

## Westinghouse Triple Valves

Effective January 1, 1935, triple valves must be equipped with the heavier type graduating springs (Pc. 18286 or Pc. QT-369), regardless of type in valve removed.

*(The A.A.R. have ruled that no additional charge for same is permissible).*

### Test No. 1—Resistance Test

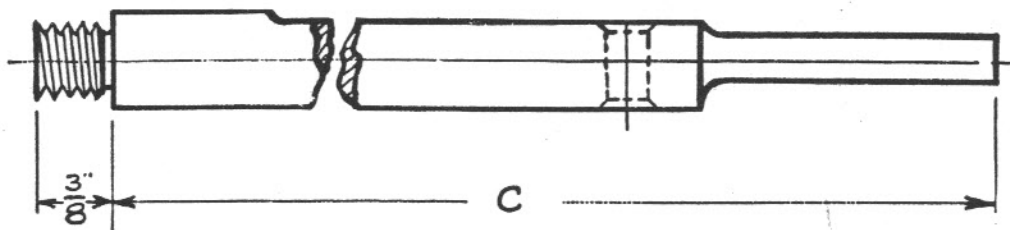
The resistance to movement of the triple valve piston and slide valve is measured before the triple valve is clamped on the stand, using the measuring device furnished with each rack. At the start of this test, the triple valve piston and slide valve must be in release position. To insure that these parts are in release position, bump the triple valve lightly against the bench a few times with the bolting face downward. Then, with the triple valve in position so that the piston moves horizontally with the slide valve resting on its seat, place the measuring device against the spider end of the piston and force the handle inward. The force required to overcome the resistance of the piston and slide valve will be registered by the indicator, which is graduated in pounds.

The scarf of the piston packing ring should be placed  $\frac{3}{4}$ " either side of the feed groove.

The following table specifies the resistance in pounds allowable for various size pistons.

DIAMETER OF PISTON	Resistance with Slide Valve in Place	Resistance of Piston alone in the Bush
$3\frac{1}{2}$ " and under.....	6 lbs.	5 lbs.
Over $3\frac{1}{2}$ " (incl. 4").....	7 lbs.	6 lbs.
Over 4" (incl. $4\frac{3}{4}$ ").....	8 lbs.	7 lbs.

## PISTON STOP TABLE



## PISTON STOP

Triple Valve Type	WAB Pc. No.	NYAB Pc. No.	Piston Stop Length "C"
H-1	64622	TA-589	$5\frac{1}{8}$ "
H-2	64623	TA-590	$5\frac{1}{2}$ "
P-1	64630	TA-594	$5\frac{3}{16}$ "
P-2	64629	TA-593	$5\frac{41}{64}$ "
M-1	64633	TA-667	$5\frac{13}{16}$ "
M-2-A	64634	TA-668	$5\frac{11}{16}$ "
R-1	64635	TA-669	$6\frac{9}{64}$ "
R-2	64636	TA-670	$5\frac{23}{32}$ "
L-1-B	64640	TA-674	$6\frac{3}{16}$ "
L-2-A	64627	TA-596	$5\frac{25}{32}$ "
L-3	64628	TA-597	$5\frac{47}{64}$ "
K-1	64624	TA-591	$5\frac{17}{64}$ "
K-2	64625	TA-592	$5\frac{39}{64}$ "

## Cap Nut Piston Stops

F-1, F-2	15125	TA-585
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This resistance can best be measured before the triple valve is completely assembled, especially for the Type K triple Valve, where the retarded release device obscures observation. This method will have to be followed for the M-2-B and plain triple valves.

#### **APPLYING PISTON STOPS**

Before placing the triple valve on the stand, the proper piston stop spindle should be screwed in up to the shoulder in the small piston within the triple valve stand. See piston stop table.

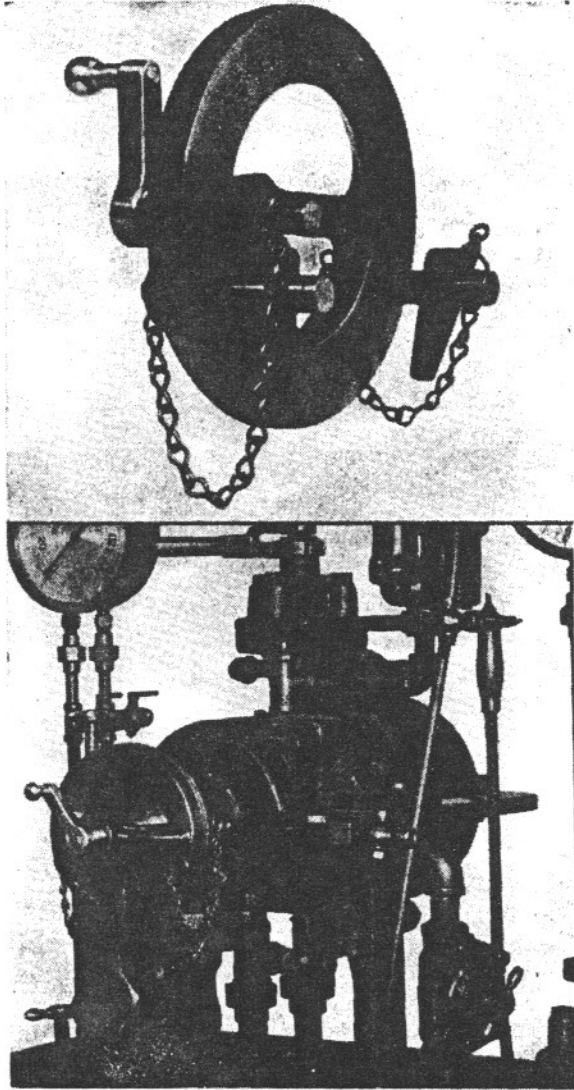
#### **MOUNTING TRIPLE VALVES FOR TESTING**

When mounting triple valves on stand, apply gasket to the triple valve flange, place the latter against the testing stand in a vertical position, and open cock *X*. Then if the triple valve to be tested is of the pipeless type, open cock *Y*. If it is of the type arranged for pipe connections, connect the brake pipe to the triple valve with the union hose, and open cock *Z*. One or the other of these two cocks should always be closed and the other open, while the triple valve is on the stand for test.

#### **Test for Checking Feed Groove Relation to Release Port**

With the triple valve assembled on the test rack, remove the cylinder cover and replace it with the Test Device, Pc. 92915, Fig. 10. (N. Y. A. B. Pc. 144-TA). Turn the adjusting screw of the test device in a counter clockwise direction outward, until the triple valve piston can be moved to application position, then move valve "R" handle to position No. 5, charging the auxiliary reservoir and brake cylinder to 10 pounds. Return valve "R"

handle to position No. 2. Turn the adjusting screw of the adjusting device in a clockwise direction inward, and note that the brake cylinder pressure commences to reduce before the auxiliary reservoir pressure reduces. This may be determined in the following manner: First coat the brake cylinder exhaust opening with soap suds and then place a finger on the triple piston at the point where the feed groove is located, so any air escaping through the feed groove will strike the finger and in this way be detected. If air is noted at the finger before a bubble at the exhaust opening shows that brake cylinder pressure is starting to escape, this will indicate that the feed groove is too long or the release port is not properly located. In such event, the only certain means of insuring correct restandardization of the triple valve is to return it to the manufacturer.



**Fig. 10. Test Device for Checking the Relationship of Feed Groove and Release Port Opening.**

### Test No. 2—Charging Test For All Triple Valves

Commencing the test with cocks 2 and 3 open, all other numbered cocks closed, valve *A* in position No. 8, valve *R* in position No. 1, auxiliary reservoir empty and main reservoir pressure 80 pounds, proceed as follows:

Move valve *R* to position No. 2 and valve *A* to position No. 1 and with brake pipe pressure maintained at 80 pounds, note the time required by the various triple valves to charge the auxiliary reservoir to the specified pressure, as given in the table.

**Time Limits for Charging Test**

Triple Valve Type	Time in Seconds to charge Auxiliary Reservoir			
	—New and Repaired Valves—		—Cleaned Valves—	
	0 to 30 lbs.	0 to 70 lbs.	0 to 30 lbs.	0 to 70 lbs.
F-1	13 to 17	40 to 52	11 to 19	34 to 58
F-2		20 to 26		18 to 28
F-24	13 to 17	40 to 52	11 to 19	34 to 58
F-25		20 to 26		18 to 28
G-24	13 to 17	40 to 52	11 to 19	34 to 58
H-1 (F-36)	21 to 28	58 to 78	19 to 30	50 to 80
H-2 (H-49)	13 to 17	40 to 52	11 to 19	34 to 58
K-1 (new)	35 to 50	90 to 130	30 to 60	60 to 155
K-2 (new)	20 to 30	55 to 85	18 to 35	50 to 95
K-1 (rep.)	32 to 50			
K-2 (rep.)	19 to 30			
L-1-B		16 to 26		14 to 28
L-2-A		12 to 15		11 to 16
L-3		9 to 12		8 to 13
M-1		16 to 20		14 to 22
M-2-A		10 to 15		9 to 16
M-2-B		10 to 15		9 to 16
P-1 (F-27)	13 to 17	40 to 52	11 to 19	34 to 58
P-2 (F-29)		20 to 26		18 to 28
R-1		12 to 22		11 to 25
R-2		10 to 15		9 to 16

NOTE—The charging times given from 0 to 30 lbs. and from 0 to 70 lbs. are equivalent, and either may be used; the former is to save time in making the test.

### Test No. 3

#### Leakage Test

Commencing each of the sections of Test No. 3 with cocks 2 and 3 open, all other numbered cocks closed, valve *A* in position No. 1, valve *R* in position No. 2, and auxiliary reservoir charged to 80 pounds, proceed as follows:

When leakage indicator is used, it should be filled with water up to the first graduation, and the cock furnished with the leakage indicator should be screwed into the exhaust port of the triple valve under test. No tests should be made until the triple valve has been operated several times, and at no time should the leakage in release position be noted after an emergency application; that is, the release position test should be preceded by a service application and release.

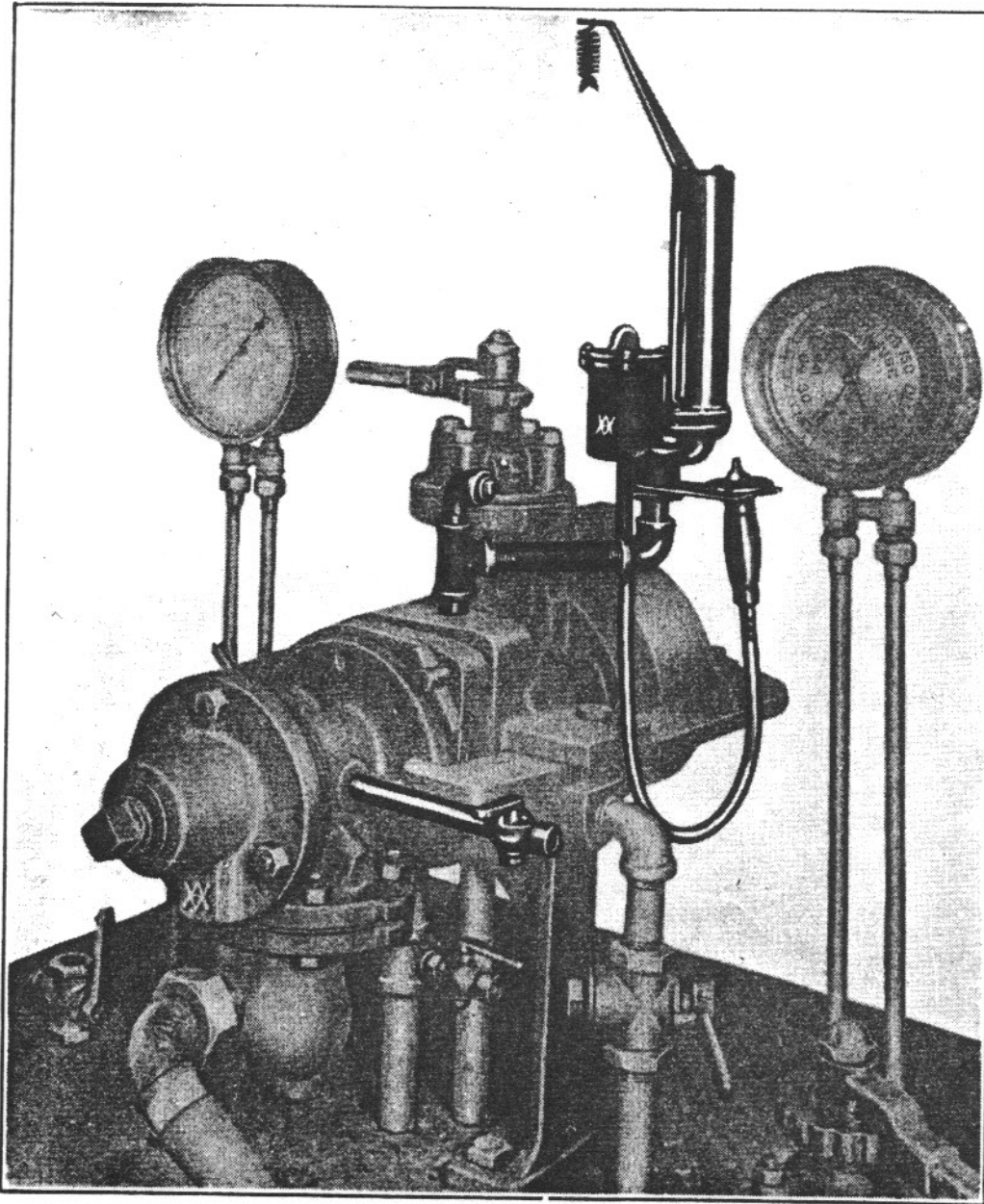
#### SECTION A.

##### LEAKAGE IN EMERGENCY POSITION CHECK VALVE AND CYLINDER CAP GASKET LEAKAGE

Operate the triple valve two or three times in quick succession by moving valve *A* between positions Nos. 1 and 8, finally leaving valve *A* in position No. 8.

On racks with diaphragm type cocks, operate the triple valve two or three times by closing and opening cock *Z*, finally leaving cock *Z* closed. When testing pipeless triple valves use cock *Y*.

NOTE—If, during this test or test No. 2 (Charging Test), any considerable leakage is discovered, the charging test must be repeated, after the leakage is eliminated.



**Fig 11. Photographic View of the Leakage Indicator arranged for testing triple valves having direct brake pipe connection.**

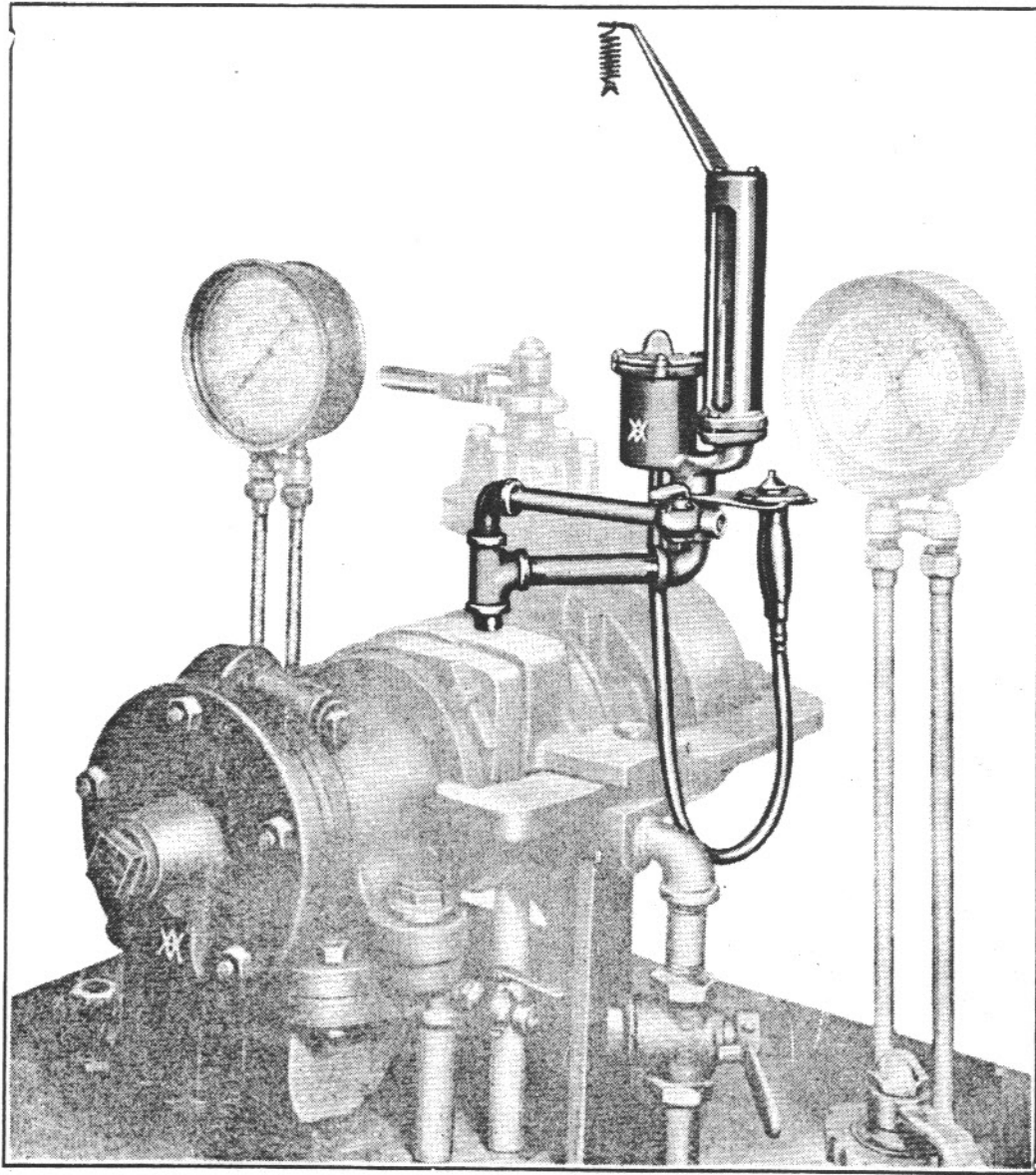
Coat the exhaust port of the triple valve with soap-suds to ascertain whether leakage exists past the slide valve, or bushing to the exhaust. When using leakage indicator, place hose nozzle against the exhaust cock and note time required for the water to rise from the second to the third graduation, which should be not less than 7 seconds for new and repaired valves.

For cleaned valves, the time required for the water to rise from the second to the fourth graduation should be not less than 4 seconds.

For new and repaired valves, close cocks 2 and 3; for cleaned valves, not new, and not repaired, close cock 2 only. Then note the rate of fall of pressure on brake cylinder gage. Check valve and cylinder cap gasket leakage will produce a drop in brake cylinder pressure, and individual check valve or cylinder cap gasket leakage should not exceed 5 pounds in 10 seconds. If the cylinder cap and check valve leakage combined is greater than 5 pounds in 10 seconds, it should be ascertained that the individual leakage is not greater than 5 pounds in 10 seconds, by applying a new cylinder cap gasket known to be free from leakage in place of the one under test, checking piston to ascertain if it is straight, and repeating test with the new gasket. Check valve leakage only will then be indicated, which should not exceed 5 pounds in 10 seconds. Deducting check valve leakage from the combined leakage gives the cylinder cap gasket leakage which also should not exceed 5 pounds in 10 seconds.

When "L" type triple valves are under test, remove the safety valve and coat with soap-suds the safety valve connection of triple valve. A 1" bubble in not less than 2 seconds is permissible.





**Fig. 12. Photographic View of the Leakage Indicator arranged for testing "pipeless" triple valves.**

Screw pipe plug in exhaust connection, move valve *A* to position No. 1 and coat the entire valve with soap-suds to locate leakage through the body, or at the gaskets.

With rack having diaphragm type cocks and leakage indicator, close cock in exhaust port, open cock *Z*, and coat the triple valve with soapsuds to detect body or gasket leakage.

At the completion of this test, open cocks 2, 3, and 4 in the order given, and remove pipe plug from triple valve exhaust. (Open leakage indicator exhaust port cock).

#### SECTION B.

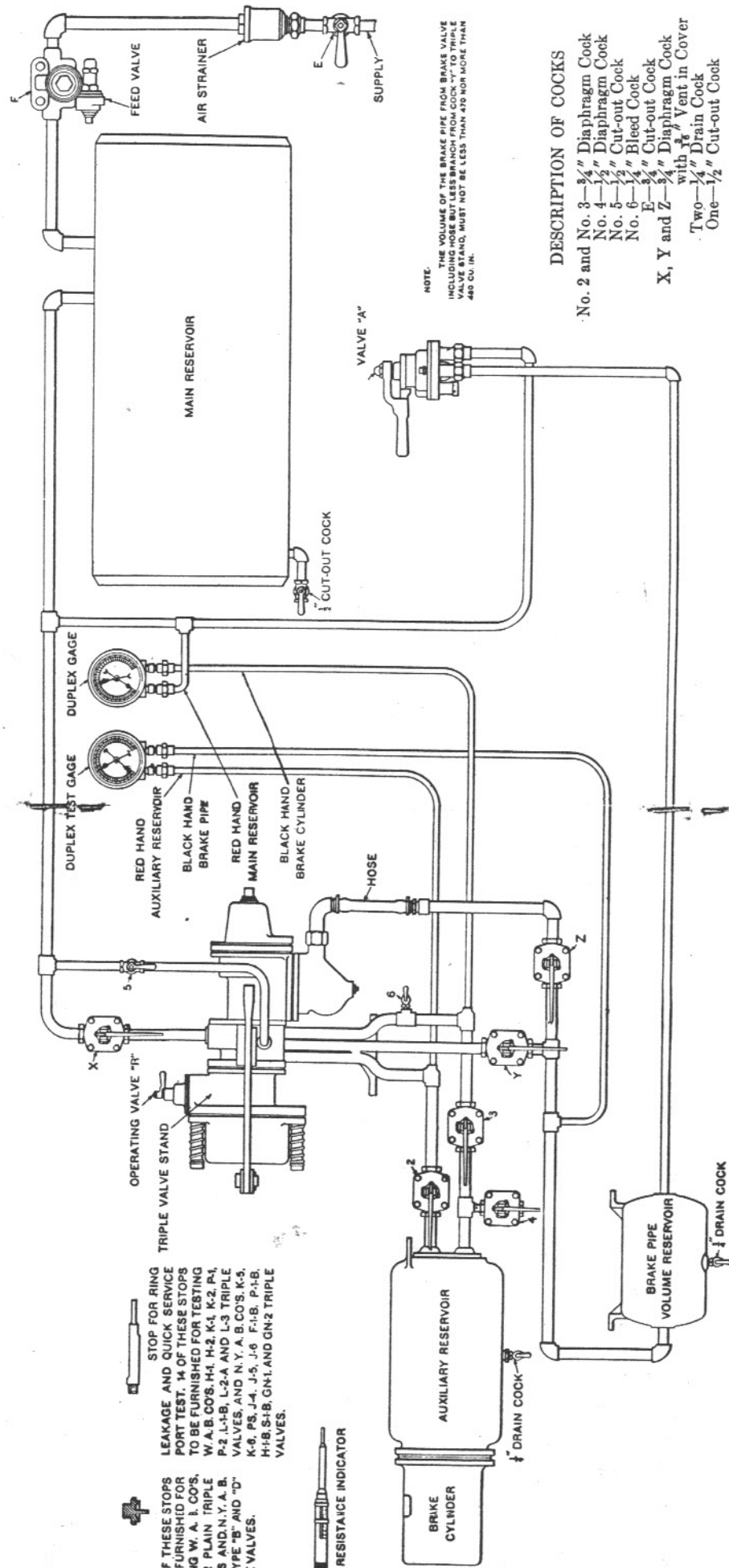
##### LEAKAGE IN RELEASE POSITION SLIDE VALVE AND EMERGENCY VALVE LEAKAGE

Move valve *A* to position No. 5, making a 10 lb. reduction, then release by returning valve *A* to position No. 1.

After the brake cylinder pressure is exhausted, close cock 3, and again coat the exhaust port with soapsuds to determine leakage by the slide valve in release position from the auxiliary reservoir to the brake cylinder, or leakage by the emergency valve from the brake pipe to the brake cylinder. When using leakage indicator, place the hose nozzle against the exhaust cock and note the time required for the water to rise from the second to the fourth graduation. This should be not less than the following:

New and Repaired Valves:	10 seconds
Cleaned Valves:	4 seconds

At the conclusion of the test open cock 3.



STOP FOR RING LEAKAGE AND QUICK SERVICE PORT TEST. 14 OF THESE STOPS TO BE FURNISHED FOR TESTING W. A. B. CO'S. F-1, F-2 PLAIN TRIPLE VALVES AND N.Y. A. B. CO'S TYPE "B" AND "D" TRIPLE VALVES.

STOP FOR RING LEAKAGE AND QUICK SERVICE PORT TEST. 14 OF THESE STOPS TO BE FURNISHED FOR TESTING W. A. B. CO'S. H-1, H-2, K-1, K-2, R-1, P-2, L-1-B, L-2-A AND L-3 TRIPLE VALVES, AND N.Y. A. B. CO'S. K-3, K-5, P-3, J-4, J-5, J-6 F-1-B, P-1-B, H-1-B, S-1-B, G-1, AND G-2 TRIPLE VALVES.



NOTE: THE VOLUME OF THE BRAKE PIPE FROM BRAKE VALVE INCLUDING HOSE BUT LESS BRANCH FROM COCK "Y" TO TRIPLE VALVE STAND, MUST NOT BE LESS THAN 470 NOR MORE THAN 480 CU. IN.

DESCRIPTION OF COCKS

- No. 2 and No. 3— $\frac{3}{4}$ " Diaphragm Cock
- No. 4— $\frac{1}{2}$ " Diaphragm Cock
- No. 5— $\frac{1}{2}$ " Cut-out Cock
- No. 6— $\frac{1}{2}$ " Bleed Cock
- E— $\frac{3}{4}$ " Cut-out Cock
- X, Y and Z— $\frac{3}{4}$ " Diaphragm Cock with  $\frac{1}{8}$ " Vent in Cover
- Two— $\frac{1}{4}$ " Drain Cock
- One— $\frac{1}{2}$ " Cut-out Cock

Fig. 13 The No. 3-T Test Rack. Diagrammatic Piping Diagram

Leakage at the triple valve exhaust in release position indicates leakage of slide valve or rubber seated emergency valve. With graduated release triple valves, leakage of graduating valve also may cause a blow at the exhaust.

To separate these leakages, in order that the defect may be located and remedied, it is necessary to have available a complete triple valve check case with all its parts in good condition. Substituting this good check case for the one on the defective triple valve and repeating the test will enable locating the source of the leakage.

When L type triple valves are under test, coat the safety valve connection of triple valve with soapsuds to detect slide valve leakage. A 1" bubble in not less than 4 seconds is permissible for new and repaired valves or 2 seconds for cleaned valves. At completion of the test, replace safety valve.

### SECTION C.

#### EMERGENCY VALVE LEAKAGE TEST

Close cock 4, move valve *A* to position No. 3 and valve *R* to position No. 1. Reduce auxiliary reservoir and brake pipe pressure to 55 pounds, and return valve *R* to position No. 2.

Move valve *A* to position No. 4 and reduce brake pipe pressure to 40 pounds, then return valve *A* to position No. 3.

NOTE—When testing "P" type triple valves, the reduction should be made with valve "A" in position No. 5.

Open cock 6. If brake pipe pressure falls with the brake cylinder, it indicates that the emergency valve is not seating properly.

At the completion of this test, close cock 6 and return valve *A* to position No. 1.

#### SECTION D.

##### LEAKAGE IN SERVICE LAP POSITION GRADUATING VALVE LEAKAGE

Move valve *A* to position No. 5, making a 12 pound reduction, then return valve *A* to position No. 3 (Lap). Open cock 4 and reduce the brake cylinder pressure to 30 pounds. Close cock 3, allowing cock 4 to remain open during the graduating valve leakage test.

Observe the pressure on brake cylinder gage. An increase in pressure indicates graduating valve leakage (and in rare instances, slide valve leakage). The rate of increase in brake cylinder pressure should not exceed the limits specified:

New and Repaired Valves:	8 lbs. in 20 seconds
Cleaned Valves:	12 lbs. in 20 seconds

##### TEST FOR LEAKAGE AT EXHAUST PORT

The time for leakage indicated by the leakage indicator for the rise of water from the second to the third graduation should not be less than the following:

New and Repaired Valves:	11 seconds
Cleaned Valves:	5 seconds

Upon the completion of the test, open cock 3 and move valve *A* to position No. 1.

## Test No. 4

### (A) Release Test For All Triple Valves

Commencing the test with cocks 2 and 3 open, other numbered cocks closed, auxiliary reservoir charged to 80 pounds, valve *A* in position No. 1, valve *R* in position No. 2, proceed as follows:

Make a 15 pound reduction with valve *A* in position No. 5, then return to position No. 3. Reduce brake cylinder pressure to 40 pounds by opening cock 4, and closing cock 4 after the required pressure is obtained. Move valve *A* to position No. 2. This should move the triple valve piston and slide valve to full release position.

The time of release of brake cylinder pressure from 40 to 10 pounds for the respective triple valves should not exceed:

4 seconds for K-1\*, K-2\*, R-1, H-1, L-1-B,

3 seconds for M-1, R-2, P-1, H-2, M-2-A, L-2-A,

2 seconds for P-2, M-2-B, L-3.

Longer release times than the above indicate a restriction in the exhaust passage.

Following this test recharge the system to 80 pounds by moving valve *A* to position No. 1.

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\*NOTE—A longer release time than 4 seconds for the K-1 and K-2 Triple Valves may indicate that the retarding device spring is broken, or that the retarding device has excessive friction and is sticking in retarded release position.

## (B) Retarded Release Test For Type K Triple Valves Only

With brake pipe and auxiliary reservoir charged to 80 pounds, move valve *A* to position No. 5 making a 15 pound brake pipe reduction, then return valve *A* to position No. 3. By opening cock 4 reduce brake cylinder pressure to 40 pounds, then close cock 4 and move valve *A* to position No. 1.

The triple valve piston and slide valve should be forced to retarded release position, indicated by a slow release of brake cylinder pressure. The time of release of cylinder pressure from 40 to 10 pounds should be:

8 to 12 seconds for K-2,  
14 to 20 seconds for K-1.

If in this test the time is shorter than specified, the piston and slide valve are stopping short of retarded release position, and it indicates that the retarding device is offering excessive resistance, which is most likely to be caused by the retarding device sticking in the cap.

### Test No. 5

#### Quick Service Port Test

Commencing with cocks 2, 3, and 4 open, all other numbered cocks closed, valve *A* in position No. 1, valve *R* in position No. 2, proceed as follows:

Place valve *A* in position No. 3 and move valve *R* to position No. 1, reducing both auxiliary and brake pipe pressures to 60 pounds.

Then place valve *R* in position No. 5. Brake pipe pressure should drop 5 pounds in not more than 4 seconds. If, however, the triple valve piston moves to full service position before the 4 seconds time has elapsed, the triple valve should be passed, provided the brake pipe pressure has been reduced  $2\frac{1}{2}$  pounds or more.

NOTE—In making this test it will be noticed that a slight rise occurs in brake pipe pressure due to the displacement of the triple valve piston as it moves toward service position. **The measurement of time and pressure should start with the attainment of the maximum pressure in the brake pipe.**

If the requirements of this test are not met, the quick service port must be unduly restricted.

At the completion of this test, place valve *R* in position No. 2 and valve *A* in position No. 1.

## Test No. 6

### Packing Ring Leakage Test

Commencing the test with cocks 2 and 4 open, other numbered cocks closed, valve *A* in position No. 1, place valve *R* in position No. 3. Move valve *A* to position No. 8 and reduce brake pipe pressure to 64 pounds, then return valve *A* to position No. 3. Open cock 6 and cock 3 so as to reduce auxiliary reservoir pressure to 66 pounds, then close cock 3 and complete the auxiliary reservoir reduction to 60 pounds with cock 6 open and valve *R* in position No. 4. Close cock 6 and move valve *R* to position No. 3. Reduce brake pipe pressure to 60 pounds with valve *A* in position No. 4. It is important that auxiliary reservoir and brake pipe pressures be reduced to agree exactly at 60 pounds.



Move valve *R* to position No. 4 and note the drop in brake pipe pressure.

For new and newly repaired triple valves, this drop should not exceed 5 pounds in one minute. It is permissible to repeat this test once or twice if the ring has failed on a margin of one pound or less, and if it passes any single test, the ring should be approved.

When the brake pipe pressure drop exceeds 7 pounds in one minute, the triple valve cannot be expected to operate satisfactorily under service conditions, therefore, to provide a suitable margin to insure satisfactory operation, a triple valve removed from service for test should not be returned to service without making proper repairs when this drop in brake pipe pressure exceeds 6 pounds in one minute.

Upon the completion of this test, place valve *R* in position No. 2, valve *A* in position No. 1 and open cock 3, close cock 6 if open.

The above specification is correct for all triple valves except the M-2-B, L-2-A, L-3, and plain triple valves. These should be tested as follows:

L-2-A and L-3 Triple Valves: Commencing the test with cocks 2 and 4 open, other numbered cocks closed, valve *A* in position No. 1, place valve *R* in position No. 7. Move valve *A* to position No. 8 and reduce brake

pipe pressure to 64 pounds, returning valve *A* to position No. 3. Move valve *R* to position No. 3, open cock 6 and cock 3 so as to reduce auxiliary reservoir pressure to 66 pounds, then close cock 3 and complete the auxiliary reservoir reduction to 60 pounds with cock 6 open and valve *R* in position No. 4. Then return valve *R* to position No. 3. Close cock 6 and reduce brake pipe pressure to 60 pounds with valve *A* in position No. 4. It is important that auxiliary reservoir and brake pipe pressures be reduced to agree exactly at 60 pounds. Move valve *R* to position No. 4, noting the rate of brake pipe pressure drop. The limits are the same as those specified above for the other valves.

M-2-B and Plain Triple Valves: The piston stop in the stand controlled by valve *R* is not used in the Ring Leakage Test for any of the plain triple valves, or the M-2-B triple valves, as the piston in these types of valves operate vertically instead of horizontally; therefore, special piston stops are provided. Before commencing the Ring Leakage Test, open cock 4 and close cock 2 and place valve *A* in position No. 8, remove the lower cap nut from the triple valve and replace with proper piston stop. With the stop in place, move valve *A* to position No. 1, then open cock 2. Move valve *R* to position No. 7 to recharge auxiliary reservoir, then return it to position No. 3 and proceed with test as outlined above for the other triple valves.

## Test No. 7

### Emergency Test

With cocks 2, 3, and 4 open, other numbered cocks closed, and valve *R* in position No. 2, move valve *A* from position No. 1 to position listed for the triple valve under test.

Position No. 7 for H-1, M-1, K-1 (H-2 and P-1 with  $\frac{3}{16}$ " service port).

Position No. 8 for K-2, L-1-B, P-1, M-2-A, R-1 and M-2-B.

For the following types of triple valves, open cocks 2, 3, and 4, place valve *R* in position No. 7, close cock *E* and move valve *A* to position listed for the valve undergoing test.

Position No. 4 for L-2-A, R-2 and H-2.

Position No. 5 for P-2.

Position No. 7 for L-3.

This test should produce emergency before the brake pipe pressure has dropped 20 pounds. Failure to produce emergency indicates improper fitting or assembly of emergency parts.

At the completion of this test, move valve *A* to position No. 2, open cock *E* if it was closed in this test, move valve *R* to position No. 2, and observe that the quick action parts close.

## Test No. 7A

### Emergency Test For Triple Valves with Heavy Graduating Springs

With cocks 2, 3 and 4 open, other numbered cocks closed, place valve *R* in position No. 7, close cock *E* and move valve *A* to position listed for the triple valve under test.

Position No. 4 for P-1 triple valves.

Position No. 5 for P-2 and L-2-A triple valves.

Position No. 8 for L-3 triple valves.

This test should produce emergency before the brake pipe pressure has dropped 20 lbs. Failure to produce emergency indicates improper fitting or assembly of emergency parts.

At the completion of this test, place valve *A* in position No. 1, open cock *E* and place valve *R* in position No. 2.

## Test No. 8

### Service Stability Test

With cocks 2, 3, and 4 open, other numbered cocks closed, and valve *R* in position No. 2, move valve *A* from position No. 1 to the position listed for the triple valve undergoing test.

Position No. 4 for M-1, (P-1 with  $\frac{3}{16}$ " service port).

Position No. 5 for H-1, K-1, L-1-B, R-1, (H-2 with  $\frac{3}{16}$ " service port).

Position No. 6 for H-2, K-2, M-2-A, P-1, M-2-B.

Position No. 7 for L-2-A, P-2 and R-2.

For L-3 type of triple valve, open cocks 2, 3, and 4, and place valve *R* in position No. 7. Close cock *F* and place valve *A* in position No. 4.

The triple valve must not go to emergency before the brake pipe pressure is reduced 20 pounds. If it does, it indicates a restricted service port, or weak graduating stem spring.

At the completion of this test, place valve *A* in position No. 1, open cock *E* if it was closed in this test, and place valve *R* in position No. 2.

## Test No. 9

### By-Pass Valve, By-Pass Piston, Safety Valve Tests

Commence each of the three sections of this test with cocks 2 and 3 open, all other numbered cocks closed, valve *A* in position No. 1, valve *R* in position No. 2, proceed as follows:

#### SECTION A.

##### BY-PASS VALVE TEST

Move valve *A* to position No. 8. Reduce auxiliary and brake cylinder pressures to 50 pounds, using cock 4 for this purpose. Close cocks 2 and 3. Open cock 5, and observe the pressure on brake cylinder gage. Leakage by the by-pass valve will be indicated by an increase in brake cylinder pressure, which should not exceed the specified limits:

New and repaired valves: 9 lbs. in 10 seconds

Cleaned valves: 13 lbs. in 10 seconds

At the completion of this test, open cocks 2 and 3 and place valve *A* in position No. 1.

#### SECTION B.

##### BY-PASS PISTON TEST

Place valve *A* in position No. 3 and open cock *Z*. Brake cylinder pressure should promptly rise to not less than 70 pounds or not more than 75 pounds.

**Tests**

If the pressure is less than 70 pounds, it may be due to either a loose fitting packing ring in the by-pass piston, or by-pass piston guide, restriction in by-pass piston auxiliary reservoir ports, or a combination of these defects.

If the pressure is more than 75 pounds, it may be due to excessive resistance in the movement of the by-pass piston and valve, or too weak by-pass valve spring.

Upon the completion of the test, close cock *Z* and move valve *A* to position No. 1.

**SECTION C.****SAFETY VALVE TEST**

Place valve *A* in position No. 5 until a brake cylinder pressure of 35 to 40 pounds is obtained. Then return it to position No. 3. Move valve *R* to position No. 5 and note the opening and closing pressures of the safety valve. The safety valve should be adjusted to open at 62 pounds and close at 58 pounds pressure. The range of the safety valve is regulated by increasing or decreasing the area of the discharge ports from the spring chamber by means of the regulating ring.

Move valve *R* to position No. 2 and paint the safety valve and triple valve body around passage to safety valve with soapsuds to determine leakage in safety valve or connection. At completion of the test, move valve *A* to position No. 1.

## Test No. 10

### Graduated Release Test

With cock 5 open, place valve *A* in position No. 6 until a brake cylinder pressure of 45 to 50 pounds has been obtained, then move handle of valve *A* to position No. 1 until the triple valve moves to release position, after which it should be returned immediately to position No. 3 (Lap). When the triple valve exhaust closes, due to the graduated release action, move valve *A* from position No. 3 to position No. 1 and back to position No. 3. If the triple valve has the required sensitiveness for graduation of the release, it will close the exhaust simultaneously with the movement of the handle of valve *A* from position No. 1 to position No. 3. At least four release graduations should be obtained before the cylinder pressure is entirely exhausted.

A failure to obtain the required number of graduated release operations indicates a restriction of the supplementary reservoir opening through the triple valve to the auxiliary reservoir, or graduating valve leakage.

At the completion of this test, move valve *A* to position No. 1 and close cock 5.