provides some details for all of the **Pacific Coast Shays** including design phase, **Shop Number (S/N)**, **Order Number (O/N)**, date built, etc. Note that each phase is assigned a color in this publication. These colors will be used in this and other charts to indicate the design/production phases.

The design/production phases outlined in this publication were not designated by the Lima Locomotive Works, but rather have been identified by and are here set forth by this author after considerable research. This research includes the detailed examination of all of the **Master Indexes** of the **Pacific Coast Shays**, as well as viewing many of the relevant drawings. The research method used was based upon a survey comparing 84 component and arrangement drawings common to nearly all of the **Pacific Coast Shays**. The components selected

for this survey are also common to nearly all Shay locomotives as well. The compiled data of this survey can be seen in the chart beginning on page six through page eight. This chart shows the major components used in the **Pacific Coast Shays** and how they changed or remained the same from phase to phase. Under each phase is listed Lima's drawing or **Card Number** for that component or general arrangement drawing. (Please refer to **LocoGear Technical Bulletin - 09** for an explanation of the Lima Drawing / Card Numbering System.) The background colors distinguish the phase that initiated a change in the specification (**Card Number**) of a major component and show how long that specification was in effect.

Although the phases outlined in this publication are used to distinguish their variation, there were many components of the twenty-four **Pacific Coast Shays** that remained consistent throughout their

production. For example, the same Erection and Cross-Section drawings were used for all twenty-four built. Also the 13-inch bore by 15-inch stroke Piston Valve Cylinders, 36-inch diameter Wheels, right and left side cast steel Truck Frames, Crank Shafts, Line Shafts, Rim Gears and Pinions, Engine and Tender Frame End Castings, and Tender Frames all remained unchanged for all of the **Class 3-PC-13** Shay locomotives built.

This author has taken great care to distinguish these phases based on **major** specification changes. However, it should also be noted that some changes in specifications shown are relatively minor and are not necessarily used to define a new phase. For example, the change in the Engine Frame specification was used to distinguish **Phase I** from **Phase II** when a new drawing was used. However, the difference in Engine Frame specifications between **Phase II** and **Phase III - IV** using a later revision of the same drawing, which in this case was only a change in the location of the water fill Siphon, is relatively minor and was not in itself used as a factor determining a change in phase. Then when the Engine Frame specifications changed again with new drawings for each of **Phases V, VI, and VII**, these changes all contributed to determine these phase changes.

It should also be noted that the **Pacific Coast Shays** were not entirely designed new from the rail up. Although there were many new components designed specifically for the **Pacific Coast Shays**, Lima followed their normal design practice and used old component designs where they could. For example, much of the engine section including the Piston Valve Cylinders, Cylinder Frames and Bottom Bracket were all new component designs specifically made for the **Pacific Coast Shays**, however, the Crank Shaft, Coupling Rings, Horn Couplings, Square Shafts, Rim Gears, Pinions and Wheels were all component designs borrowed from earlier Shay locomotives.

The following are descriptions of the design/production phases and show how the **Pacific Coast Shay** design evolved over the years. **Phases I** through **IV** are assigned chronologically to the twenty-four **Pacific Coast Shays** that were built. **Phases V** through **VII** are assigned to the three **Pacific Coast Shay** designs that never made it off the drawing board. These last three phases do not follow a strict chronological order but rather are based

on their progressive differences away from the standard **Pacific Coast Shay** designs found in the previous phases.

## Phase I

The first **Pacific Coast Shay**, S/N 3312, built in 1927 was also Lima's prototype for this new **Class 3-PC-13** Shay locomotive and as a result had some unique features. It alone is designated **Phase I** because several design changes were made after its completion to the subsequent **Pacific Coast Shays**. The major difference it had was that it was built on a different Engine Frame than all the rest.

## Phase II

Beginning with the second **Pacific Coast Shay**, S/N 3316, all of the remaining **Class 3-PC-13** Shay locomotives built shared a new Frame Plan, which included several new frame components. Changes were also made to the Fuel Bunker and Oil Tank beginning with **Phase II** which lasted through **Phase IV**. The **Phase II** design includes eight **Pacific Coast Shays**, S/N 3316 through 3320, 3322, 3326 and 3327, all built in 1928 and early 1929.

During **Phase II** production, the **Pacific Coast Shay's** Cab underwent some changes. Beginning with S/N 3319, Lima made some changes in the Cab's back wall panel and lowered some of the windows for better visibility. Initially a revision was made to the original Cab drawing, but by S/N 3322 these changes were incorporated into a new Cab drawing. This new Cab design was used on the remaining **Phase II** and **Phase III Pacific Coast Shays**.

The **Phase II Pacific Coast Shays** contain two locomotives with specification changes that were not enough to designate a new phase, but must be noted. The S/N 3320, which was very similar to the other **Phase II** Shay locomotives, had several unique features added to it because it was the only one originally designed and built to burn wood. Most of the other **Pacific Coast Shays** were built to burn oil. Therefore S/N 3320 had a Grate in the Firebox, a wood burning Smoke Stack and a Wood

*(Continued on page 8)*

PACIFIC COAST SHAYS	Phase I	Phase II	Phase II	Phase II	Phase III	Phase III	Phase III	Phase IV	Phase IV	Phase V	Phase VI	Phase VII
Shop Number (S/N)	3312	3316-3319, 3322, 3326	3320	3327	3328, 3330, 3331, 3334, 3335, 3340, 3343, 3346-3349	3329	3350	3352	3351	3332 (487)	3332 (505)	
Class	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-15	3-PC-15
Axle	112-A-5015	112-A-5015	112-B-5015	112-B-5015	112-B-5015	112-B-5015	112-B-5015	112-B-5015	112-B-5015	112-B-5015	112-B-5004	112-A-5001
Boiler	139-B-5011	139-B-5011	139-B-5011	139-B-5011	139-B-5011	139-B-5011	139-E-5011	139-D-5011	139-A-5016	139-A-5016	139-A-5013	139-A-5014
Bottom Bracket	187-A-5012	187-A-5012	187-A-5012	187-A-5012	187-A-5012	187-A-5012	187-A-5012	187-A-5015	187-B-5015	187-B-5015	187-A-5013	187-A-5014
Air Pump Bracket	202-C-5021	202-C-5021	202-C-5021	202-C-5021	202-C-5021	202-C-5021	202-C-5021	202-C-5021	202-C-5021	202-C-5021	202-H-5021	202-H-5021
End Timber Arrgt. Engine	214-A-5031	214-A-5032	214-A-5032	214-A-5032	214-A-5032	214-A-5032	214-A-5032	214-A-5032	214-B-5032	214-B-5032	214-A-5033	214-A-5033
End Timber Arrgt. Tender	213-A-5057	213-A-5057	213-A-5057	213-A-5057	213-A-5057	213-A-5057	213-A-5057	213-A-5057	213-A-5057	213-A-5057	214-A-5034	214-A-5034
Cab	223-A-5036	223-AB-5036	223-B-5036	223-A-5037	223-A-5037	223-A-5037	223-A-5037	223-B-5037	223-A-5037	223-A-5037	224-A-5007	224-A-5007
Cylinder Frame Support	313-A-5011	313-A-5011	313-A-5011	313-A-5011	313-A-5011	313-A-5011	313-A-5011	313-A-5011	313-B-5011	313-B-5011	313-A-5012	313-A-5013
Cylinder Frame	314-A-5014	314-A-5014	314-A-5014	314-A-5014	314-A-5014	314-A-5014	314-A-5014	314-A-5014	314-A-5027	314-A-5027	314-A-5016	314-A-5018
Cylinder (Piston Valve)	314-A-5015	314-A-5015	314-A-5015	314-A-5015	314-A-5015	314-A-5015	314-A-5015	314-A-5015	314-A-5015	314-A-5015	314-A-5017	314-A-5017
Cylinder Head	322-B-5000	322-B-5000	322-B-5000	322-B-5000	322-B-5000	322-B-5000	322-B-5000	322-B-5000	322-B-5000	322-B-5000	322-A-5068	322-A-5068
Steam Chest Head Top	322-A-5062	322-A-5062	322-A-5062	322-A-5062	322-A-5062	322-A-5062	322-A-5062	322-A-5062	322-A-5062	322-A-5062	322-A-5067	322-A-5067
Steam Chest Head Bottom	322-A-5063	322-A-5063	322-A-5063	322-A-5063	322-A-5063	322-A-5063	322-A-5063	322-A-5063	323-A-5003	323-A-5003	322-A-5069	323-A-5004
Drawhead	372-A-5030	372-A-5030	372-B-5030	372-B-5030	372-A-5030	372-A-5030	372-A-5030	372-A-5030	372-A-5030	372-A-5030	372-B-5030	372-B-5030
Safety Bar Pin & Key	372-A-5083	372-A-5083	372-A-5083	372-A-5083	372-A-5083	372-A-5083	372-A-5083	372-A-5083	372-A-5083	372-A-5083	372-A-5083	372-A-5083
Draft Gear Frame (Front)	373-AB-5007	373-AB-5007	373-AB-5007	373-AB-5007	373-AB-5007	373-AB-5007	373-AB-5007	373-AB-5007	373-AB-5007	373-AB-5007	373-K-5020	373-K-5020
Draft Gear Frame (Rear)	373-A-5024	373-A-5024	373-A-5024	373-A-5024	373-A-5024	373-A-5024	373-A-5024	373-A-5024	373-A-5024	373-A-5024	373-B-5024	373-B-5024
Eccentric	392-A-5097	392-A-5097	392-A-5097	392-A-5097	392-A-5097	392-A-5097	392-A-5097	392-A-5097	392-A-5097	392-AB-5101	392-B-5100	392-B-5100
Erecting Elevation Engine & Tender	420-A-5003	420-A-5003	420-B-5003	420-A-5003	420-A-5003	420-B-5003	420-A-5003	420-A-5003	420-A-5003	420-A-5008	420-A-5004	420-A-5009
Sections Front & Backhead	437-A-5001	437-A-5001	437-A-5001	437-A-5001	437-A-5001	437-A-5001	437-C-5001	437-C-5001	437-A-5003	437-A-5003	Not Listed	437-A-5002
Exhaust Drop Pipe	442-A-5096	442-A-5096	442-A-5096	442-A-5096	442-A-5096	442-A-5096	442-A-5096	442-A-5096	442-A-5096	442-A-5096	442-A-5042	442-A-5042
Exhaust Pipe Arrgt.	443-A-5002	443-A-5002	443-A-5002	443-A-5002	443-A-5002	443-A-5002	443-A-5002	443-A-5002	443-B-5002	443-B-5002		
Furnace Bearer Plate	482-A-5149	482-A-5149	482-D-5149	482-D-5149	482-D-5149	482-D-5149	482-D-5149	482-D-5149	482-A-5149	482-D-5149	482-A-5151	482-A-5151
Boiler Saddle	482-A-5098	482-A-5098	482-A-5098	482-A-5098	482-A-5098	482-A-5098	482-A-5098	482-A-5098	482-A-5098	482-A-5098	482-C-5093	482-C-5093
Furnace Bearer Rear	482-B-5133	482-B-5133	482-B-5133	482-B-5133	482-B-5133	482-B-5133	482-B-5133	482-B-5133	482-B-5133	482-B-5133	482-A-5203	482-A-5203
Boiler Bearer Fill Block	482-A-5134	482-A-5134	482-A-5134	482-A-5134	482-A-5134	482-A-5134	482-A-5134	482-A-5134	482-A-5134	482-A-5134	482-B-5134	482-B-5134
Frame Spreader Brace	482-A-5198	482-A-5198	482-A-5198	482-A-5198	482-A-5198	482-A-5198	482-A-5198	482-A-5198	482-A-5198	482-A-5198	482-B-5198	482-B-5198
Frame Center Plate	482-D-5088	482-D-5088	482-D-5088	482-D-5088	482-D-5088	482-D-5088	482-D-5088	482-D-5088	483-A-5059	483-A-5059	483-C-5008	483-C-5008
Furnace Bearer Front	483-A-5059	483-A-5059	483-A-5059	483-A-5059	483-A-5059	483-A-5059	483-A-5059	483-A-5059	483-A-5059	483-A-5059	483-A-5061	483-A-5061
Frame End Casting (Engine)	483-A-5060	483-A-5060	483-A-5060	483-A-5060	483-A-5060	483-A-5060	483-A-5060	483-A-5060	483-A-5060	483-A-5060	483-A-5062	483-A-5062
Eng. Frame Layout Girder	488-AB-5051	488-A-5054	488-B-5054	488-B-5054	488-B-5054	488-B-5054	488-B-5054	488-B-5054	488-AB-5061	488-AB-5061	488-A-5055	488-A-5062
Grate Arrgt.			513-A-5012		514-A-5007							
Link	583-A-5001	583-A-5001	583-A-5001	583-A-5001	583-A-5001	583-A-5001	583-A-5001	583-A-5001	583-A-5001	583-A-5001	583-B-5003	583-B-5003



PACIFIC COAST SHAYS	Phase I	Phase II	Phase II	Phase II	Phase III	Phase III	Phase III	Phase III	Phase IV	Phase IV	Phase V	Phase VI	Phase VII
Shop Number (SN)	3312	3316-3319, 3322, 3326	3320	3327	3328, 3330, 3331, 3334, 3335, 3340, 3343, 3346-3349	3329	3350	3352	3351	3332 (487)	3351	3332 (487)	3332 (505)
Class	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-15	3-PC-15
Super Heater Damper Cylinder Piping Arrgt	642-A-5003	642-A-5003	642-A-5003	642-A-5003	642-A-5003	642-A-5003	642-A-5003	642-A-5003	642-A-5003	642-A-5003	642-A-5003		
Piston Rod	7514	7514	7514	7514	7514	7514	7514	7514	652-B-5172	652-B-5172	652-B-5172	652-B-5172	652-B-5172
Piston Head	652-A-5000	652-A-5000	652-A-5000	652-A-5000	652-A-5000	652-A-5000	652-A-5000	652-A-5000	652-A-5000	652-A-5000	652-A-5000	652-A-5166	652-A-5166
Reverse Lever Arggt.	683-A-5012	683-A-5012	683-A-5012	683-A-5012	683-A-5012	683-A-5012	683-A-5012	683-A-5012	683-C-5012	683-A-5013	683-A-5013	683-A-5013	683-A-5013
Coupling Ring #16	743-AB-5011	743-AB-5011	743-AB-5011	743-AB-5011	743-AB-5011	743-AB-5011	743-AB-5011	743-AB-5011	743-AB-5094	743-AB-5095	743-AB-5095	743-AB-5095	743-AB-5114
Coupling Ring # 14	743-AB-5010	743-AB-5010	743-AB-5010	743-AB-5010	743-AB-5010	743-AB-5010	743-AB-5010	743-AB-5094	743-AB-5094				
Crankshaft	745-A-5000	745-A-5000	745-A-5000	745-A-5000	745-A-5000	745-A-5000	745-A-5000	745-A-5000	745-A-5022	745-A-5020	745-A-5021	745-A-5020	745-A-5021
Gear Rim	743-A-5077	743-A-5077	743-A-5077	743-A-5077	743-A-5077	743-A-5077	743-A-5077	743-A-5077	743-A-5107	743-A-5084	743-A-5111	743-A-5084	743-A-5111
Crankshaft Horn Coupling	742-A-5002	742-A-5002	742-A-5002	742-A-5002	742-A-5002	742-A-5002	742-A-5002	742-A-5002	742-A-5416	742-A-5369	742-A-5369	742-A-5369	742-A-5369
Line Shaft	743-A-5078	743-A-5078	743-A-5078	743-A-5078	743-A-5078	743-A-5078	743-A-5078	743-A-5078	743-A-5103	743-A-5090	743-A-5109	743-A-5090	743-A-5109
Line Shaft Bearing	742-A-5097	742-A-5097	742-A-5097	742-A-5097	742-A-5097	742-A-5097	742-A-5097	742-A-5097	742-J-5097	742-A-5370	742-B-5370	742-A-5370	742-B-5370
Line Shaft Bearing Plate	742-E-5084	742-E-5084	742-E-5084	742-E-5084	742-E-5084	742-E-5084	742-E-5084	742-E-5084	742-E-5084				
Line Shaft Horn Coupling	742-B-5001	742-B-5001	742-B-5001	742-B-5001	742-B-5001	742-B-5001	742-B-5001	742-B-5001	742-A-5416	742-A-5369	742-A-5369	742-A-5369	742-A-5369
Line Shaft Horn Coupling	742-A-5280	742-A-5280	742-A-5280	742-A-5280	742-A-5280	742-A-5280	742-A-5280	742-A-5280					
Pinon	742-A-5344	742-A-5344	742-A-5344	742-A-5344	742-A-5344	742-A-5344	742-A-5344	742-A-5344	742-A-5415				
Square Shaft Front	742-A-5343	742-A-5343	742-A-5343	742-A-5343	742-A-5343	742-A-5343	742-A-5343	742-A-5343	742-F-5003	742-A-5373	742-A-5373	742-A-5373	742-A-5373
Square Shaft Center	742-A-5003	742-A-5003	742-A-5003	742-A-5003	742-A-5003	742-A-5003	742-A-5003	742-A-5003	742-H-5003	742-A-5373	742-A-5373	742-A-5373	742-A-5373
Square Shaft Back	742-D-5250	742-D-5250	742-D-5250	742-D-5250	742-D-5250	742-D-5250	742-D-5250	742-D-5250	742-A-5003	742-A-5373	742-A-5373	742-A-5373	742-A-5373
Square Shaft Sleeve Front	742-C-5310	742-C-5310	742-C-5310	742-C-5310	742-C-5310	742-C-5310	742-C-5310	742-C-5310	742-A-5387	742-A-5372	742-A-5372	742-A-5372	742-A-5372
Square Shaft Sleeve Center	742-A-5387	742-A-5387	742-A-5387	742-A-5387	742-A-5387	742-A-5387	742-A-5387	742-A-5387	742-A-5387	742-A-5372	742-A-5372	742-A-5372	742-A-5372
Square Shaft Sleeve Back	742-A-5110	742-A-5110	742-A-5110	742-A-5110	742-A-5110	742-A-5110	742-A-5110	742-A-5110	742-A-5417	742-A-5372	742-A-5372	742-A-5372	742-A-5372
Smoke Box Front Details	752-A-5079	752-A-5079	752-A-5079	752-A-5079	752-A-5079	752-A-5079	752-A-5079	752-A-5079	752-A-5079	752-A-5079	752-A-5079	752-A-5079	752-A-5079
Smoke Box Front	A-12964	A-12964	A-12964	A-12964	A-12964	A-12964	A-12964	A-12964	A-12964	A-12964	A-12964	A-12964	A-12964
Smoke Stack	752-B-5023	752-B-5023	752-B-5023	752-B-5023	752-B-5023	752-B-5023	752-B-5023	752-B-5023	752-B-5023	752-B-5023	752-B-5023	752-B-5023	752-B-5023
Smoke Box Arrangement	813-B-5011	813-B-5011	813-B-5011	813-B-5011	813-B-5011	813-B-5011	813-B-5011	813-B-5011	813-B-5011	813-B-5011	813-B-5011	813-B-5011	813-B-5011
Fuel Bunker	833-B-5007	833-D-5007	833-D-5007	833-D-5007	833-D-5007	833-D-5007	833-D-5007	833-D-5007	NONE	NONE	NONE	833-D-5001	NONE
Frame Center Plate	852-A-5001	852-A-5001	852-A-5001	852-A-5001	852-A-5001	852-A-5001	852-A-5001	852-A-5001	852-A-5001	852-A-5002	852-A-5002	852-A-5002	852-B-5002
Tender Frame End Casting	853-A-5005	853-A-5005	853-A-5005	853-A-5005	853-A-5005	853-A-5005	853-A-5005	853-A-5005	853-A-5005	853-A-5005	853-A-5005	853-A-5005	853-A-5005
Frame Tender	857-A-5003	857-A-5003	857-A-5003	857-A-5003	857-A-5003	857-A-5003	857-A-5003	857-A-5003	857-A-5003	857-A-5003	857-A-5003	857-A-5004	857-A-5004
Oil Tank	883-D-5047	883-E-5047	883-E-5047	883-A-5052	883-E-5047	NONE	883-A-5054	883-A-5054	883-A-5054	883-A-5054	883-A-5054	883-E-5015	883-A-5053
Water Tank	883-L-5017	883-L-5017	883-L-5017	883-B-5051	883-L-5017	883-L-5017	883-N-5017	883-L-5017	883-N-5017	883-N-5017	883-N-5017	884-E-5003	883-A-5053
Throttle Arrangement	914-A-5014	914-A-5014	914-A-5014	914-A-5014	914-A-5014	914-A-5014	914-A-5014	914-A-5014	914-A-5014	914-A-5014	914-A-5015	917-A-5003	884-F-5003
Throttle Valve	912-A-5079	912-A-5079	912-A-5079	912-A-5079	912-A-5079	912-A-5079	912-A-5079	912-A-5079	912-A-5079	912-A-5079	912-A-5079	912-A-5079	912-A-5079

PACIFIC COAST SHAYS	Phase I	Phase II	Phase II	Phase II	Phase III	Phase IV	Phase IV	Phase V	Phase VI	Phase VII
Shop Number (S/N)	3312	3316-3319, 3322, 3326	3320	3327	3328, 3330, 3331, 3334, 3335, 3340, 3343, 3346-3349	3329	3350	3351	3332 (487)	3332 (505)
Class	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-13	3-PC-15	3-PC-15
Equalizer	932-A-5203	932-A-5203	932-B-5203	932-B-5203	932-B-5203	932-B-5203	932-B-5203	932-A-5619	932-A-5208	932-A-5618
Thrust Plate	932-J-5481	932-J-5481	932-J-5481	932-J-5481	932-B-5505	932-B-5505	932-B-5505	932-A-5559	932-A-5509	932-A-5610
Truck Inside Box	932-A-5147	932-A-5147	932-A-5147	932-A-5147	932-A-5518	932-A-5518	932-A-5518	932-B-5518	933-A-5508	932-A-5607
Truck Inside Box Cap	932-B-5480	932-B-5480	932-B-5480	932-B-5480	932-A-5531	932-A-5531	932-A-5531	932-A-5531	NONE	932-A-5608
Truck Pedestal Cap	932-A-5320	932-A-5320	932-A-5320	932-A-5320	932-A-5529	932-A-5529	932-A-5529	932-A-5529	932-A-5507	932-A-5609
Truck Bolster	933-E-5037	933-E-5037	933-E-5037	933-E-5037	933-E-5037	933-E-5037	933-E-5037	933-A-5144	933-B-5096	933-A-5142
Truck Box Cap Right	932-A-5105	932-A-5105	932-A-5105	932-A-5105	932-A-5105	932-A-5105	932-A-5105	932-D-5105	932-A-5535	932-A-5617
Truck Box Right	933-A-5036	933-A-5036	933-A-5036	933-A-5036	933-A-5036	933-A-5036	933-A-5036	933-F-5036	933-D-5031	933-B-5001
Truck Center Plate	932-A-5415	932-A-5415	932-A-5415	932-A-5415	932-A-5415	932-A-5415	932-A-5415	933-A-5154	933-DK-5093	933-B-5154
Truck Frame Left	933-B-5034	933-B-5034	933-B-5034	933-B-5034	933-B-5034	933-B-5034	933-B-5034	933-B-5034	933-B-5061	933-B-5004
Truck Frame Right	933-B-5033	933-B-5033	933-B-5033	933-B-5033	933-B-5033	933-B-5033	933-B-5033	933-B-5033	933-B-5095	933-B-5002
Truck Pedestal Left	933-A-5035	933-A-5035	933-A-5035	933-A-5035	933-B-5035	933-B-5035	933-B-5035	933-B-5035	933-C-5011	933-A-5003
Truck Plan	938-C-5002	938-C-5002	938-C-5002	938-C-5002	938-D-5002	938-D-5002	939-A-5007	938-A-5010	80-2 truck	938-A-5009
Truck Side Bearing Base	932-A-5250	932-A-5250	932-A-5250	932-A-5250	932-A-5250	932-A-5250	932-A-5250	932-A-5250	932-C-5247	932-C-5247
Valve Stern Crosshead	942-A-5043	942-A-5043	942-A-5043	942-A-5043	942-A-5043	942-A-5043	942-A-5043	942-A-5043	942-A-5089	942-A-5094
Piston Valve	943-A-5004	943-A-5004	943-A-5004	943-A-5004	943-A-5004	943-A-5004	943-A-5004	943-A-5004	943-A-5005	943-A-5005
Driving Wheel Center	953-M-5019	953-M-5019	953-M-5019	953-M-5019	953-M-5019	953-M-5019	953-M-5019	953-M-5019	953-C-5008	953-A-5001

(Continued from page 5)

Rack on top of the Tender Water Tank and the Fuel Bunker. The Lima builder's photo of this Shay locomotive is striking with the large Smoke Stack and Wood Rack. However when it was sold by Lima, the new owner wanted it converted to oil, which was done before it was put into service. It was later changed to burn coal when it moved to the Cass Scenic Railroad where it is still operational and currently burning coal. The large Smoke Stack has remained with it to today. It is also interesting to note that S/N 3320 is the only **Pacific Coast Shay**, during various stages of its life, to have been equipped to burn wood, oil, and coal as fuels.

The second **Phase II Pacific Coast Shay** to have a variation in specifications is the S/N 3327 which has both an extra large Oil Tank and Water Tank. All of the other **Pacific Coast Shays** built were equipped with 1,200 gallon Oil tanks and 3,000 gallon Water Tanks. The S/N 3327 was equipped with a 1,500 gallon Oil Tank and a 4,000 gallon Water Tank. The difference can easily be seen in photos of S/N 3327. What stands out about the Water Tank is that the top of the rim is 16-inches higher than the Fuel Bunker on the back of the engine. All of the rest of the **Pacific Coast Shays** had a water tank which had its rim at the same level as the Fuel Bunker. Also the Oil Tank is noticeably taller than all of the rest and extends up nearly to the roof of the Cab! It has a curved extension of the tank rising up from the sides toward the center allowing for visibility past it from the rear Cab windows on both sides. This makes the oil fill hole on top of the Oil Tank just about at the roof line of the Cab.

### Phase III

The **Phase III** was the largest group of **Pacific Coast Shays** with common



characteristics, thirteen in all, ranging from S/N 3328 through S/N 3349, built between 1929 and 1931. The **Phase III Pacific Coast Shays** had a new design change in the trucks that remained through to the end of production. Beginning with S/N 3328 all of the remaining **Class 3-PC-13** Shay locomotives had this redesigned truck. There were several truck components that changed here with regard to the Inside Journal Boxes and the Truck Pedestals. In the Master Index for S/N 3328, this new Pedestal design was attributed to the Lima Design Engineer Lewis E. Feightner. At first this change was not enough to require a new Truck Plan, but beginning with S/N 3334, a new truck plan incorporated these component changes in the Trucks and lasted through the end of production.

The **Phase III Pacific Coast Shays** contain one locomotive with specification changes that were not enough to designate a new phase, but must be noted. The S/N 3329, which was very similar to the other **Phase III Pacific Coast Shays**, had several unique features added to it because it was the only one originally designed and built to burn coal. Therefore S/N 3329 had a Grate in the Firebox and a coal burning Smoke Stack. It also had a modification to the Boiler. It therefore also did not have an Oil Tank. It is interesting to note here that Lima's standard practice for all of the **Phase I** through **Phase III Pacific Coast Shays** was to equip them with both a coal Fuel Bunker and an Oil Tank. The Oil Tank just sat inside the Fuel Bunker. A close examination of the builder's photo of the S/N 3329 clearly shows that there is no oil tank inside the Fuel Bunker. There is no Oil Tank fill sticking up above the Fuel Bunker like on the rest of the **Pacific Coast Shays**. What is also a dead give away in the Lima builder's photo is that light can be seen through the right side Cab door window, which could not be seen if there were to be an Oil Tank sitting in the Coal Bunker!

## Phase IV

The next group, **Phase IV**, included the last two **Class 3-PC-13 Pacific Coast Shays** built, S/N 3350 in 1936 and S/N 3352 in 1940. There were changes in the Boiler, Coupling Rings, Piston Rods, and Reverse Lever Arrangement among others.

The most striking change made with these two

Shay locomotives, however, was the lack of a Fuel Bunker surrounding the Oil Tank. All of the previous **Pacific Coast Shays** were equipped with a Fuel Bunker. On the previous **Pacific Coast Shays**, the Fuel Bunker was built to uniformly extended back from the Cab and had square rear corners. However, these last two **Pacific Coast Shays** had a new and wider Oil Tank behind the Cab. The Cab was modified to extend back and attach directly to the sides of the Oil Tank. These last two **Pacific Coast Shays** are easy to recognize in photos because the rear corners of the Oil tank, which are rounded, and can thus be easily seen because there is no Fuel Bunker covering up the Oil Tank.

There is an interesting note, dated 3/11/1931, in the **Master Index** for S/N 3350 about the Oil Tank that may help to explain this change. It originally was to have the standard **Pacific Coast Shay** Oil Tank, but this was crossed out and a note indicating that it was being replaced with a new Oil Tank, which happened to be "in stock." It also says that the Cab should be modified to suit this new Oil Tank. Since this new "in stock" Oil Tank is the same Oil Tank specified for the S/N 3351, which was a cancelled order in 1931, it could be that this new Oil Tank may have already been built for S/N 3351 and was then switched to S/N 3350. The Master Index also indicates that it originally was to have the standard **Pacific Coast Shay** Fuel Bunker, but obviously this was left out when the S/N 3350 was built.

The S/N 3352 also has this new Oil Tank and the specification of it's Cab is a modification to the second standard **Pacific Coast Shay** Cab, used since S/N 3322. The S/N 3352, also had one major component that was unique compared to the rest, and that was a new Bottom Bracket. The drawing for the original Bottom Bracket used on the first 23 **Pacific Coast Shays** has a bold note written across it indicating that it was "Superceded" by this new Bottom Bracket design used on S/N 3352.

## Phase V

The **Phase V Pacific Coast Shay**, which is the most similar in design to the twenty-four that were built, and which Lima seems to have had every intention to build it, is assigned this next phase designation. This **Phase V Pacific Coast Shay** design was a modified **Class 3-PC-13**, and was assigned

**S/N 3351.** Although Lima completed extensive construction drawings for this new design in 1931, the order was noted as “cancelled.” It is unclear who would have been the intended owner of this Shay. The **S/N 3351** was actually designed before the two **Phase IV Pacific Coast Shays**, and seems to have left not only its design influence on them when they were built, but also an “in stock” Oil Tank!

Although this Shay shares many of the same components as the **Phase IV Pacific Coast Shays**, like the new Bottom Bracket used on **S/N 3352**, the new wider Oil Tank, modified Cab, and no Fuel Bunker, it has some significant changes. It had a different Erection Drawing, Engine Frame, Boiler, Truck Plan, Line Shafts and Couplings, Gears and Pinions, among many other changes.

## Phase VI

## Phase VII

In 1929 and again in 1931, Lima designed two new larger **Pacific Coast Shays**. They were designated **Class 3-PC-15 Pacific Coast Shays**, but neither were built. Both of these designs were assigned the same **Shop Number, S/N 3332**. However, there were two separate **Construction Order Numbers** assigned to these designs, **O/N 487** in 1929 and **O/N 505** in 1931. These will be identified as **Phase VI** and **VII** respectively.

Since these two Shay locomotives represented an entirely new class of **Pacific Coast Shay**, the **3-PC-15**, they were practically new designs from the rail up. Virtually every component of these two Shay locomotives was different from the **Class 3-PC-13 Pacific Coast Shays**.

Although the two **Class 3-PC-15 Pacific Coast Shays** did share some component designs with each other, they were also quite different. The **S/N 3332 - O/N 487** used Lima’s standard 80-2 Shay truck with 37-inch diameter wheels. The **S/N 3332 - O/N 505** used a new design Shay truck with 40-inch diameter wheels. They both shared the same 15-inch bore by 15-inch stroke Piston Valve Cylinders, but the Cylinder Frames, Bottom Brackets and Crank Shafts were different. The Engine Frames and Boilers were different, but the Cabs, Water Tanks and Tender Frames were the same.

Fortunately for the live steam Shay model builder, many of the original drawings used to build the twenty-four **Class 3-PC-13 Pacific Coast Shays** and the manufacturing drawings for the other three **Pacific Coast Shays** not built were saved from destruction and are available from either the California State Railroad Museum (CSRM) or the Allen County Historical Society (ACHS). Although the combined drawing collections of both museums pertaining to **Pacific Coast Shays** are incomplete, nearly all of the major drawings for both the **Class 3-PC-13** and the **Class 3-PC-15 Pacific Coast Shays** are available.

The CSRM Library’s collection includes over 60,000 original drawings for many of the locomotives built by the Lima Locomotive Works, not just the Shays. The CSRM Library reading room is open to the public Tuesday through Saturday from 1:00 to 5:00 p.m. The CSRM Library also has an extensive collection of books, manuscripts, photographs and papers pertaining to all aspects of railroad history. The CSRM Library’s collections do not circulate.

The ACHS also has an extensive collection of Lima Locomotive Works related materials including drawings and builder photos. Their drawing collection includes those formerly available from George Kadelak, and portions of the P.E. Percy collection from Jim Mengals.

To order copies of drawings from either museum, you should first contact them and obtain their drawing order form and discuss their fees. For those drawings held by CSRM, the file storage number if known is indicated in this listing and will aid when ordering the drawings from CSRM.

On the following pages are listed 373 drawings for the **Pacific Coast Shays** that are known to be available from each museum. However, it is not necessary to obtain every drawing listed here to build a live steam model of a **Pacific Coast Shay**. On page eleven is a list of drawings recommended to be a basic set to build a live steam model of a **Pacific Coast Shay**. A number of drawings with scale dimensions for the **Pacific Coast Shays** are also available from **LocoGear** and are listed in the **LocoGear Technical Bulletin - 07**.

For those live steam model builders wanting to build any of the **Pacific Coast Shays**, most of the Lima prototype drawings listed in this **LocoGear**

## ***Recommended Basic Set of Drawings***

Under construction at this time.

*Technical Bulletin* and all of the **Pacific Coast Shay** castings available from **LocoGear** can be used to build a successful live steam model.

DRAWING NUMBER	DESCRIPTION	REFERENCE	SUPERCEDES	SUPERCEDED BY	DATE	SIZE	Location	Pattern Number
3413	Tire #13				7/9/01	9 x 12	ACHS/CSRM	4 2.2
5471	Reverse Lever Shaft Stand				1/16/12	18 x 24	ACHS/CSRM	4 2.4
7203	Cyl. Head Casing			Several	2/19/35	18 x 24	ACHS/CSRM	4 2.5
7514	Piston Rod			652-A-5172	No Date		CSRM	4 2.5
7721	Valve Stem Packing Stuffing Box Gland				4/5/06		CSRM	4 2.5
7758	Piston Rod Stuffing Box Studs		Old Card		10/16/13	18 x 24	ACHS/CSRM	4 2.7
7759	Spring Washers		Old Card	Several	1/7/15	18 x 24	ACHS/CSRM	4 2.5
8006	Valve Stem Keys				7/28/49	18 x 24	ACHS/CSRM	4 2.5
8340	Tumbling Shaft Coupling				11/12/12		CSRM	4 2.5
8509	Eccentric Blade Bolts				1/10/07	18 x 24	ACHS	
8511	Link Saddle Bolts				1/11/07	18 x 24	ACHS	
8512	Link Block Pin				10/16/07		CSRM	4 2.5
8513	Link Hanger Pins			Several	3/24/15	18 x 24	ACHS	
8824	Gear Keys		Old Card		10/25/29	18 x 24	ACHS/CSRM	4 2.5
8956	Connecting Rod Wedge Bolts		Old Card		1/17/31	6 x 8	ACHS/CSRM	4 2.5
8957	Connecting Rod Wedge (Top)				2/5/09	6 x 6	ACHS/CSRM	4 2.5
8959	Connecting Rod Wedge (Bottom)				2/2/29		CSRM	4 2.5
8964	Connecting Rod Key				2/8/09	6 x 6	ACHS	
8976	Connecting Rods				3/20/14		CSRM	4 2.5
9060	Horn Coupling Key				10/26/15		CSRM	4 3.1
10003	Generator Bracket Pyle Electric Headlight				8/13/06	12 x 18	ACHS	
10010	Hand Rail Brackets				11/6/11	9 x 12	ACHS	53-10
10153	King Bolts				12/16/14	9 x 12	ACHS	
11301	Hose Brackets				8/29/04	12 x 18	ACHS	
11305	Syphon Pipe Flange				2/28/10	9 x 12	ACHS	
11329	Syphon Hose Nipple				8/31/15	9 x 12	ACHS	
11464	Steam Gauge Nipple				12/14/11	9 x 12	ACHS	
11632	Boiler Tube Setting				12/2/14	18 x 24	ACHS	
11721	Crown Bolt		Old Card			9 x 12	ACHS	
11745	Radial Stay Bolt 1.125in.		Old Card		12/22/14	9 x 12	ACHS	
12227	Flue Sand Box				1/27/13	9 x 12	ACHS/CSRM	4 3.3
12511	Bell				6/27/12		CSRM	4 3.3
12512	Bell Yoke				7/9/12		CSRM	4 3.3
12726	Fire Door Oil 16x20 Opening		Old Card		5/24/16	18 x 24	ACHS/CSRM	4 3.3
13002	Smoke Box Brace Pins				12/21/14	9 x 12	ACHS/CSRM	4 3.4
DRAWING NUMBER	DESCRIPTION	REFERENCE	SUPERCEDES	SUPERCEDED BY	DATE	SIZE	Location	Pattern Number





DRAWING NUMBER	DESCRIPTION	REFERENCE	SUPERCEDES	SUPERCEDED BY	DATE	SIZE	Location	Pattern Number
313-A-5012	Cylinder Frame Support				12/24/30	18 x 24	CSRM	1 1.4
313-A-5013	Cylinder Frame Support				12/24/30	18 x 24	CSRM	1 1.4
314-AB-5014	Cylinder Frame	313-A-5001			5/2/27	24 x 30	ACHS	31-258
314-AB-5015	Cylinder 13x15 (Piston Valve)		Old Card		6/4/27	24 x 30	ACHS	31-260
314-A-5016	Cylinder Frame				1/17/28	24 x 30	CSRM	1 1.4
314-A-5017	Cylinder 15x15 (Piston Valve)				1/23/28	24 x 30	CSRM	1 1.4
314-A-5018	Cylinder Frame				1/9/31	24 x 30	CSRM	1 1.4
322-A-5062	Steam Chest Head Top				5/6/27	12 x 18	ACHS	32-528
322-A-5063	Steam Chest Head Bottom				5/6/27	12 x 18	ACHS	32-529
322-A-5064	Piston Valve Bushing				5/9/27	12 x 18	ACHS	32-533
322-A-5065	Steam Chest Casing				7/13/27	12 x 18	ACHS	
323-A-5004	Steam Chest Head Bottom				3/18/32	18 x 24	CSRM	1 1.5
360-D-51	Method Of Constructing Dome Casing					9 x 12	ACHS	
363-A-5017	Dome Casing				7/10/28	18 x 24	CSRM	1 1.5
372-AR-5000	Coupler Knuckle					12 x 18	ACHS	
372-A-5083	Safety Bar Pin & Key				7/4/27	12 x 18	ACHS	
372-A-5073	Coupler Knuckle				11/16/25	12 x 18	ACHS	
373-A-5002	Coupler				6/25/18	18 x 24	CSRM	1 1.5
373-AD-5003	Coupler		5631		12/3/18	18 x 24	ACHS	
373-AN-5007	Draft Gear Frame (Front)		Old Card		10/21/33	18 x 24	ACHS/CSRM	1 1.5
373-B-5007	Draft Gear Frame (Front)				10/31/23	18 x 24	CSRM	1 1.5
373-K-5020	Draft Gear Frame (Front)				1/18/29	18 x 24	CSRM	1 1.5
373-AB-5024	Draft Gear Frame (Rear)				7/15/27	18 x 24	CSRM	1 1.5
392-A-5029	Eccentric Strap				4/21/21	12 x 18	CSRM	1 1.5
392-AB-5084	Eccentric Rod				4/20/21	12 x 18	CSRM	1 1.5
392-A-5097	Eccentric				7/13/27	12 x 18	CSRM	1 1.5
392-B-5100	Eccentric				2/1/28	12 x 18	CSRM	1 1.5
392-AB-5101	Eccentric				3/11/31	12 x 18	CSRM	1 1.5
393-AM-5000	Eccentric Blade Pin	8510			4/5/22	18 x 24	ACHS	
420-AD-5003	Erecting Elevation Engine & Tender				7/24/27	26 x 84	ACHS/CSRM	101 9.3
420-A-5004	Erecting Elevation Engine & Tender				2/26/29		CSRM	101 9.3
420-A-5008	Erecting Elevation Engine & Tender				4/1/31		CSRM	101 9.3
420-D-1	Presure Plate Frame					9 x 12	ACHS	
420-D-449	Test Plate Lima Locomotive Works Inc.					9 x 12	ACHS	
437-AC-5001	Sections Front & Backhead				8/26/27	24 x 42	ACHS	
437-A-5003	Sections Front & Backhead				4/16/31	24 x 42	CSRM	1 2.1



542-AD-5020	Valve Handles Name Plate in Cab	542-A-398				7/29/27	12 x 18	ACHS		54-514
553-A-5001	Feed Hose Connection 2 1/2 inch Hose		3820			1/21/21	18 x 24	ACHS		55-68/69/70
572-A-6	Plug Casing					9/18/18	12 x 18	ACHS/CSRM	1 3.2	57-4
572-A-46	Jacket Clip					6/7/23	12 x 18	ACHS/CSRM	1 3.2	57-28
572-B-80	Pressure Plate Frame					3/4/27	12 x 18	CSRM	1 3.2	57-60
572-AB-5004	Jacket Eye Bolt					3/2/20	12 x 18	ACHS		
572-AB-5012	Cylinder Hood	572-C-5011				4/10/28	12 x 18	ACHS		
582-A-5015	Link Plates & Blocks		8116			1/13/21	12 x 18	ACHS		
582-A-5025	Link Hanger		8122s5			2/25/21	12 x 18	ACHS		
583-A-5001	Link					1/10/21	18 x 24	CSRM	1 3.5	58-7
583-B-5003	Link					12/28/27	18 x 24	CSRM	1 3.5	
592-A-5004	Oil Can Shelf		11422			2/14/21	12 x 18	ACHS		59-120
592-A-5006	Bottom Bracket Oil Cup		Several			2/7/21	12 x 18	ACHS		59-48/49
592-A-5007	Grease Cup		7154			3/18/21	12 x 18	ACHS		59-50/51/52
592-AD-5025	Connecting Rod Grease Plug					1/15/23	12 x 18	ACHS		
592-AD-5030	Oil Pump Connection & Pin					1/11/26	12 x 18	ACHS		
592-AD-5031	Lubricator Bracket					3/28/28	12 x 18	ACHS		
592-A-5032	Manzel Pump Support					5/25/28	12 x 18	ACHS		
602-A-5045	Quadrant Bracket	602-A-5002				7/25/27	12 x 18	ACHS		
602-A-5046	Damper Regulator Handle	602-A-5013				7/27/28	12 x 18	ACHS		60-18
<b>DRAWING NUMBER</b>	<b>DESCRIPTION</b>	<b>REFERENCE</b>	<b>SUPERCEDES</b>	<b>SUPERCEDED BY</b>	<b>DATE</b>	<b>SIZE</b>	<b>Location</b>			<b>Pattern Number</b>
602-A-5047	Damper Regulator Quadrant	602-A-5019			8/27/28	12 x 18	ACHS			
602-A-5048	Damper Regulator Latch	602-A-5015			7/27/28	12 x 18	ACHS			
602-A-5049	Oil & Damper Regulator Arrgt.	602-A-5026	Old Card		7/29/27	12 x 18	ACHS			
602-AD-5050	Oil Cook Shaft	Several			12/14/27	12 x 18	ACHS			
602-A-5051	Oil Regulator Shaft Bracket				6/5/28	12 x 18	ACHS			
602-AB-5052	Oil Regulator Shaft Hanger				6/21/29	12 x 18	ACHS			
602-AE-5053	Oil Burner Turret		C-11881		7/2/29	12 x 18	ACHS			
602-A-5054	Oil Burner 3in.				12/16/31	12 x 18	ACHS			
602-A-5056	Pipe Clamp				1/14/42	12 x 18	ACHS			
602-A-5057	Lever Connection				4/6/42	12 x 18	ACHS			
603-A-5032	Oil Burner Arrgt.	603-A-5028			7/5/27	18 x 24	ACHS/CSRM	2 1.5		
603-B-5031	Oil Heater				6/27/27	18 x 24	CSRM	2 1.5		
632-AB-5004	Blower Elbow		187		1/14/21	12 x 18	ACHS			63-6
632-AB-5007	Steam Gauge Union Fitting				3/5/23	12 x 18	ACHS			
632-AC-5005	Cylinder Oil Pipe Fitting		7138		11/3/21	12 x 18	ACHS			
632-A-5009	Air Pump Exhaust Drain Oil Burning Locos				5/1/28	12 x 18	ACHS			
640-A-5003	Piping Arrgt Engine & Tender					36 x 105	ACHS			

642-A-5003	Super Heater Damper Cylinder Piping Arrgt	642-A-28				2/23/26	12 x 18	ACHS		
652-AB-5000	Piston Head	7518				6/3/18	12 x 18	ACHS		65-247
652-A-5057	Packing Stuffing Box		7767			2/17/21	12 x 18	ACHS		65-260
652-AB-5063	Stuffing Box Cap		Several			2/19/21	12 x 18	ACHS		65-84
652-AC-5070	Piston Head 6in.		7521				12 x 18	ACHS		
652-A-5172	Piston Rod						12 x 18	ACHS		
652-A-5177	Piston Valve Bull Ring 6in						12 x 18	ACHS		
652-A-5178	Piston Valve Spider 6in						12 x 18	ACHS		
652-A-5179	Piston Valve Spacer 6in						12 x 18	ACHS		
652-AB-5089	Packing Swab Cup		7735s6&8			2/28/21	12 x 18	ACHS		65-30
652-AV-5154	Packing Rings		Several			11/14/23	12 x 18	ACHS		
653-K-5000	Piston Packing Rings					No Date	18 x 24	CSRM	2 1.5	65-9
662-AL-5000	Fusible Plugs		11449			1/14/19	12 x 18	ACHS		66-116
662-AD-5007	Washout Plugs 1.5in.		A-11431			3/21/21	12 x 18	ACHS		66-7
662-AD-5010	Plugs	662-A-5007	11417 Old Cd			12/3/29	12 x 18	ACHS		66-267
682-D-173	Reverse Lever Handle					No Date	12 x 18	CSRM	2 1.4	68-3-A
682-AB-5039	Reverse Lever Details		3294			10/18/23	12 x 18	ACHS		
682-AF-5042	Reverse Lever Shaft		682-A-5006&9			6/23/25	12 x 18	ACHS		
682-AC-5043	Quadrant Plate					7/16/27	12 x 18	ACHS		
683-A-5012	Reverse Lever Atggt.	683-A-50??				7/15/27	18 x 24	ACHS/CSRM	2 1.5	
683-A-5013	Reverse Lever Atggt.									
<b>DRAWING NUMBER</b>	<b>DESCRIPTION</b>	<b>REFERENCE</b>	<b>SUPERCEDES</b>	<b>SUPERCEDED BY</b>	<b>DATE</b>	<b>SIZE</b>	<b>Location</b>	<b>Pattern Number</b>		
692-AB-5028	Thumbling Shaft Box		8212			5/26/21	18 x 24	ACHS		
692-AB-5029	Thumbling Shaft Box Cap		Several			5/26/21	12 x 18	ACHS		69-9
692-AD-5052	Thumbling Shaft		692-A-5019			6/22/25	12 x 18	ACHS		
692-A-5056	Universal Ball Coupling		8340				12 x 18	ACHS		69-58
712-A-5020	Running Board Bracket					7/30/27	12 x 18	ACHS		
712-AB-5021	Running Board Bracket	713-D-5017				8/6/27	12 x 18	ACHS		
712-A-5022	Running Board Bracket	712-A-5034				8/23/27	12 x 18	ACHS		
712-AB-5023	Running Board Bracket					8/25/27	12 x 18	ACHS		
712-A-5024	Running Board Bracket					9/16/27	12 x 18	ACHS		
712-A-5055	Running Board Bracket	712-A-5022				12/15/27	12 x 18	ACHS		
717-A-5029	Running Board Filler Plate Tender					7/28/27		CSRM	2 3.3	
717-A-5031	Running Board Engine					10/12/27		CSRM	2 3.3	
722-AC-5059	Connecting Rod Brass (Crosshead End)		8927s15			1/31/21	12 x 18	ACHS		72-29
722-AF-5072	Connecting Rod Brass		8977s1			1/25/21	12 x 18	ACHS		72-73





743-A-5107	Gear Rim #10					3/3/31	18 x 24	CSR	2 3.1	
743-A-5109	Line Shafts					1/18/28	18 x 24	CSR	2 3.1	
743-A-5111	Gear Rim #15					3/9/31	18 x 24	CSR	2 3.1	
745-A-5000	Crankshaft #82					6/18/18	12 x 42	ACHS		
745-A-5020	Crankshaft					1/21/29	12 x 42	CSR	2 3.4	
745-A-5021	Crankshaft					12/23/30	12 x 42	CSR	2 3.4	
745-A-5022	Crankshaft					2/25/31	12 x 42	CSR	2 3.4	
752-A-79	Superheater Deflector Handle					1/15/24	12 x 18	CSR	2 2.4	
752-AC-5023	Stack Cast Iron Taper (12 inch)			12660 s2		12/20/20	12 x 18	ACHS		75-28
752-A-5044	Cinder Pocket Lid			A-12600		1/27/20	12 x 18	ACHS		75-53
752-AC-5047	Smoke Box Brace Pad				13014	1/31/21	12 x 18	ACHS		75-10
752-A-5050	Stack Base Ring 16in				12667	2/1/21	12 x 18	ACHS		75-60
752-AD-5051	Cinder Pocket				12631	5/27/21	12 x 18	ACHS		75-55
752-A-5054	Cleaning Hole Flange				12911	3/24/21	12 x 18	ACHS		75-61
752-A-5055	Cleaning Hole Cover				12911	3/23/21	12 x 18	ACHS		75-66
752-AF-5075	Smoke Stack Saddle				12668	11/2/22	12 x 18	ACHS		75-67
752-A-5079	Smoke Box Front Details			A-12952		12/1/23	12 x 18	ACHS		75-25/26/455
752-A-5090	Smoke Stack Cone 16in. R&H				12665	12/16/25	12 x 18	ACHS		75-87
752-A-5101	Smoke Box Liner Bracket				752-A-5004		12 x 18	ACHS		
753-A-5036	Stack Cast Iron Taper (15 inch)					9/22/27	18 x 24	CSR	2 3.2	
753-A-5037	Smoke Stack					7/21/28	18 x 24	CSR	2 3.2	
762-AD-5003	Truck Bolster Spring					7/13/21	12 x 18	ACHS		
762-A-5010	Truck Bolster Spring					10/26/27	12 x 18	ACHS		
782-AB-5005	Steam Turret Details					1/29/21	12 x 18	ACHS		78-3/4 27-14
782-AB-5008	Safety Valve & Whistle Elbow				A-11422	2/15/24	12 x 18	ACHS		
782-A-5011	Safety Valve Turret Flange					9/21/27	12 x 18	ACHS		78-361
782-A-5012	Safety Valve Turret Casing					9/30/27	12 x 18	ACHS		
782-A-5013	Safety Valve Elbow			782-A-5008		12/20/27	12 x 18	ACHS		78-252-C
792-AC-5008	Steam Pipe Casing				Old Card	7/10/22	12 x 18	ACHS		
792-AB-5009	Steam Pipe Slip Joint			B-12169		7/2/19	12 x 18	ACHS		79-552
792-A-5015	Steam Pipe Elbow					12/23/19	12 x 18	ACHS		
792-AC-5019	Steam Pipe					4/12/20	12 x 18	ACHS		
792-A-5029	Steam Pipe Joint Ring			Several		7/23/20	12 x 18	ACHS		
792-AY-5042	Steam Pipe Joint Ring					3/28/21	12 x 18	ACHS		79-662
792-AY-5053	Steam Pipe Joint Ring			792-A-5029		10/4/22	12 x 18	ACHS		
792-A-5061	Steam Pipe Elbow					6/7/27	12 x 18	ACHS		79-901
792-A-5062	Steam Pipe Elbow					6/7/27	12 x 18	ACHS		79-900
792-AC-5063	Steam Pipe Elbow					6/7/27	12 x 18	ACHS		79-901

DRAWING NUMBER	DESCRIPTION	REFERENCE	SUPERCEDES	SUPERCEDED BY	DATE	SIZE	Location	Pattern Number
792-A-5064	Steam Pipe Elbow	792-A-5015			9/21/27	12 x 18	ACHS	79-909
792-A-5065	Steam Pipe Flange	Several			9/21/27	12 x 18	ACHS	
793-A-5008	Slip Joint				6/22/27	18 x 24	CSRM	2 3.2
812-A-44	Tube Clamp				4/6/21	12 x 18	ACHS	
812-A-47	Tube Bands				4/7/21	12 x 18	ACHS	
812-A-49	Pipe Support				4/7/21	12 x 18	ACHS	
812-AB-51	Superheater Deflector Clamp				4/11/21	12 x 18	CSRM	3 1.1
812-A-5003	Header	L.S.Co.Prt.			7/24/19	12 x 18	ACHS	
813-B-5011	Smoke Box Arrangement				3/11/26	18 x 24	CSRM	3 1.3
812-AK-5012	Header Support	A-12968			10/6/22	12 x 18	ACHS	
813-B-5021	Smoke Box Arrangement				1/10/40	18 x 24	CSRM	3 1.3
814-A-5005	Smoke Box Arrangement				2/4/22	24 x 30	CSRM	3 1.5
822-A-5000	Syphon (4 Inch)	11331			9/7/18	12 x 18	ACHS	82-30/83
822-AF-5029	Oil Tank Valve		A-15163		10/20/26	12 x 18	ACHS	82-53
822-AB-5033	Syphon Bracket	822-A-5030			12/28/27	12 x 18	ACHS	
823-A-5006	Water Tank Valve				4/7/21	18 x 24	CSRM	3 1.3 82- 14/15/16/17/18/1 9/20/21/22/23
832-A-5000	Fuel Bunk Rack	A-19154			10/30/22	12 x 18	ACHS	
833-D-5007	Fule Bunker				10/1/27	18 x 24	CSRM	3 1.3
852-A-5001	Frame Center Plate	852-A-4			7/14/27	12 x 18	ACHS	85-109
853-A-5005	Frame End Casting				7/20/27	18 x 24	CSRM	3 1.4 85-110
857-A-5003	Frame Side Bearings				7/26/27		CSRM	3 1.5
882-A-5019	Oil Heater Pipe Bushing				10/17/25	12 x 18	ACHS	
882-AF-5018	Tank Funnel & Details	5091			9/23/25	12 x 18	ACHS	
882-AN-5020	Tank Ladder	A-15102			2/20/26	12 x 18	ACHS	
883-A-5015	Oil Tank (1500 Gallon)				1/28/29	18 x 24	CSRM	3 1.4
883-AP-5017	Water Tank (Box)	A-15174	Old Card		9/30/25	18 x 24	ACHS	
883-AH-5047	Oil Tank (1200 Gallon)	Several			5/2/23	18 x 24	ACHS/CSRM	3 1.4
883-A-5053	Oil Tank (1500 Gallon)				1/22/31	18 x 24	CSRM	3 1.4
883-A-5054	Oil Tank (1200 Gallon)				2/14/31	18 x 24	CSRM	3 1.4
884-E-5003	Water Tank (Box)				2/1/29	24 x 30	CSRM	3 2.1
884-F-5003	Water Tank (Box)				3/13/31	24 x 30	CSRM	3 2.1
912-A-5011	Dry Pipe Elbow				7/2/19	12 x 18	ACHS	91-370
912-A-5012	Dry Pipe Ring				7/3/19	12 x 18	ACHS	91-371
912-AC-5013	Throttle Case	B-12174			7/11/19	12 x 18	ACHS	91-476-A
912-AC-5015	Dry Pipe				7/12/19	12 x 18	ACHS	
913-AF-5018	Throttle Lever		12135		2/15/21	18 x 24	ACHS	
912-AB-5050	Throttle Stuffing Box & Gland		12144s2		1/22/21	12 x 18	ACHS	91-14/15
912-AP-5052	Throttle Stem		B-12181		2/15/21	12 x 18	ACHS	



933-B-5001	Truck Box Right (Cast Steel)				3/16/31	18 x 24	CSRM	3 2.5	
933-A-5003	Truck Pedstal Left (Cast Steel)				7/3/18	18 x 24	CSRM	3 2.5	
933-C-5011	Truck Pedstal Left (Cast Steel)				1/21/29	18 x 24	CSRM	3 2.5	
933-D-5031	Truck Box Right (Cast Steel)				4/28/20	18 x 24	CSRM	3 2.5	
933-AB-5035	Truck Pedstal Left (Cast Steel)	Old Card			9/2/25	18 x 24	ACHS/CSRM	3 2.5	93-613
933-AC-5033	Truck Frame Right (Cast Steel)	Old Card			12/6/19	18 x 24	ACHS		93-608
933-AC-5034	Truck Frame Left (Cast Steel)	Old Card			12/6/19	18 x 24	ACHS		93-609
933-AF-5036	Truck Box Right (Cast Steel)				8/22/22	18 x 24	ACHS		93-615
933-AH-5037	Truck Bolster				4/11/24	18 x 24	ACHS		
933-D-5093	Truck Center Plate				10/11/22	18 x 24	CSRM	3 2.5	
933-A-5142	Truck Bolster				2/19/31	18 x 24	CSRM	3 2.5	
933-A-5144	Truck Bolster				3/17/31	18 x 24	CSRM	3 2.5	
933-AB-5154	Truck Center Plate				3/30/32	18 x 24	CSRM	3 2.5	
938-AD-5002	Truck Plan (Cast Steel)	Old Card			7/28/27	25 x 59	ACHS/CSRM	103 6.2	
938-A-5009	Truck Plan (Cast Steel)				3/17/31		CSRM	103 6.2	
938-A-5010	Truck Plan (Cast Steel)				4/14/31		CSRM	103 6.3	
DRAWING NUMBER	DESCRIPTION	REFERENCE	SUPERCEDES	SUPERCEDED BY	DATE	SIZE	Location	Pattern Number	
942-A-5033	Valve Stem Crosshead Guide & Plate		8007s2		2/1/21	12 x 18	ACHS		94-11
942-AB-5043	Valve Stem Crosshead		8000s4		2/11/21	12 x 18	ACHS		94-4
942-AB-5087	Piston Valve Stem				7/21/27	12 x 18	ACHS/CSRM	3 2.3	
943-A-5004	Piston Valve				3/23/27	18 x 24	CSRM	3 2.5	
943-A-5005	Piston Valve				1/30/28	18 x 24	CSRM	3 2.5	
953-A-5001	Driving Wheel Center				7/12/18	18 x 24	CSRM	3 3.1	
953-C-5008	Driving Wheel Center				2/1/28	18 x 24	CSRM	3 3.1	
953-AY-5019	Driving Wheel Center		9932		1/13/21	18 x 24	ACHS		95-358
962-A-5010	Whistle Lever		A-11428		3/21/21	12 x 18	ACHS		