

LIONEL SERVICE MANUAL

NO. 671 and NO. 2020 LOCOMOTIVES

Lionel's No. 671 and No. 2020 locomotives which are identical, with the exception of the number, are patterned on Pennsylvania's radically new S-2 steam turbine locomotive designed for long-distance high speed passenger and freight service. Like their prototype these locomotives are characterized by the absence of the conventional steam locomotive reciprocating parts. Instead, the drivers are coupled together by a single massive connecting rod.

These locomotives are powered by a longitudinally located motor. The armature is supported on one side only by a long shaft which rides in two sleeve bearings and which is equipped with two sets of thrust ball bearings. The power is transmitted to the drivers by a worm and gear arrangement having a ratio of 8 to 1. Since the shaft rides in a lubricant reservoir, the motor requires little care besides an occasional cleaning of the commutator slots which may be reached without disassembling the motor through an opening in the brush plate. The brushes and brush springs are reached by removing the brush plate. It is advisable to replace the brushes and brush springs whenever the locomotive is serviced.

When replacing the motor armature be careful to assemble the thrust ball bearings properly, following directions in the illustrations on page 4.

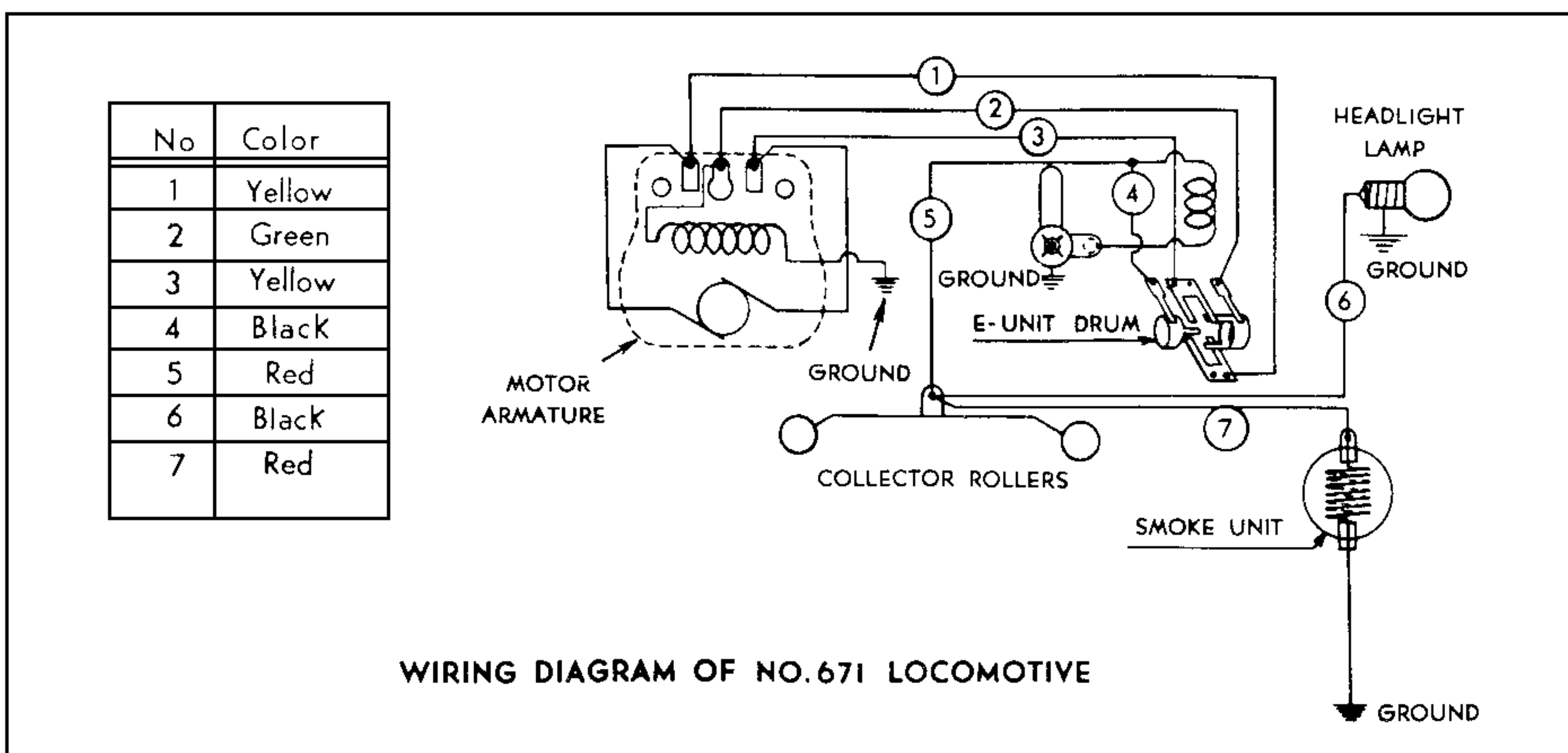
When mounting motor on the frame, mesh the worm of the armature shaft to the gear on the drive wheel axle before tightening up screws. The screws should be tightened evenly. As the screws are tightened check the alignment by rolling the drive wheels by hand. If wheels roll reasonably free continue to tighten screws. If wheels become tight the gears are improperly meshed.

These locomotives are equipped with a smoke generator No. 671-170 activated by a lever moved by means of a cam mounted on the front driving shaft. Servicing of the smoke generator is described in Section LOC-SU.

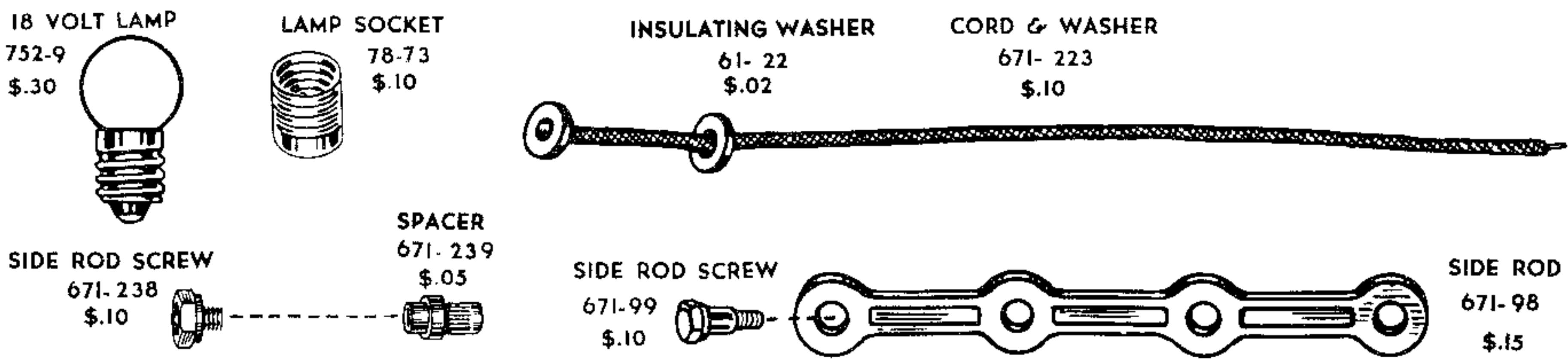
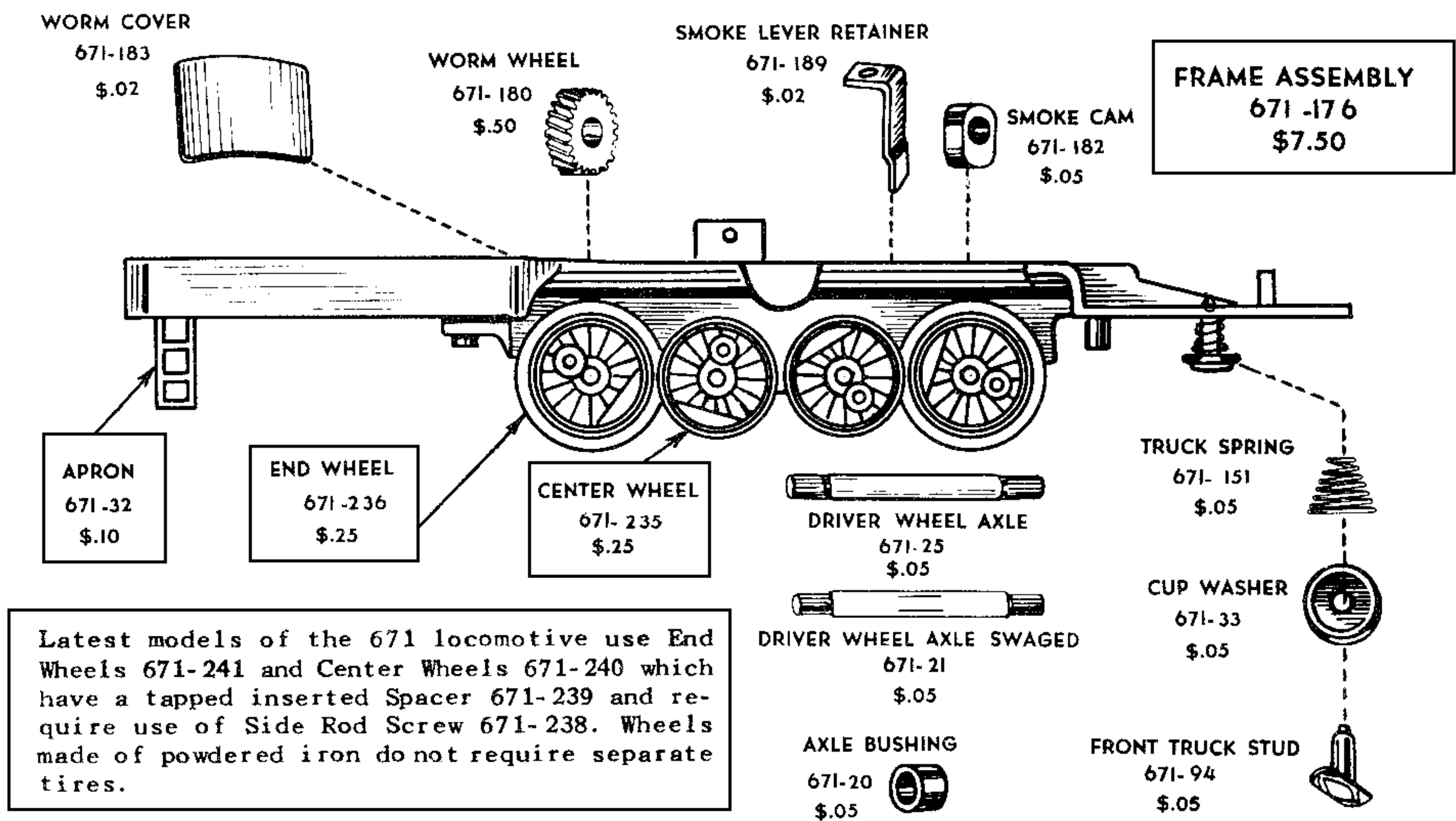
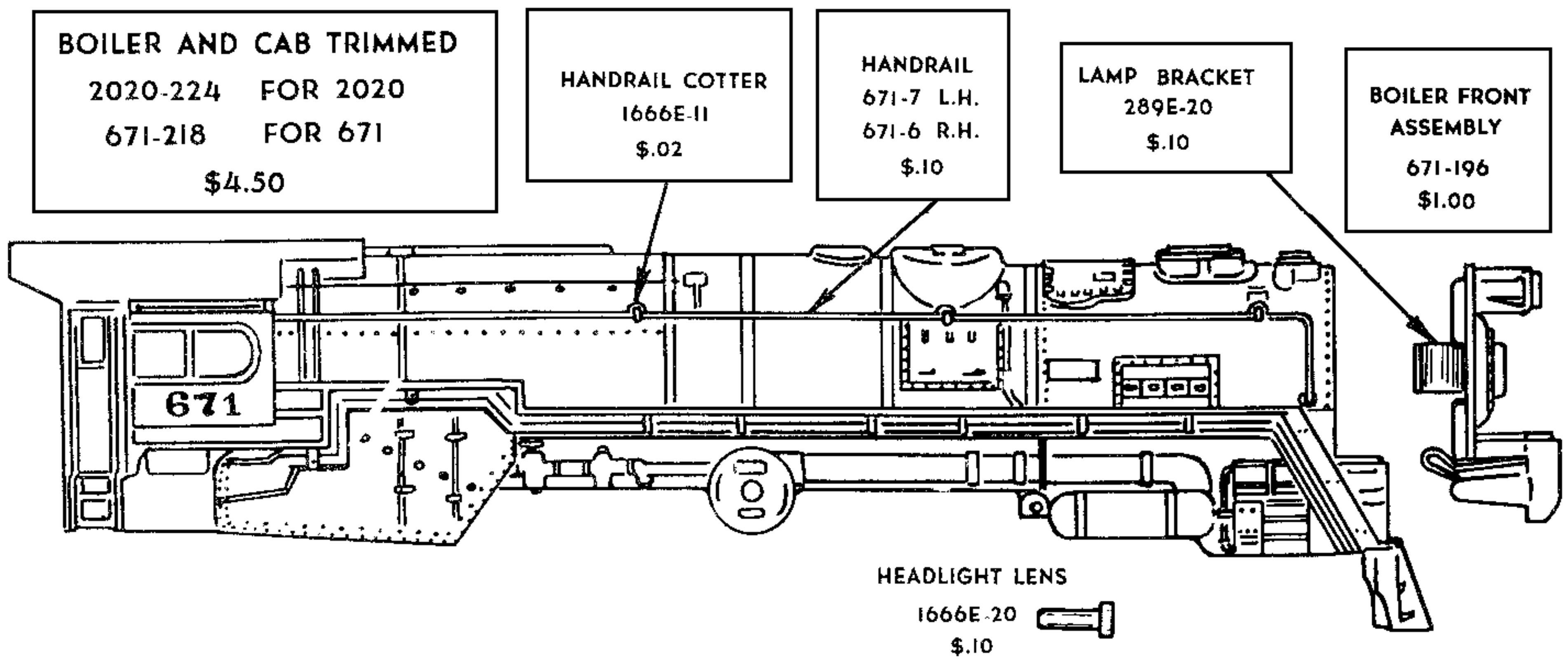
The reversing E-Unit used is No. 671-90, described in Section LOC-E.

The headlight is No. 752-9 18-volt screw-base miniature lamp which can be reached by simply pulling out the boiler front cover.

No. 671 and No. 2020 locomotives made in 1946 differ in several respects from the later models and are generally not interchangeable with them. The 1946 locomotives are equipped with a horizontally-mounted E-unit and a horizontal double worm-drive motor. The earlier models also employ a lamp-type smoke generator, described in Section LOC-726 (1946). In order to prevent obsolescence, Smoke Unit Conversion Kits No. 671S for installing heater-type generators into the 1946 smoke locomotives are available. The conversion is described in Section LOC-SU.

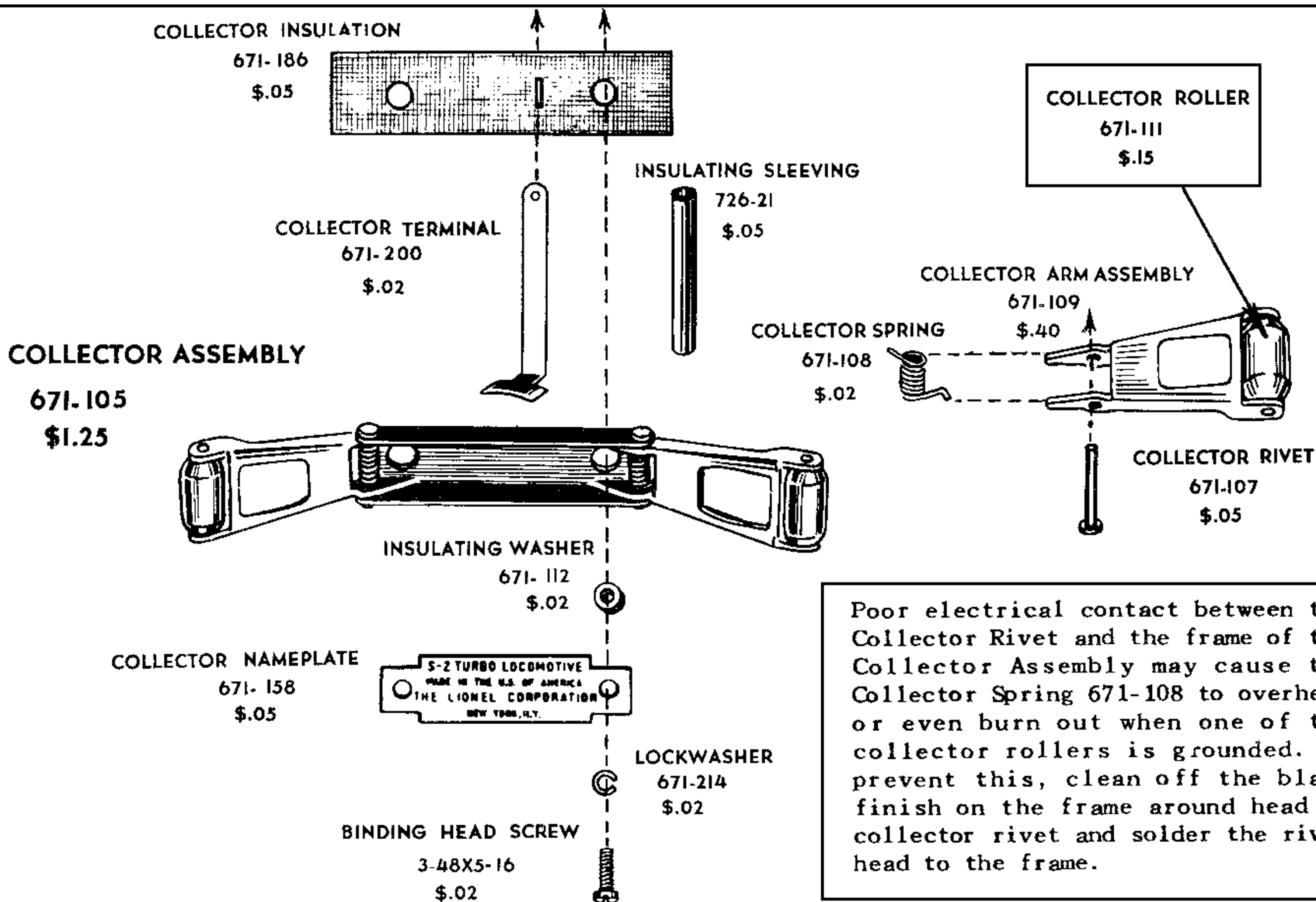
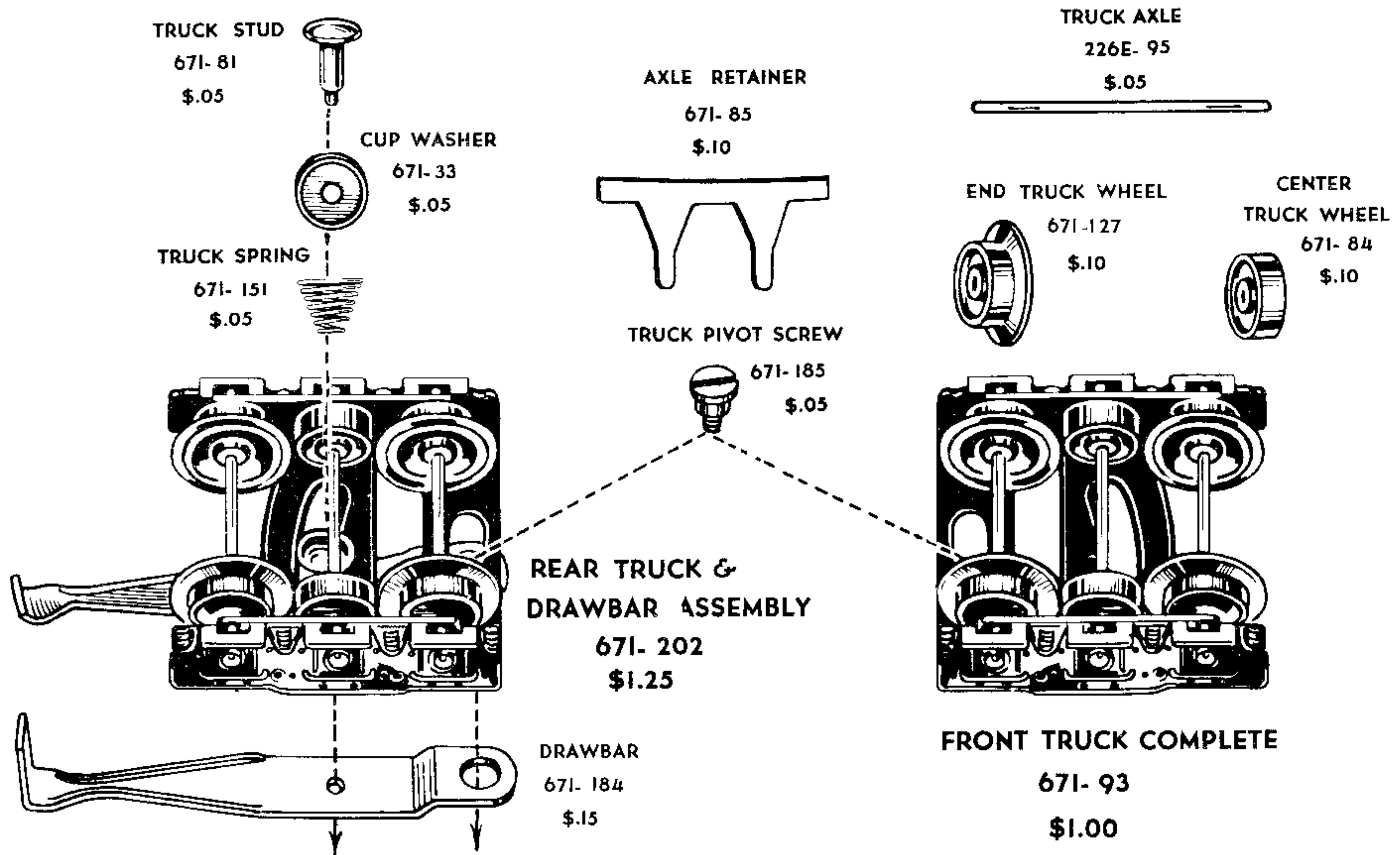


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Side Rod Screws 671-238 are used with End Wheel 671-241 and Center Wheel 671-240.

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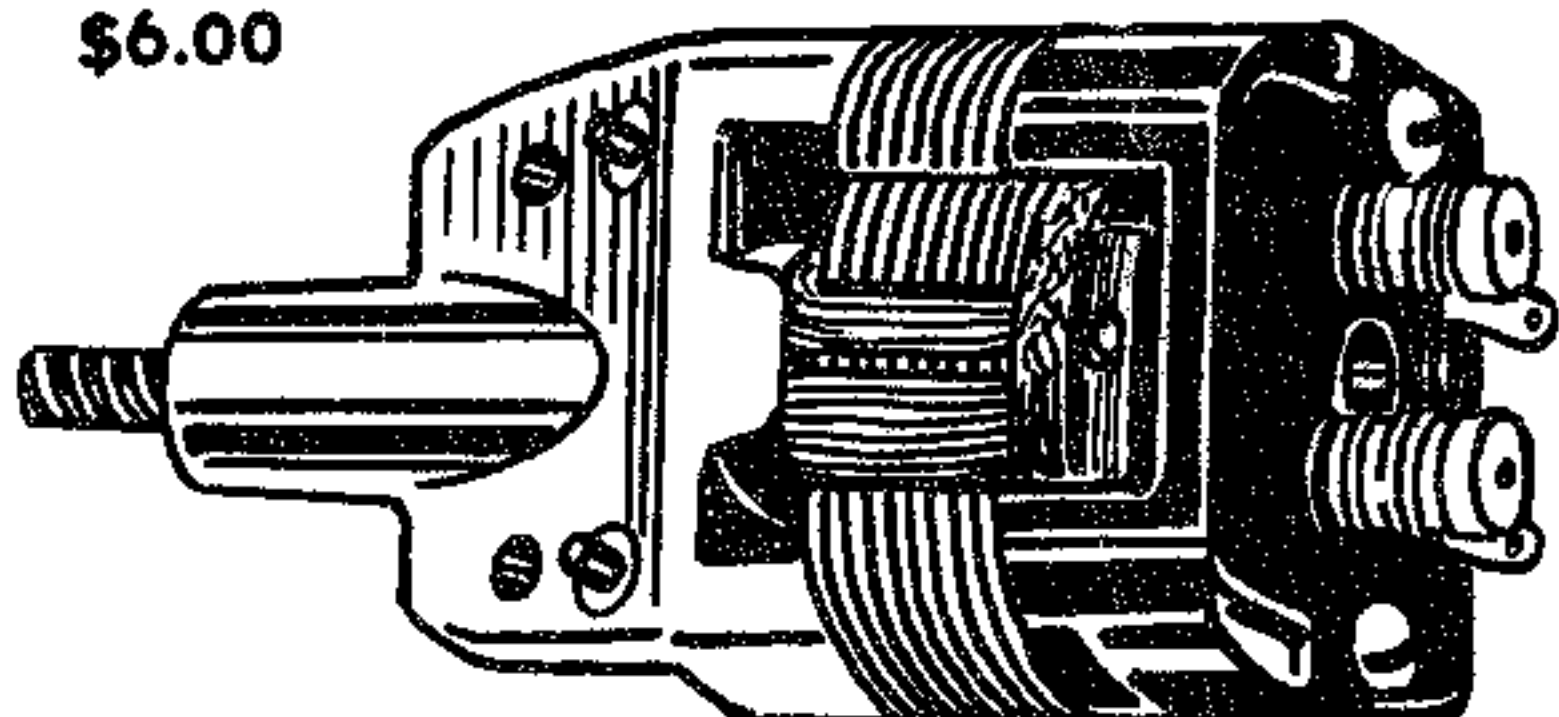


Poor electrical contact between the Collector Rivet and the frame of the Collector Assembly may cause the Collector Spring 671-108 to overheat or even burn out when one of the collector rollers is grounded. To prevent this, clean off the black finish on the frame around head of collector rivet and solder the rivet head to the frame.

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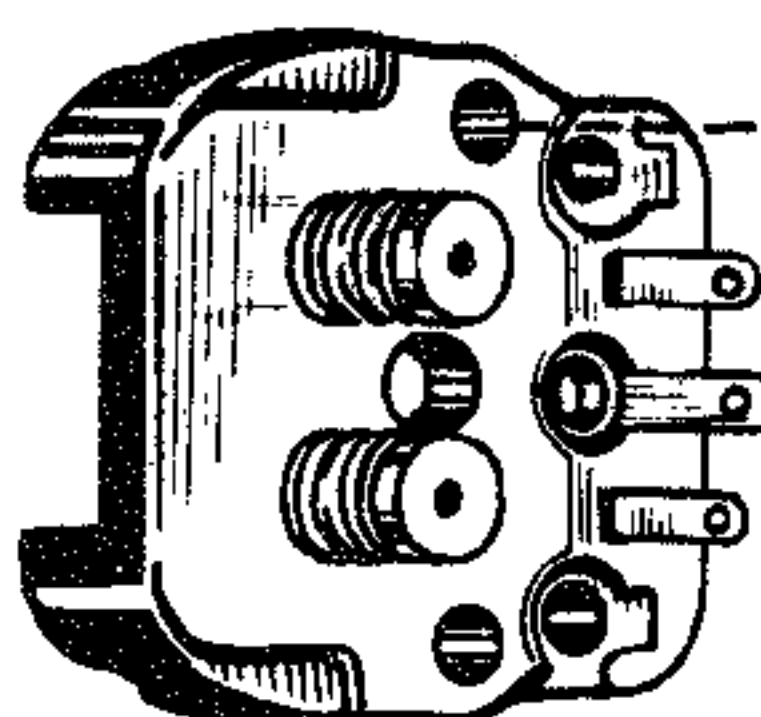
MOTOR COMPLETE

671M-1
\$6.00

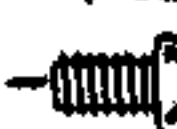


BRUSH PLATE ASSEMBLY

671M-5
\$.75

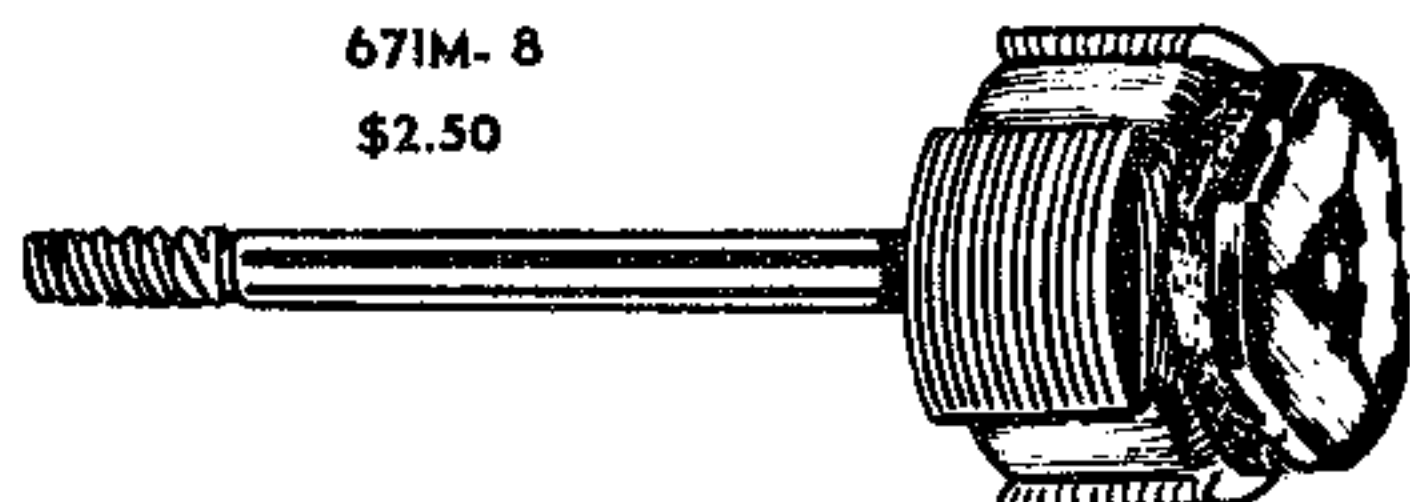


ROUND HEAD SCREW
6-32X1/4"
\$.02



ARMATURE ASSEMBLY

671M-8
\$2.50



CARBON BRUSH

2020 M-33
\$.60 a pair



BRUSH SPRING

2020 M-34
\$.10 a pair



REAR BEARING

671M-20
\$.10



.348L x .438D

FRONT BEARING

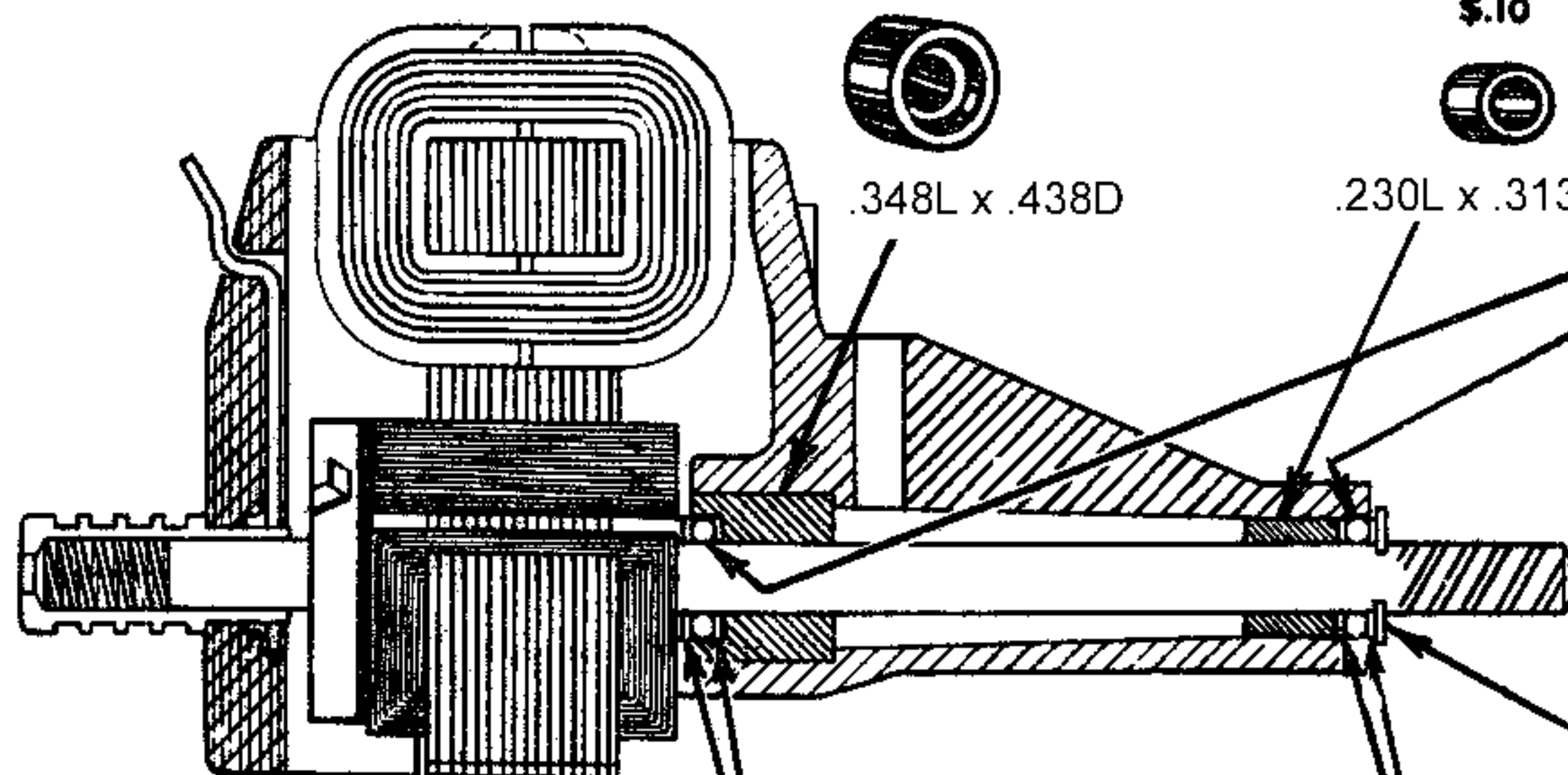
2020M-17
\$.10



.230L x .313D

BEARING BALLS

671M-21
\$.02



Play in armature should not exceed .010". Use additional Front Washers behind Retaining Ring to take up excessive slack.

.302 DIA.
BLUE



REAR THRUST WASHER

671M-19
\$.02

.365 DIA.
WHITE

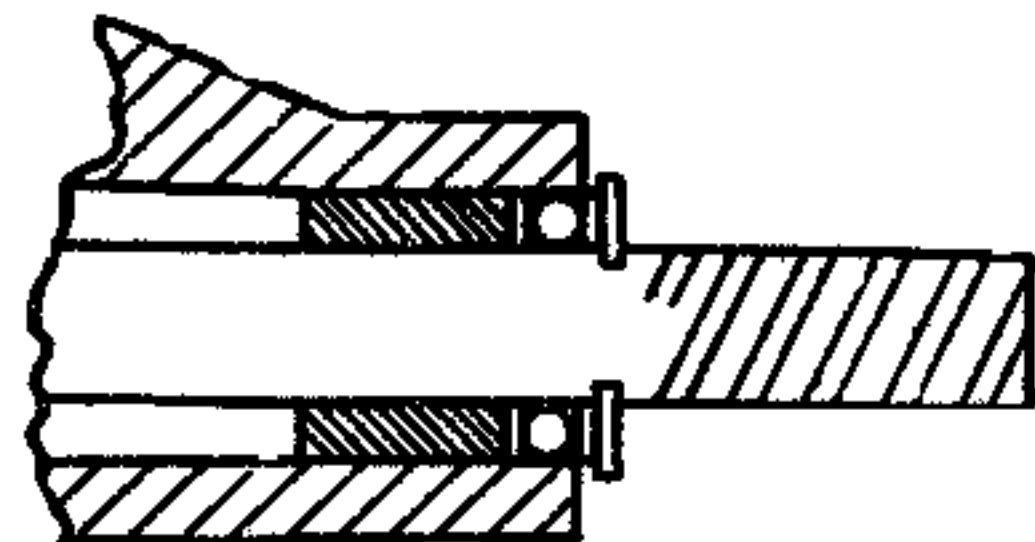
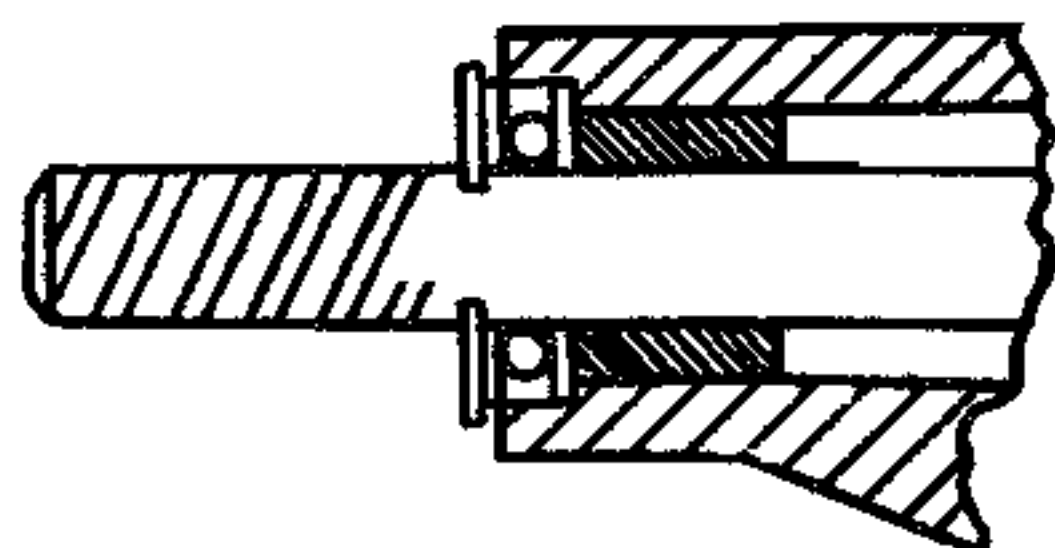


FRONT THRUST WASHER

671M-23
\$.02

RETAINING RING


671M-22
\$.03




In the earlier design of the bearing assembly shown at the left, Rear Thrust Washers 671M-19, of .302" diameter, are used on both ends of the shaft. In the later design, shown on the right, the front end of the casting is counter-bored and Front Thrust Washers, 671M-23, of .365" diameter, are used in the front bearing assembly.

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STACK GASKET
671-181
\$.05



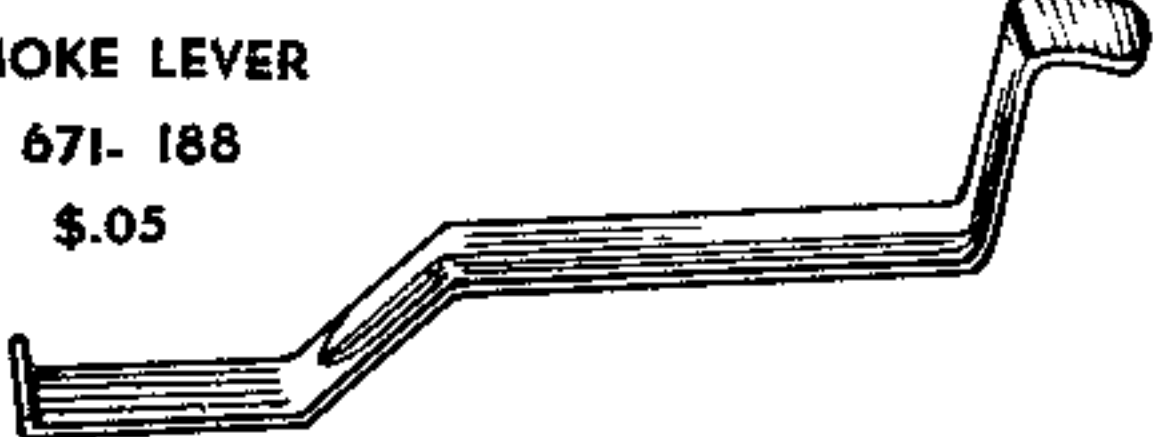
BINDING HEAD SCREW
4-40 X 7/32"
\$.02



SMOKE UNIT PISTON
671-167
\$.15



SMOKE LEVER
671-188
\$.05

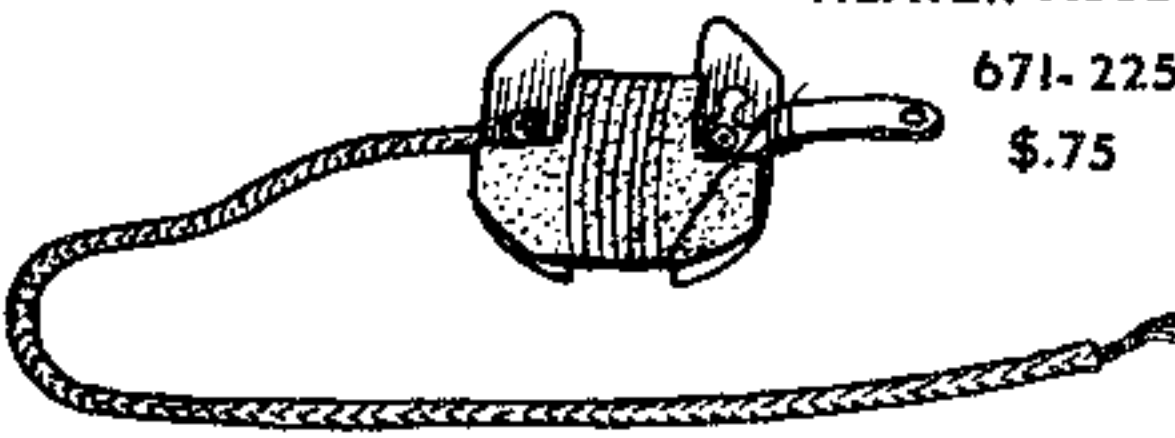


SMOKE UNIT COMPLETE
671-170
\$2.00

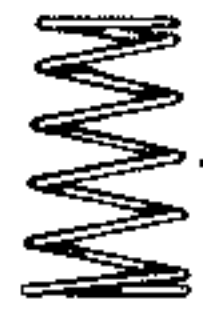
To provide a good seal between the smoke unit and the locomotive body the Smoke Gasket should be replaced whenever the locomotive is overhauled.

The use of spring No. 2026-44 in 671 Smoke Unit is optional and results in quieter operation.

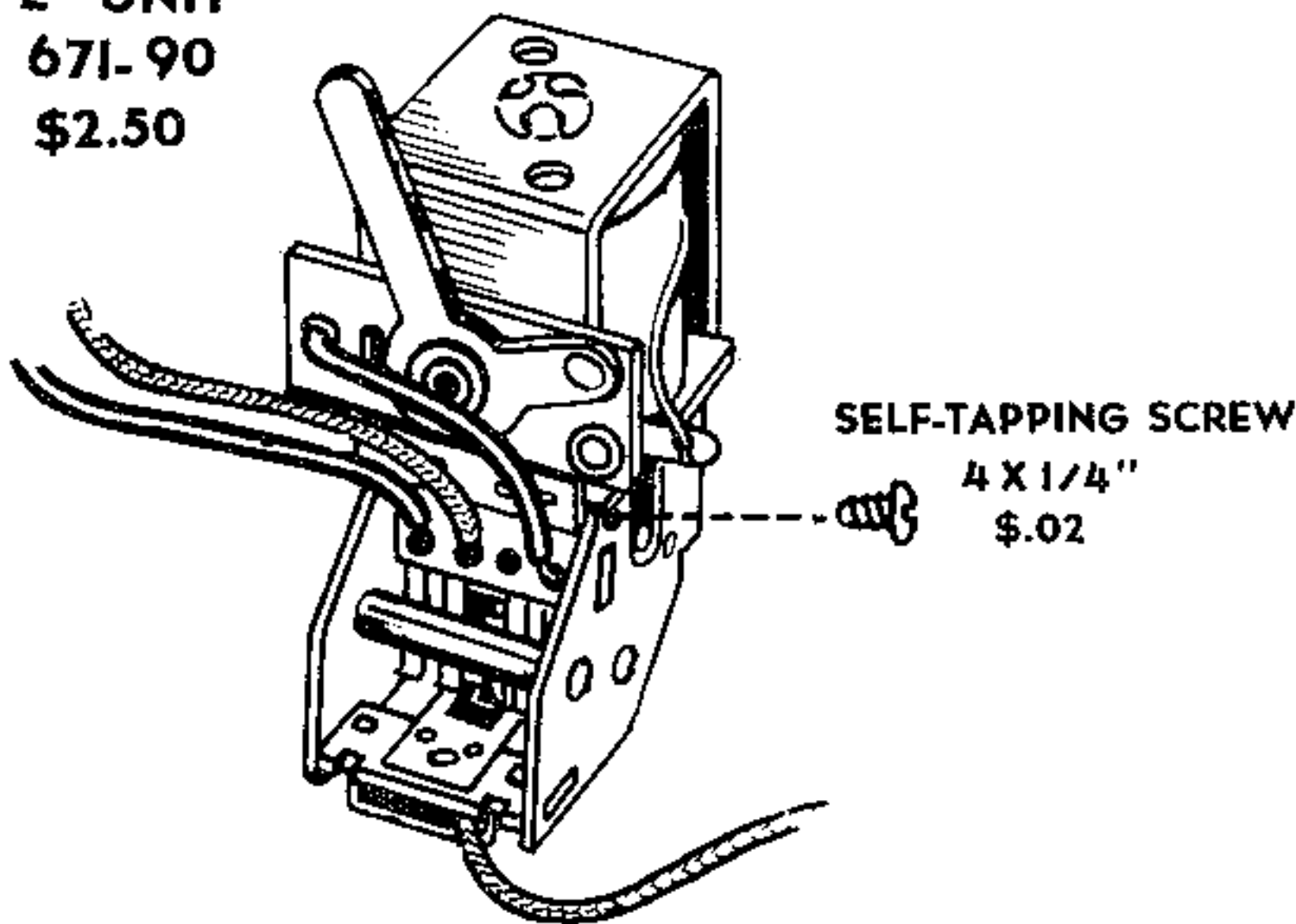
HEATER ASSEMBLY
671-225
\$.75



SPRING
2026-44
\$.05



E-UNIT
671-90
\$2.50

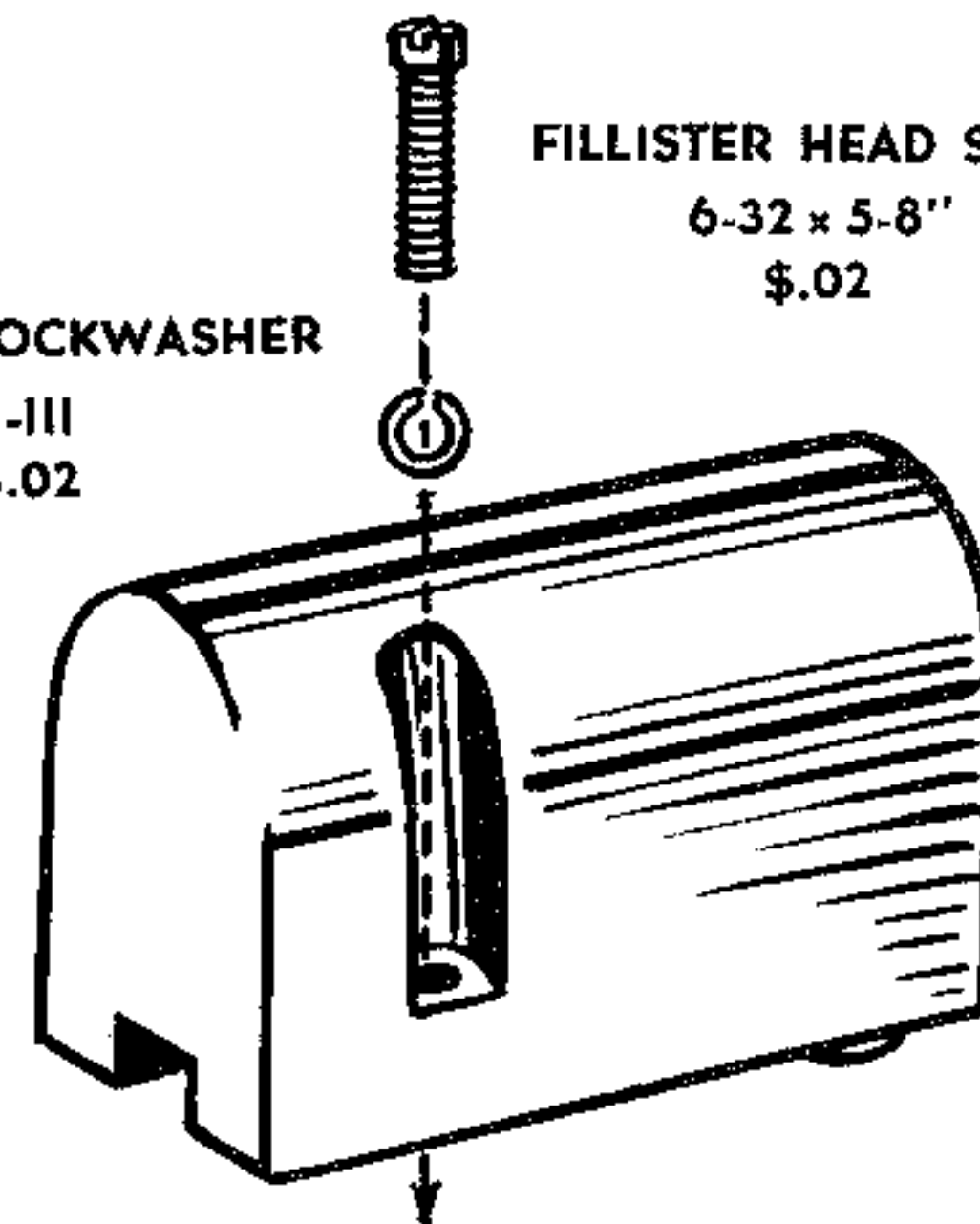


For parts and servicing of the E-Unit see Section LOC-E.

NO. 6 LOCKWASHER
2-III
\$.02

FILLISTER HEAD SCREW
6-32 x 5-8"
\$.02

BALLAST
671-219
\$.75



Ballast No. 671-219 has been added to later model locomotives to improve their traction. To mount ballast in older models set ballast on frame in front of the E-Unit so that smoke lever clears channel in base of ballast. Drill and tap frame for No. 6-32 x 5/8" screws.

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LOC-671
1947-49 MODEL
PL
4-60
PAGE 1

NO. 671 & NO. 2020 - LOCOMOTIVES 1947-49 MODELS

<u>Part Number</u>	<u>Location</u>	<u>Unit Price</u>	<u>Min. Quan.</u>	<u>Description</u>
2-111	A-61	.02	25	#6 Lockwasher
61-13	A-61	.02	25	Insulating Washer (Lamp)
61-22	A-61	.05	25	Lamp Contact
78-73	A-71	.15	12	Lamp Socket
100-25	C-22	3.50		Reversing Unit
226E-95	A-106	.10	6	Truck Axle
289E-20	A-76	.15	6	Lamp Bracket
671-6	B-87	.15	4	Handrail RH
671-7	B-87	.15	4	Handrail LH
671-20	B-76	.10	6	Axle Bushing
671-21	Obsolete			Swaged Axle
671-25	B-107	.10	6	Axle
671-32	B-107	.15	4	Apron (Steps)
671-33	B-107	.05	12	Cup Washer
671-81	C-71	.05	12	Rear Truck Stud
671-84	C-47	.10	6	Center Truck Wheel
671-85	C-72	.15	4	Axle Retainer (Truck)
671-90	J-48	3.50		Reversing Unit
671-93	B-14	1.50		Front Truck Complete
671-94	C-71	.10	6	Front Truck Stud
671-98	C-72	.20		Side Rod
671-99	C-72	.10	12	Side Rod Screw (Long)
671-105	Sub. 681-4			Collector Assem.
671-107	C-72	.02	12	Collector Arm Rivet
671-108	C-72	.02	25	Collector Spring
671-109	C-57	.50		Collector Arm Assem.
671-111	A-13	.20		Collector Roller
671-112	C-57	.02	25	Collector Insulating Washer
671-127	C-73	.15	4	End Truck Wheel
671-151	C-73	.05	12	Truck Spring
671-158		.05	12	Collector Nameplate
671-160	B-66	.10	6	Smoke Unit Cover
671-167	B-56	.20		Smoke Unit Piston
671-170	B-46	2.50		Smoke Unit Complete
671-176		8.00		Frame & Wheels Assem.
671-180	C-67	.75		Worm Wheel
671-181	C-67	.05	12	Smokestack Gasket
671-182	C-67	.05	12	Smoke Cam
671-183	C-67	.02	25	Worm Wheel Cover
671-184	C-74	.20		Drawbar

- continued -

<u>Part Number</u>	<u>Location</u>	<u>Unit Price</u>	<u>Min. Quan.</u>	<u>Description</u>
671-185	C-74	.05	12	Truck Pivot Screw
671-186	C-74	.05	12	Collector Insulation
671-188	C-77	.05	12	Smoke Lever
671-189	C-77	.02	25	Smoke Lever Retainer
671-200	C-77	.10	6	Collector Terminal
671-202	B-15	2.00		Rear Truck W/Drawbar
671-212	C-77	.05	12	Smoke Unit Lining
671-214	C-77	.02	25	Lock Washer (Collector)
671-218	G-21	7.00		Boiler & Cab
671-219	C-74	1.00		Ballast
671-225	B-56	1.00		Smoke Heater Element
671-233	D-11	1.25		Boiler Front Assem.
671-235	Obsolete			Center Wheel
671-236	Obsolete			End Wheel
671-238	C-73	.10	12	Side Rod Screw (Short)
671-239	C-77	.10	12	Wheel Spacer
671-240	B-51	.40		Center Wheel Assem.
671-241	B-31	.40		End Wheel Assem.
671M-1	K-17	6.50		Motor Complete
671M-5	A-45	1.50		Brushplate
671M-8	Obsolete			Armature
671M-19	C-75	.02	25	Rear Thrust Washer
671M-20	C-75	.15	4	Rear Bearing
671M-21	C-75	.02	25	Ball Bearing
671M-22	C-75	.05	12	Retaining Ring
671M-23	C-75	.02	25	Thrust Washer
681-4	L-25	.50		Collector Assem.
726-21	D-72	.10	6	Insulating Sleeve (Collector)
1447-300	LC	.35	10	Lamp
1666E-11	E-53	.02	25	Cotter Pin (Handrail)
1666E-20	E-73	.15	4	Headlight Lens
2020-224	G-14	7.00		Boiler & Cab
2020M-17	E-84	.15	4	Front Bearing
2020M-33	E-94	pr.60	6 pr	Brushes
2020M-34	E-94	pr.10	6 pr	Brush Spring
2026-44	E-65	.05	12	Smoke Piston Spring
3-48 x 5/16"		.02	25	BH Collector Screw
4 x 1/4"		.02	25	RHST "Z" Revers. Unit Screw
4-40 x 7/32"		.02	25	RH Smoke Unit Mtg. Screw
6-32 x 1/4"		.02	25	RH Brushplate Screw
6-32 x 5/16"		.02	25	FH Front Body Mtg. Screw
6-32 x 3/8"		.02	25	RH Motor Mtg. Screw
6-32 x 5/8"		.02	25	Fil. H. Ballast Mtg. Screw
6-32 x 3/4"		.02	25	FH Rear Body Mtg. Screw

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LOCOMOTIVE NO. 671R

Locomotive No. 671R is a standard No. 671 locomotive adapted to electronic control by the use of a special brush plate equipped with two jacks and a plug. The operation of the locomotive is illustrated in the wiring diagram below.

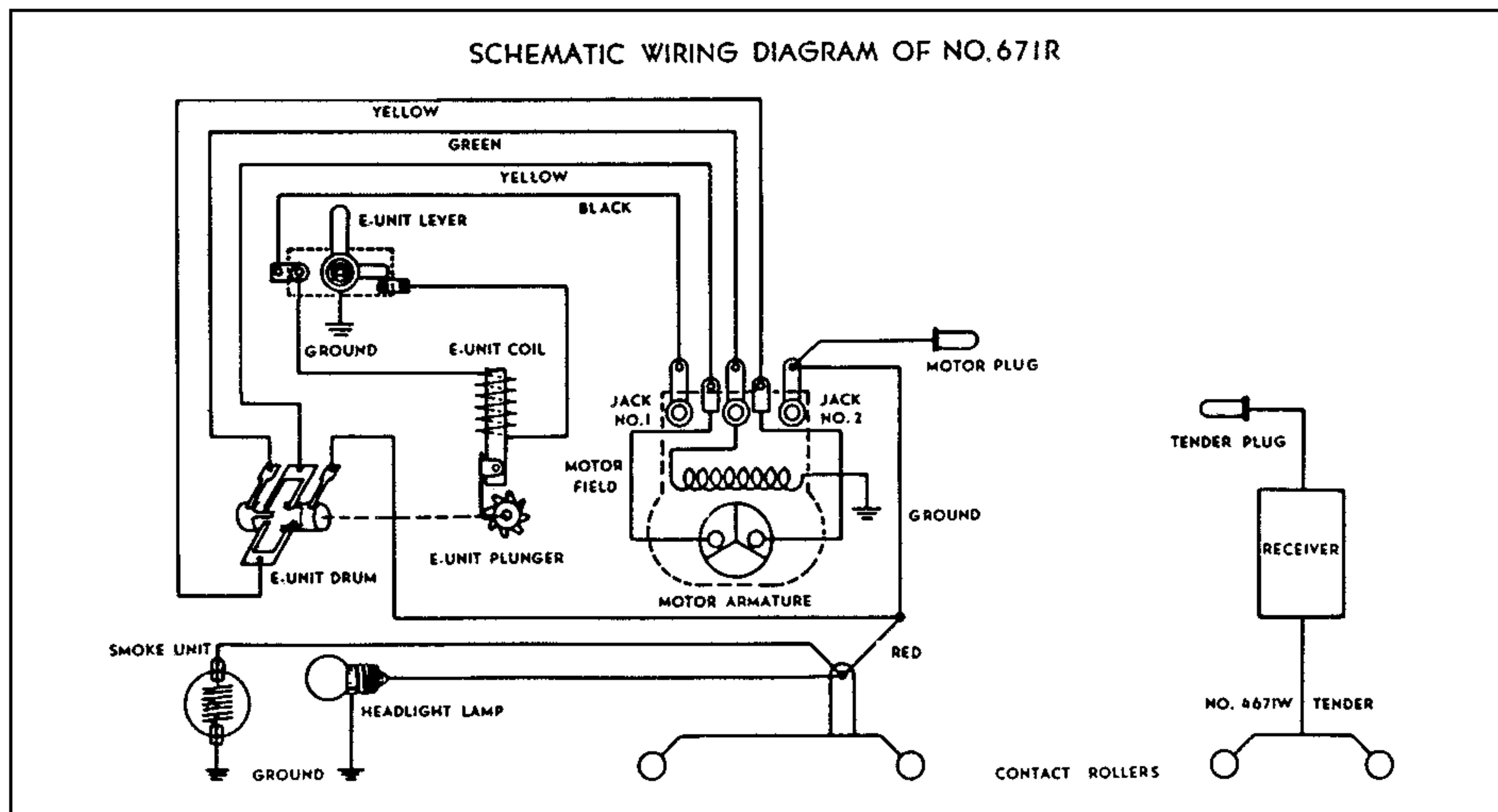
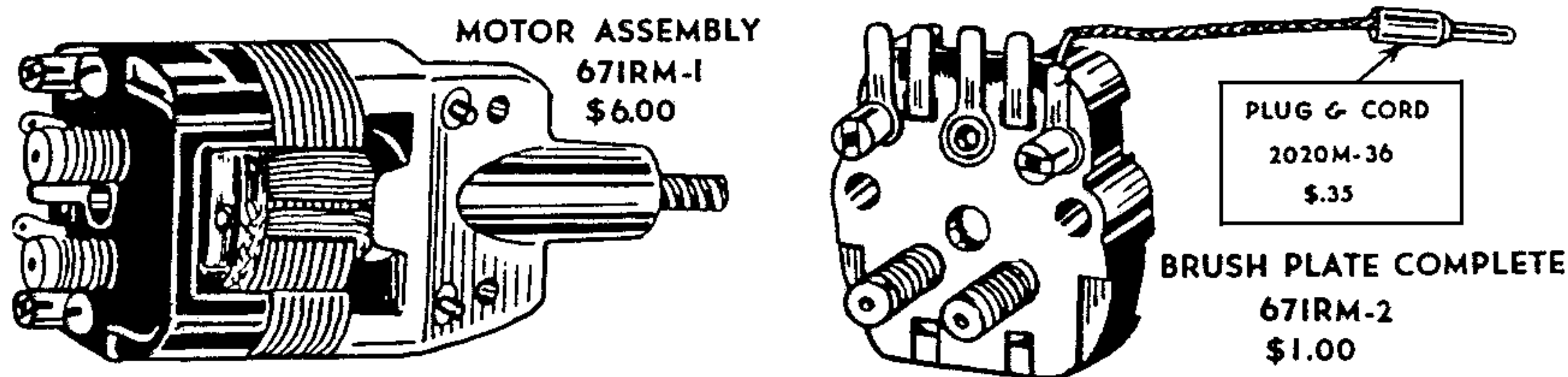
For conventional non-electronic operation, the plug from the motor brush plate is inserted into Jack No. 1, thus connecting the E-Unit coil to the contact rollers of the locomotive. The coil is normally energized, keeping the plunger and pawl assembly at the upper end of the coil tube. The E-Unit indexes whenever current in the track is momentarily interrupted either by the operation of the direction control, or by accidental means.

For electronic operation, the E-Unit coil is disconnected from the locomotive contact rollers by removing the motor plug from Jack

No. 1. (The motor plug is then usually inserted in Jack No. 2 to keep it out of the way.) Instead, the E-Unit coil is connected to the electronic receiver in No. 4671W tender by inserting the plug from the tender in Jack No. 1. Since the relay contained in the electronic receiver is normally open, the E-Unit coil is normally not energized and the E-Unit indexes only when the proper button on the electronic transmitter is pressed and released.

A number of 671R locomotives, made in 1946, are not equipped with a E-Unit lever. In these locomotives the E-Unit coil is grounded permanently and can be disconnected only at the 'high' side by removing the plug from Jack No. 1.

With the exception of the motor and brush plate, listed below all replacement parts for No. 671R locomotive are identical with No. 671.



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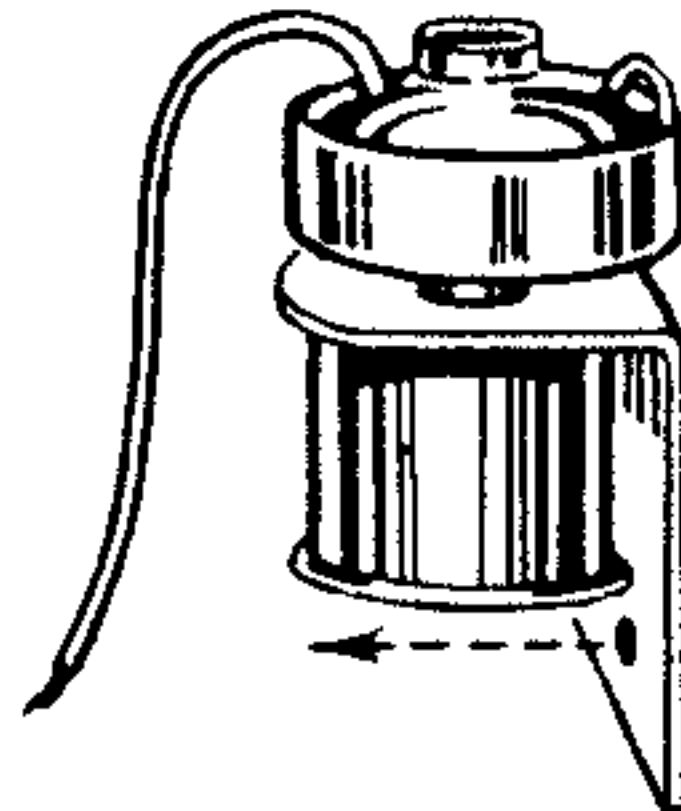
CONVERSION KIT NO. 671 S

\$2.50 NET

No. 671-S Conversion Kit is used to install heater-type smoke generators into the 1946 models of No. 671 and No. 2020 locomotives which were equipped with lamp-type smoke generators. The kit includes the following parts:



SMOKE STACK GASKET
671-181

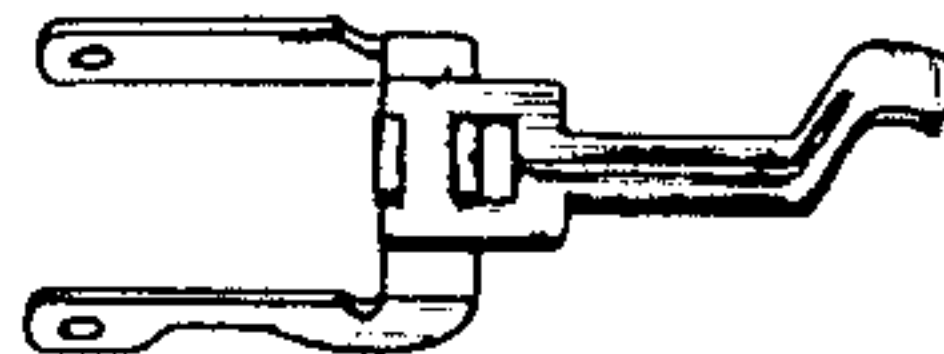


SMOKE UNIT COMPLETE
671-170

ROUND HEAD SCREW
4-40 X 7/32"

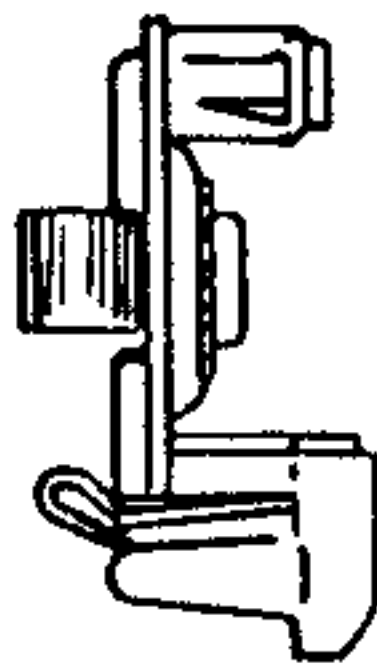


SMOKE UNIT PISTON
671-167

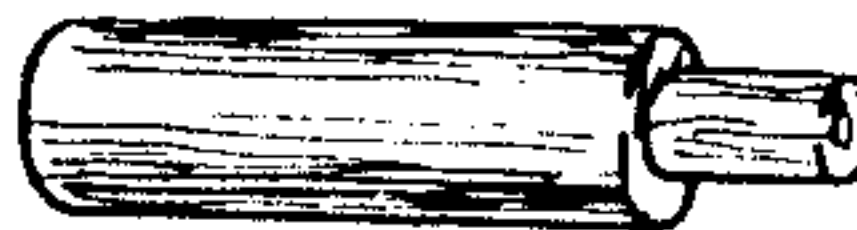


SMOKE LEVER ASSEMBLY
671-216

BOILER FRONT DOOR
671-196



SMOKESTACK CLEANER
675-33



SMOKE PELLETS
SP-1



LAMP
752-9

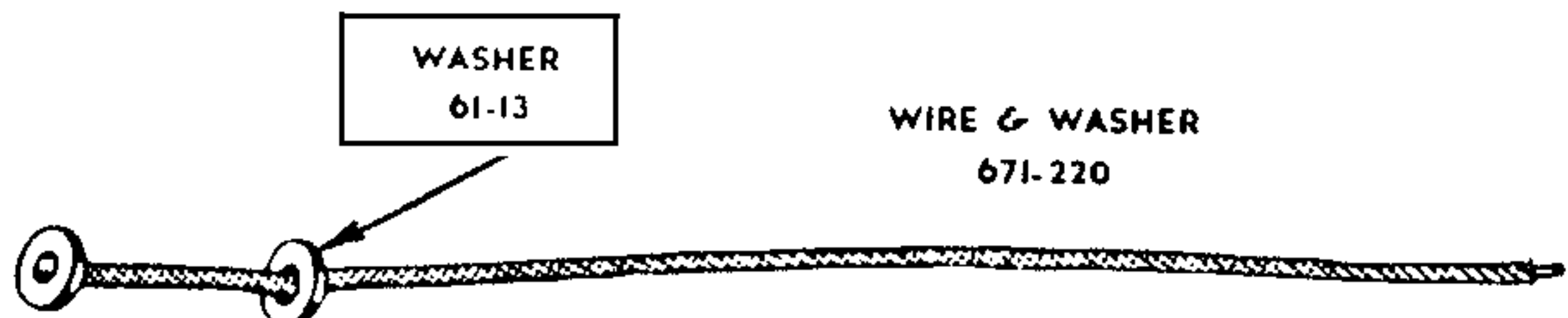


LAMP SHELL
78-73



WASHER
61-13

WIRE & WASHER
671-220



LIONEL SERVICE MANUAL

HOW TO INSTALL CONVERSION KIT NO. 671 S

INTO Nos. 671 AND 2020 LOCOMOTIVES

To install the heater-type smoke unit proceed as follows:

1. Remove boiler casting. Knock out eyelet in smoke stack. Using a 1/4" drill ream out prong holes in the front of the casting 5/16" deep to accommodate the heavier prongs of Boiler Front Assembly, 671-196. (See Figure 1).

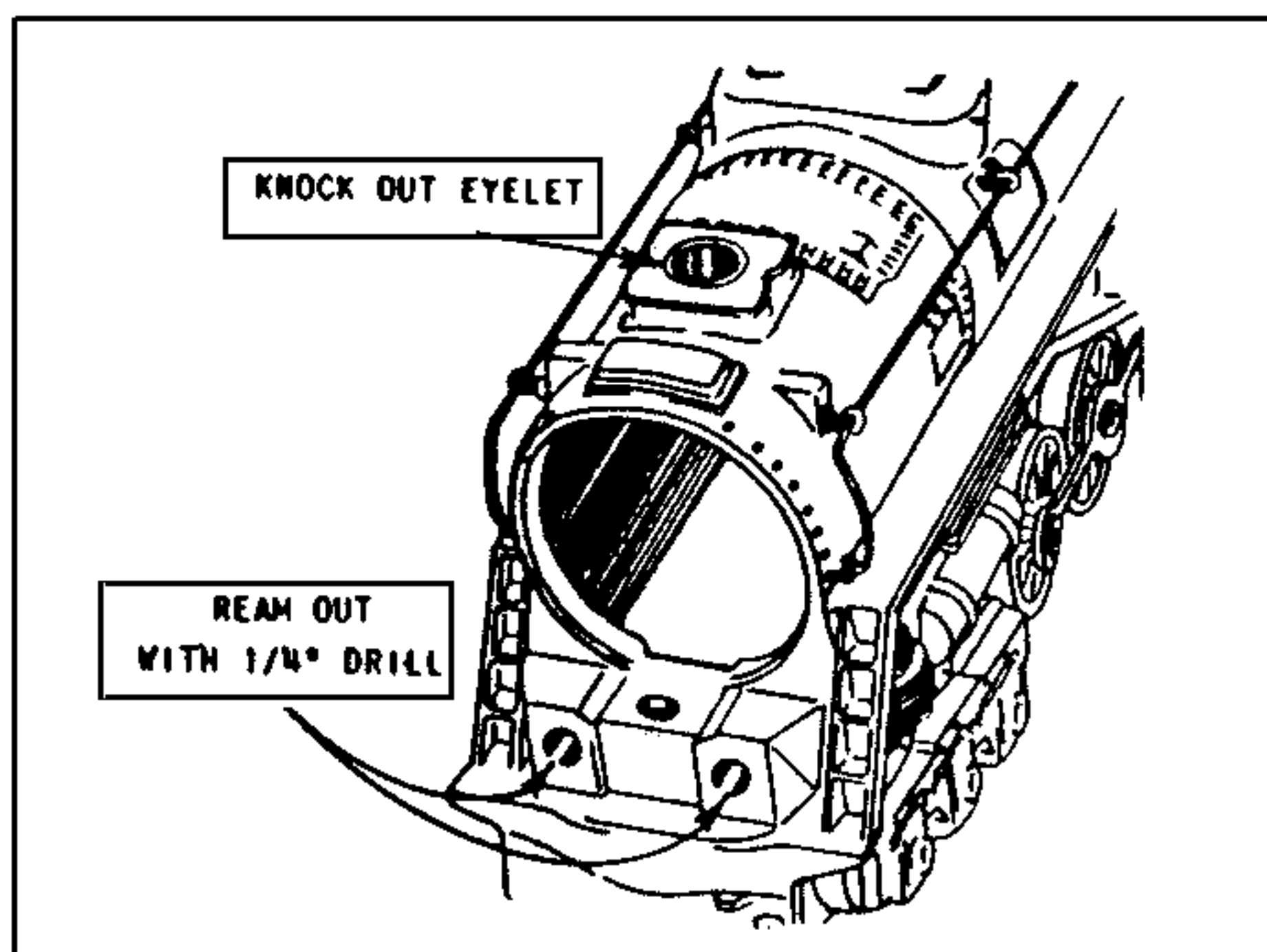


Figure 1 - How to adapt locomotive casting to heater-type smoke generator.

2. Remove the old smoke unit and unsolder its wire lead from the collector terminal.

3. Remove the two side screws holding the flapper assembly and lift out the flapper, the bakelite cam follower and the spring. The flapper must be replaced by the Smoke Lever Assembly, 671-216.

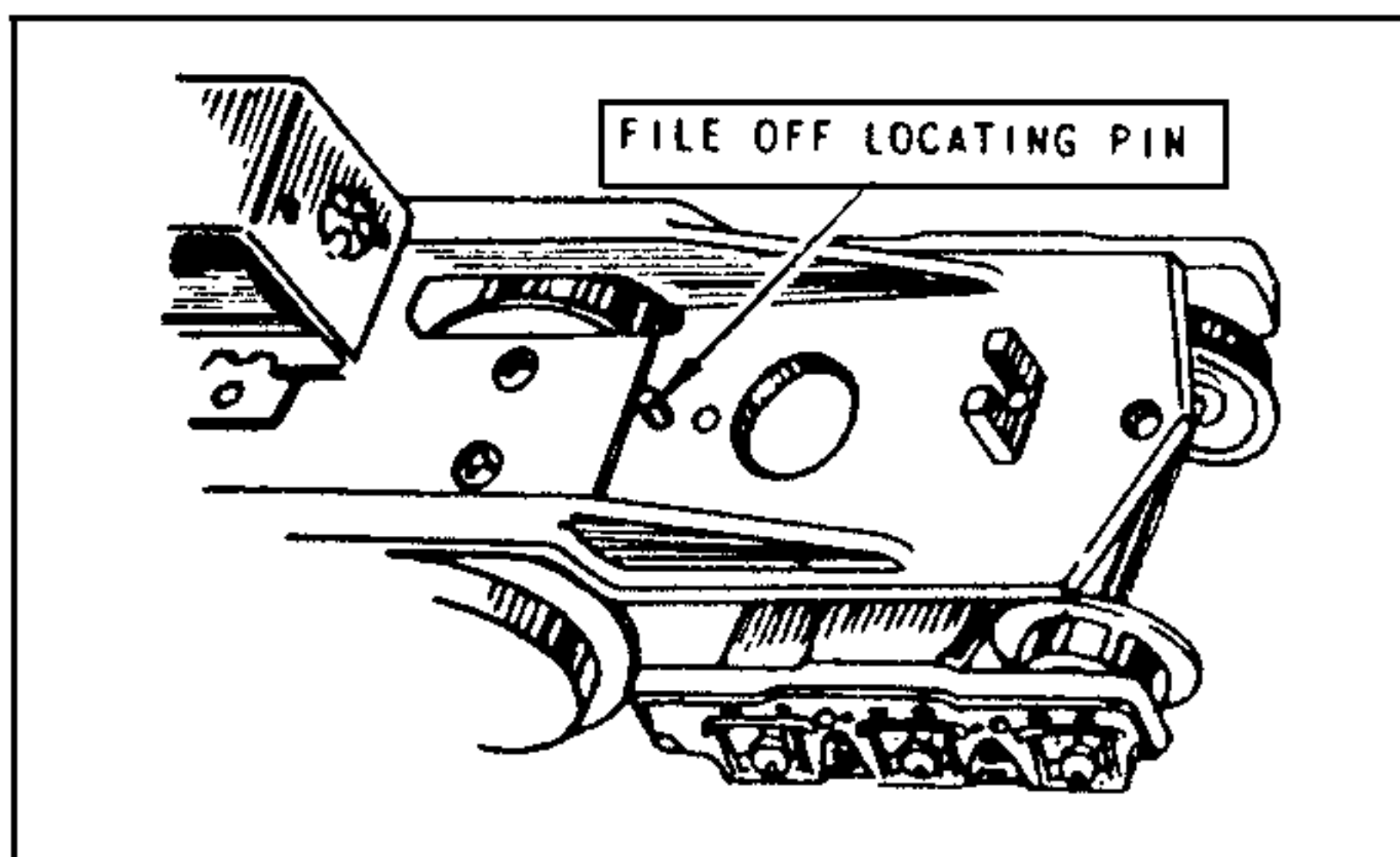


Figure 2 - File off lamp generator locating pin.

4. Before replacing the Smoke Lever Assembly file or chisel off the locating pin flush with the surface of the casting. (See Figure 2)

5. Install the Smoke Unit 671-170, and the Smoke Piston, 671-167, using the #4-40 x 3/16" Binding Head Screw. (See Figure 3)

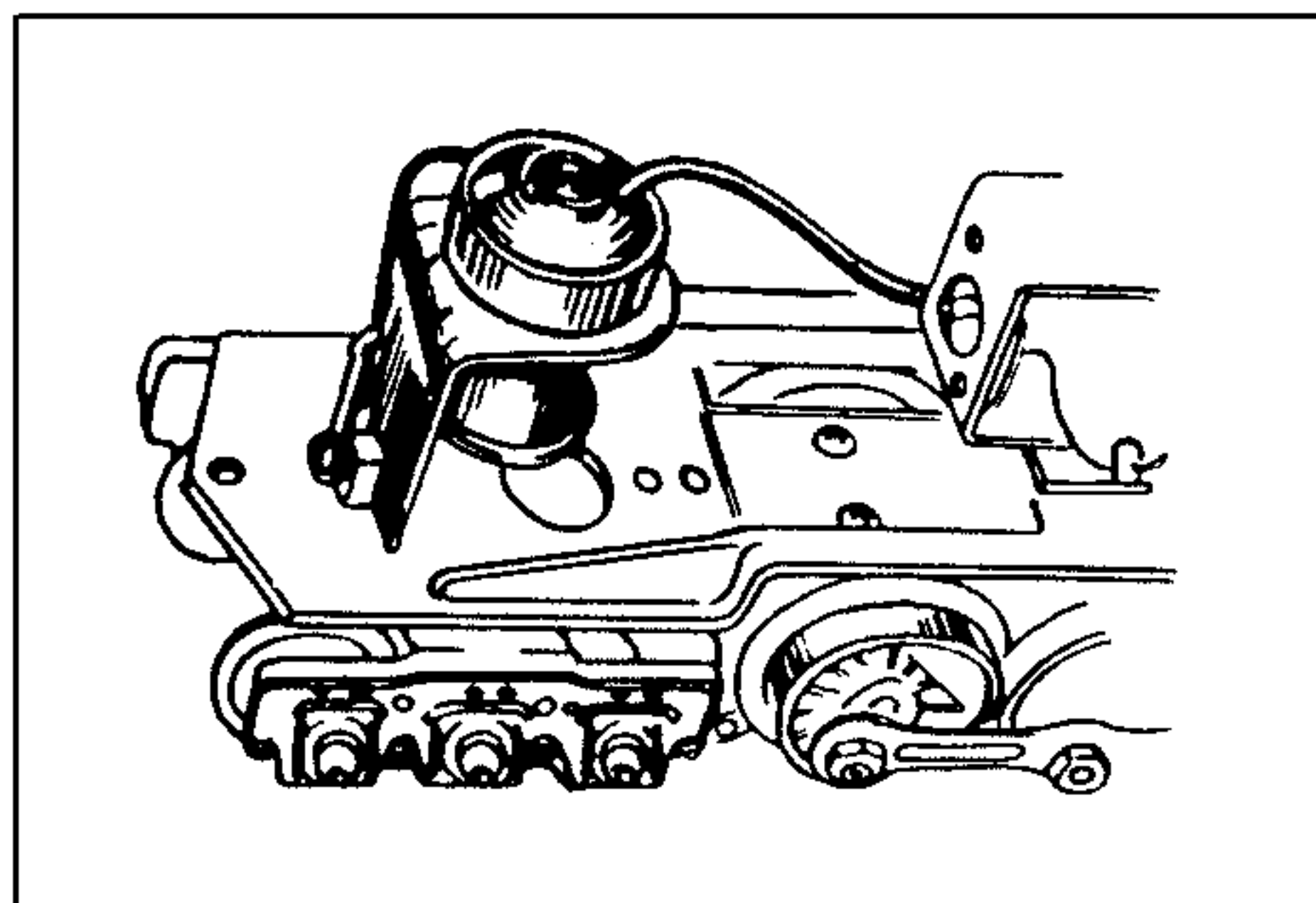


Figure 3 - Heater smoke generator in place.

6. Solder the free end of the smoke heater lead to the collector terminal. The remaining side of the smoke element is already grounded to the locomotive casting through the framework of the Smoke Unit.

7. Assemble the Washer, 61-13, and the Lamp Shell, 78-73, onto the 6-1/2" Lamp Cord, screw in the Lamp, 752-9, and solder the free end of the wire to the collector terminal.

8. Place the Stack Gasket, 671-181, over the smoke unit cover and reassemble the boiler casting onto the locomotive frame. Make sure the hole in the smoke unit cover lines up with the smoke stack opening.

9. Clip the lamp shell into the snap holder inside the Boiler Front, and assemble the Boiler Front onto the locomotive.

10. When returning the converted job to the customer be sure to include the warning label, new instruction sheet, bottle of SP smoke pellets and the smoke stack cleaner supplied with the kit.

TENDERS

<u>Part Number</u>	<u>Description</u>	<u>Price</u>
<u>671W and 2020W Tenders</u>		
2020W-6	Body	2.50
2020T-4	Corner Rail	.10
1666T-5	Handrail	.10
1666E-11	Cotter Pin	.02
2466W-3	Frame	1.00
#4x1/4"	STRHI "Z" Sc. (Body Mtg.)	.02
482-1	Truck Complete (Front)	1.25
NTCL-1	Truck Complete (Rear)	1.50
480-18	Retaining Washer	.02
WS-125	Whistle Complete	6.00
6-32X3/16"	STRHI "S" Sc. (Whistle Mtg.)	.02
2466T-10	Drawbar	.10