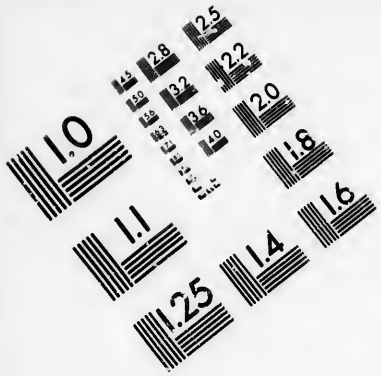


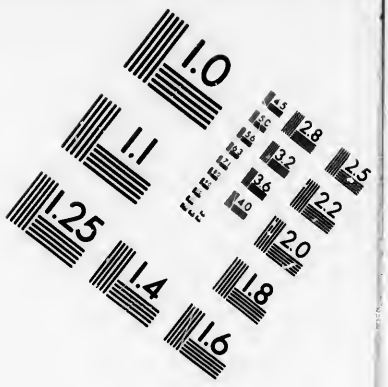
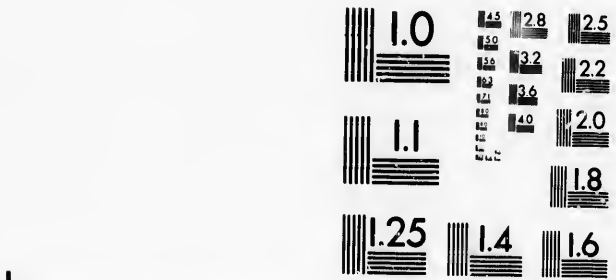
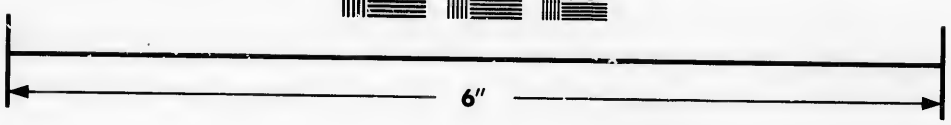
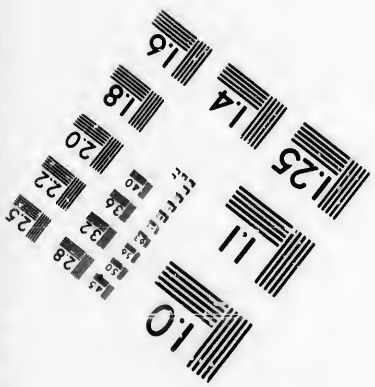
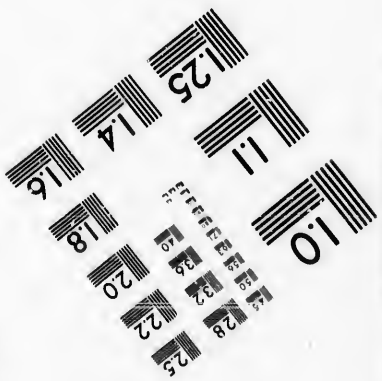


IMAGE EVALUATION TEST TARGET (MT-3)









Photographic Sciences Corporation

23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503

Technical and Bibliographic Notes/Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

- ☐ Coloured covers/ Couverture de couleur
- ☐ Covers damaged/ Couverture endommagée
- ☐ Covers restored and/or laminated/ Couverture restaurée et/ou pelliculée
- ☐ Cover title missing/ Le titre de couverture manque
- ☐ Coloured maps/ Cartes géographiques en couleur
- ☑ Coloured ink (i.e. other than blue or black)/ Encre de couleur (i.e. autre que bleue ou noire)
- ☐ Coloured plates and/or illustrations/ Planches et/ou illustrations en couleur
- ☐ Bound with other material/ Relié avec d'autres documents
- ☐ Tight binding may cause shadows or distortion along interior margin/ La reliure serrée peut causer de l'ombre ou de la distorsion le long de la marge intérieure
- ☐ Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/ Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- ☐ Additional comments:/ Commentaires supplémentaires:

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured pages/ Pages de couleur
- ☐ Pages damaged/ Pages endommagées
- ☐ Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- ☑ Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- ☐ Pages detached/ Pages détachées
- ☑ Showthrough/ Transparence
- ☐ Quality of print varies/ Qualité inégale de l'impression
- ☐ Includes supplementary material/ Comprend du matériel supplémentaire
- ☐ Only edition available/ Seule édition disponible
- ☐ Pages wholly or partially obscured by errata slips, tissues, etc., have been refilmed to ensure the best possible image/ Les pages totalement ou partiellement obscurcies par un feuillet d'errata, une pelure, etc., ont été filmées à nouveau de façon à obtenir la meilleure image possible.

This item is filmed at the reduction ratio checked below/
Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
					✓						

The copy filmed here has been reproduced thanks to the generosity of:

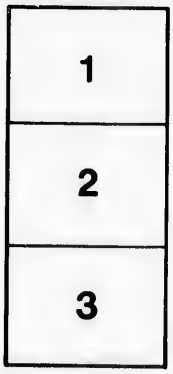
Library of the Public
Archives of Canada

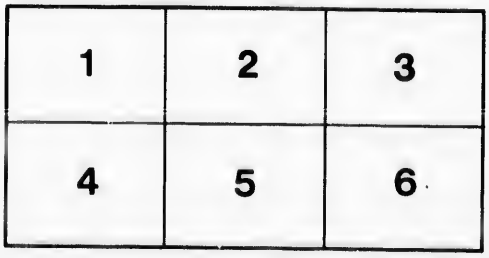
The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol → (meaning "CONTINUED"), or the symbol ▽ (meaning "END"), whichever applies.

Maps, plates, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:





L'exemplaire filmé fut reproduit grâce à la générosité de:

La bibliothèque des Archives
publiques du Canada

Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition et de la netteté de l'exemplaire filmé, et en conformité avec les conditions du contrat de filmage.

Les exemplaires originaux dont la couverture en papier est imprimée sont filmés en commençant par le premier plat et en terminant soit par la dernière page qui comporte une empreinte d'impression ou d'illustration, soit par le second plat, selon le cas. Tous les autres exemplaires originaux sont filmés en commençant par la première page qui comporte une empreinte d'impression ou d'illustration et en terminant par la dernière page qui comporte une telle empreinte.

Un des symboles suivants apparaîtra sur la dernière image de chaque microfiche, selon le cas: le symbole → signifie "A SUIVRE", le symbole ▽ signifie "FIN".

Les cartes, planches, tableaux, etc., peuvent être filmés à des taux de réduction différents. Lorsque le document est trop grand pour être reproduit en un seul cliché, il est filmé à partir de l'angle supérieur gauche, de gauche à droite, et de haut en bas, en prenant le nombre d'images nécessaire. Les diagrammes suivants illustrent la méthode.

AMERICAN
Railway Master Mechanics' Association.

LAKEWOOD CONVENTION, JUNE 19, 1893.

ATTACHMENTS BETWEEN ENGINE AND TENDER, FOOT-STEPS AND HAND-RAILS.

To the American Railway Master Mechanics' Association:

The tenor of the replies to your Committee's circular clearly shows that our members think the risk to enginemen is small from tender either mounting or running under engine foot-plate, in fact is "nil" if the chafing-plates and their backing are in line and the coupling-bar is horizontal, lying close up to casting. In locating the coupling-bar even better practice is to put it in the vertical center of the chafing-plates, so that the bar has to suffer a straight shear before tender can start to mount engine foot-plate.

Therefore, in the matter of coupling, we indorse the correctness and safety of the practice common in America of coupling engine and tender together, provided the chafing-plates have liberal surface, are of equal height, have ample straight backing (if possible in a single casting), and a stout horizontal wrought-iron draw-bar with cottered coupling-pins of large diameter is used. There are a few who believe that there is more risk to men in case of an accident from the tank moving forward on tender-frame, but no suggestions are made to improve the present mode of securing tank, viz.: by using stout lugs well riveted to tank having the lower flange bolted to frame, and solidly securing the floor inside coal space to frame, so that to shift position the tank has either to mount the floor, or, bodily shear the floor off the frame.

Safety couplings should be used to supplement the coupling-

bar, and with two exceptions the replies favor stout chain in short links as better than side coupling-bars. If solid side-bars are used one end should have an oval or slotted hole, so that there shall be no tendency to bind when on curves.

The securing of the ends of the safety chains is in many cases of a most flimsy character. The best sent us is from D. S. S. & A. R., both chains being permanently held to the tender beam by double-ended staple bolts of 1½-inch round iron, the loose ends being coupled to the underside of engine draw casting by two pair of pendent lugs cast on, through which (and through last link of chain) passes a 1¼-inch horizontal cottered bolt. Many replies say 1-inch round iron is strong enough for safety chains, but the D S. S. & A. R. very properly use four links 6 inches long of 1½-inch round iron.

Chafing-plates are commonly of chilled cast-iron, 30-inch to 40-inch area, although some face with steel plate, and one takes the wear direct on the wrought-iron wedge. No information is given as to relative cost and wear of soft and chilled iron for this service.

There is apparently no uniformity in the shape of chafing surfaces, some making both surfaces flat, others make one flat and one round, and the P. & R. use both rounded, each to a radius struck from the center of its coupling-pin. This insures contact when the vehicles are either on curve or tangent without that pinching and bending which is responsible for some of the undesirable lengthening of the coupling-bar.

Half of the members replying use a wedge to take up the slack in bar and the wear in chafing-plates, and it is to be inferred from the limited information given that they use a horizontal wedge, requiring for adjustment the labor of separating the engine from the tender and then coupling up again, as no reply gives any experience with patented or other vertical wedges that take up the slack automatically, that is, take it up by gravity. One reports using an eccentric bush on coupling-pin, to vary the length of coupling-bar.

With the single exception before mentioned the wedge is behind one of the chafing-plates, so that no direct wear comes upon the wedge itself.

Apart from use of wedge and eccentric, no other form of taking up wear and slack is mentioned, other than the old-fashioned practice of taking out the coupling-bar and getting it upset by a smith.

No difficulty or increased resistance in backing around a sharp curve has been noticed with any width or shape of chafing surface, if the gangway or platform of tender is properly curved so that it does not foul engine when on sharp curve.

It is so difficult to believe that some such resistance does not exist, that we were at first inclined to indorse the P. & R. plan of rounding both chaffing surfaces to curves struck from center of draw-pins, as this results in the coupling-pins being exactly the same distance apart, independent of the relative positions of engine and tender; but one member of this Committee, with special experience in propelling trains tender first around curves, says, if the chafing surfaces are rounded to any short radius the pressure tends to derail the tender or turn the rail over, and always causes excessive wear on the journal collars of the tender axles. He now uses a flat plate on engine, 8 x 20 inches long, and this length is used to prevent tender chafing-face slipping by the ends and locking, as did occur when a shorter flat plate was used. The tender surface is 8 x 10 inches long, curved to a radius struck from center of forward tender truck. If other conditions made it advisable to curve the engine chafing surface, he would do it to a radius struck from center of rear driving axle.

The L. & N. W. Ry. and the P. R. R. use a spring buffer coupling arrangement on new work, and the N. & W. R. think such a plan has advantages. The main draw-bar like the side couplings has clearance at one end to allow for free play of spring in compression, as well as freedom in curving.

A fair inference from practice permitting so elastic and flexible a connection is, that its users and indorsers do not consider there is any risk to men on foot-plate that justifies a closer interlocking arrangement.

Probably the intention in using a buffer coupling now—as in the early days of the locomotive—is to increase the comfort of the passengers, as well as to lessen sudden shocks on metal, and the strains tending to rack tender frame.

STEPS.

A full third of the replies express a preference for short steps—that is, under 12 inches long; two specify 12 inches, and the remainder run from 16 inches to 24 inches, emphasis in many cases being laid on the necessity for high flanges on three sides, although some few do not use flanges.

As to position horizontally: some say a low step is safe, but the distance of the lowest step above rail varies from one each of 12, 14 and 15 inches, up to the more common height of 20 inches (that is 24 inches above tie level), and there is an evident reluctance to having more than one additional step above the first step, however close to rail the first step be located, or whatever be the height of the other "risers."

It is not evident why the first "riser" (that is, the distance from tie to first step) should so commonly be higher than the second and third "risers," except it be to clear snow or other obstruction at low level. Even any equal division of the total height by two steps into three equal "risers" is not shown on any reply, although that would appear to be a more judicious and safer course for the men than the common practice.

Two advocate adjustable steps (apparently to be altered to suit the personal ideas of each runner). This the Committee thinks a mistake, believing a permanent fastening at a uniform height on all engines will, all things considered, offer less risk the year round.

But two advocate steps at same level on both engine and tender, although there seems an additional element of safety in such a course. Apparently there is an endeavor to put all the steps on one of the vehicles (either engine or tender) when this is possible.

The majority say that in material for steps, wood and rubber have no appreciable advantages over iron; but few use wood, and one only mentions rubber. Roughened and perforated iron plate is the best practice, for although castings with serrated surface are common, the lighter weight and the freedom with which wrought-iron can in winter be struck with a hammer (thus at once disengaging all ice) gives it the preference. The roughening of surface is usually done with a diamond-pointed chisel by hand.

HAND-RAILS.

A strong preference is expressed for long vertical handles on tender-tanks, with an occasional vote for short handles on cab, although it seems as if every reason given for the use of long handles on tanks will apply with equal force to reasonably long handles on cabs—say within a limit of 24 inches. Long horizontal side handles on tank (to correspond with long side steps) are neither used nor desired.

Opinion as to the use of cross hand-rails (that, is hand-rails at front and back) where engine is equipped with pilot, is very diverse. The nearest approach to a generalization of the answers, is that the engines with pilots should not have hand-rails, except for pushing and suburban, and perhaps for some regular way-freight services, because, however useful to railway servants, they are a temptation inviting other people to steal rides at points where they risk life and limb.

J. DAVID BARNETT,
G. W. STEVENS,
C. E. SMART,
J. W. HILL,
Committee.

Lewis & Lyne
committee