Review and Outlook Section

More Signal Construction In 1950

COMPARING the construction in 1950 with that of the previous year, automatic block was down 841 units, cab signaling and train-stop were up 954 units, interlocking up 30 units, spring switches up 90 units, centralized traffic control down 101 units, classification yards down 115 units, and crossing protection up 354 units. Excluding cab signaling and train stop, the totals were down 853 units. The extensive train stop project on the Santa Fe included 953 units, and this figure, with that for cab signaling on the Union Pacific makes 1,227 units, which, when added to the other construction for 1950, makes a total of 12,248 units, thus exceeding that for any previous year on record.

Signaling Economic Assets

During 1950, signaling proved to be an increasing economic asset, not only by saving train time but also by reducing operating expenses—and these are the reasons for a continued active program of new construction in this field for 1951. To a greater extent than ever before, signaling is being designed to meet the requirements of train operations with respect to volume of traffic and train speeds—as, for example, cab signaling or train stop systems for sections where trains are operated at more than 80 m.p.h.; complete centralized traffic control for maximum track capacity on both single and double track lines; simplified traffic control for medium traffic on single track; and simplified station-to-station automatic block for light traffic which includes a few fast trains. A change-over of conventional double-track to single-track with centralized traffic control, on 67 miles on one railroad in 1950, represents another phase of the adaptation of signaling, as will be discussed later. In the field of retarder classification yards, automatic control of switches was a new development placed in service, in 1950, in two yards.

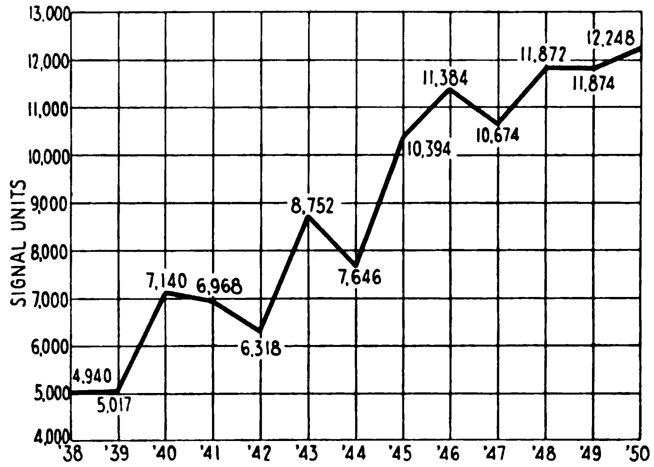


Chart showing signal units installed each year

Especially during the first half of 1950, the signaling projects given preference were those which would reduce operating costs by relieving levermen, telegraph operators, crossing watchmen and gatemen. For example, under the 40-hr. week, the annual operating expenses for an open telegraph office or an outlying interlocking, including wages for operators or levermen, with building maintenance and incidentals, now totals approximately $15,000 annually. Depending on the cash available, some roads have decided that an annual saving of $15,000 justifies an expenditure of $74,000 to $100,000 or more. Thus, in 1950, prefer-

COMPARISON OF ANNUAL SIGNAL CONSTRUCTION

	1950	1949	1948	1947	1946	1945	1944	1943	1942	1941
Automatic Block Signals	1133	1974	1711	2269	3078	2350	1539	1690	1421	1407
Cab Signaling										
Track Miles	274	270	514	----	----	----	----	----	----	----
Intermittent inductive train stop										
Road Miles	953	----	----	----	----	----	----	----	----	----
Interlockings										
Signals and switches										
At new plants	1150	863	1074	857	1529	9910	851	1498	785	518
At rebuilt plants	633	864	665	408	993	940	687	760	554	693
At automatic plants	106	132	80	83	132	88	62	55	78	80
Spring Switches										
Spring buffer mechanisms	172	242	264	356	554	764	382	448	284	275
Facing-point locks	110	73	107	107	248	341	115	88	126	159
Signals at spring switches	578	455	516	491	707	991	553	498	384	354
Centralized Traffic Control										
Power switch machines	430	496	565	538	453	633	596	463	263	190
Semi-automatic signals	1309	1428	1725	1810	1385	2217	2141	1775	1030	675
Intermediate signals in C.T.C. territory	674	590	738	853	----	----	----	----	----	----
Classification Yards										
Car retarders	68	110	100	23	18	14	25	----	51	----
Power switch machines	172	245	192	27	73	57	52	----	108	----
Highway Crossing Protection										
Protective units	4486	4132	3261	2852	2214	1089	643	477	1297	2615
Totals	12248	11874	11872	10674	11384	10394	7646	7752	6381	6966

Table comparing the total signaling units constructed annually, shows that the 12,248 units placed in service in 1950 is 374 more than for 1949, also the 1950 figure is 3,422 units more than the average for the 11 years, 1939 to 1949.

NEW AUTOMATIC BLOCK INSTALLED IN 1950

Railroad and Location	Miles of Road	Number of Signals	Manufacturer
A.T.& S.F.			
A.T.&S.F. Jct.,Kan.-Argentine	3.4d	8	Union
Nolanville, Tex.-Temple	16.0s	31	Union
A.C.L.			
Selma, N.C.-Fayetteville	49.0d	50	Union
Fayetteville, N.C.-Dillon	56.0d	34	Union
C.N.			
St. Johns, Que	3.0s	2	
Hicks, B.C.-Hope	37.5s	50	G.R.S.
Red Pass Jct.,B.C.-Jackman	23.7s	28	G.R.S.
C.P.			
Selim, Ont.-Nipigon	54.0s	80	Union
Lanigan, Sask	1.2s	1	G.R.S.
C.& O.			
Peach Creek, W.Va.-SW Cabin	1.3s 4.0d	4	Union
C.R.I.& P.			
Vinton,Ia.-Manly	101.9s	143	Union
Roland, Ark.-Perry	26.5s	30	Union
C.S.S.& S.B.			
Hammond, Ind	0.5s	1	Union
E.J.& E.			
Dyer, Ill.-Hartsdale, Ind	3.6s	3	G.R.S.
K.C.S.			
DeQueen, Ark.-Shreveport, La	122.0s	129	G.R.S.
L.& H.			
Warwick, N.Y.-Wisner	2.0s	4	G.R.S.
Me.C.			
Wytopitlock, Me.-Danforth	11.4s	30	G.R.S.
Leeds Jct., Me	----	1	G.R.S.
Calais Jct.,Me	----	1	G.R.S.
M.St.P.& S.S.M.			
Burlington, Wis.-Neenah	113.7s	259	G.R.S.
M-K-T			
Huff, Tex.-Pershing	24.1s	29	Union
Elgin, Tex.-Smithville	31.6s	46	Union
M.P.			
Bixby, Ill.-Flinton	39.5s	48	G.R.S.
N.Y.B. of T.			
Queens, N.Y	0.8d	6	G.R.S.
N.Y.C.			
Rochester, N.Y.-Chili Jct	9.4f	32	G.R.S.
B.& A.			
Becket, Mass	1.6s	2	G.R.S.
Niverville, N.Y.-Post Road	5.9d	6	G.R.S.
P.E.			
North Hollywood, Cal	0.3s	4	Union
Rosemead, Cal	1.0s	4	Union
P.& L.E.			
Dickerson Run,Pa.-Connellsville.	5.4s	1	Union
Southern			
Harrodsburg, Ky.-'SJ' Tower	5.0s	5	G.R.S.
S.P.& S.			
Moody, Ore.-Sherar	41.0s	33	G.R.S.
South Jct.,Ore.-Paxton	12.0s	11	G.R.S.
T.& P.			
Melville, La.-Fordoche	7.4s	10	G.R.S.
U.P.			
Idaho Falls, Idaho	4.0s	7	Union
Totals	690.2s 118.3d 9.4f		
Miles of Road	817.9		
Miles of Track	955.0	1,133	

ence was given to projects such as: (1) automatic interlockings to replace manual control plants at railroad crossings, (2) remote control of outlying interlockings, (3) consolidation of the control of two or more interlockings in terminal areas, and (4) centralized traffic control to permit the closing of block offices and train order offices. For example, on 103 miles of single track on the Baltimore & Ohio between Grafton, W. Va. and Parkersburg, where C.T.C is being installed, the annual payroll saving, for operators eliminated, is $180,000. The signal manufacturer, which furnished the equipment, has entered into an agreement which will enable the railroad to pay for this project through the savings in operating expense.

Signaling to Fit the Need

In 1950, perhaps as never before, new signaling projects have been planned with special reference to traffic density and train speeds. On territories where trains are operated at more than 80 m.p.h., some roads have installed protection in addition to wayside signaling. For instance, in connection with existing wayside signals, the Atchison, Topeka & Santa Fe, in 1950, installed intermittent inductive train stop system on 953 miles of road, this being the largest program of this nature made for years. Also in 1950, the Union Pacific, in connection with wayside signaling, installed coded track circuit controlled automatic cab signaling on 137 miles of double track between Grand Island, Neb., and North Platte. Similar cab signaling is now under construction on 224 miles of double track between North Platte, Neb., and Cheyenne, Wyo., and on 85 miles of single track and 2.5 miles of double track between Portland, Ore. and The Dalles. The Burlington has authorized expenditures for the installation of cab signaling on 233 miles of road between Chicago and Mt. Pleasant, Ia., and 368 miles between Aurora, Ill. and Prescott, Wis. In the accompanying table listing comparisons of signaling construction each year, the wayside automatic train stop is given a value of one unit for each mile of road, and automatic cab signaling is given a value of one unit for each mile of track so equipped.

Less Than 80 M.P.H.

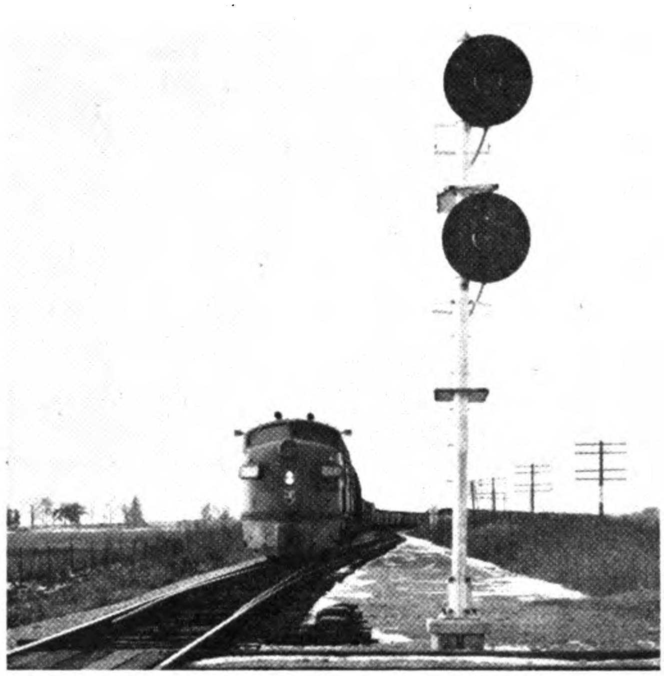
On territories not previously signaled, and on which trains are operated at more than 60 m.p.h., but less than 80 m.p.h., railroads have installed different forms of signaling depending on the number of trains. For example, on 145 miles of single track between Henderson, Ky., and Amqui, Tenn., the Louisville & Nashville schedule includes 12 passenger trains, 10 through freights and two local freights, and extra trains are operated as required to total 28 to 30 or more trains daily. In order to increase track capacity and save train time, on the 145 miles, the L. & N. in 1950,

CENTRALIZED TRAFFIC CONTROL INSTALLED IN 1950

Railroad and Location	Miles of Road	Levers	Power Switches	Lever-Controlled Signals	Intermediate Signals	Manufacturer
A.T.& S.F.						
East Jct., Kan.-West Jct.	7.0s	--	--	--	2	Union
Brink, Okla.-Waynoka	23.2s 2.8d	21	9	19	20	Union
Pueblo, Colo.-Bragdon	9.5s	15	7	13	6	Union
Slaton, Tex.-Sweetwater	102.6s	73	23	71	30	Union
B.& M.						
Nashua, N. H.-Manchester	11.0s 2.3d	9	2	15	10	Union
Amoskeag, N. H.-Bow	11.4s 2.1d	8	2	12	10	Union
C.P.						
South Jct., Que.-Hampstead	3.1d	36	19	26	2	Union
Ballantyne, Que.-St. Luc Jct	2.1s					
Wentworth, Que.-South Jct	2.6s					
C.R.R.N.J.						
Red Bank-Lakehurst	27.8s	20	--	18	--	Union
C.& O.						
Westham, Va.-Lorraine	5.0s	4	1	6	--	Union
Richmond, Va.-Highland Park	1.5s 0.8d	14	1	16	--	Union
Riverton, Ky.-DG Cabin	7.7s	7	8	6	10	Union
DG Cabin, Ky.-Limeville	3.5t	30	29	28	11	Union
Delaware, Ohio-Marion	20.8d	34	18	33	--	Union
C.B.& Q.						
Ravenna, Neb.-Seneca	131.0s	49	14	58	46	G.R.S.
C.M.St. P.& P.						
Green Isl.Ia.-Marion	67.0s 6.2d	38	15	62	36	Union
Plum, Ill.-Savanna	1.5s	5	3	8	--	Union
Glencoe, Minn	2.5s	2	1	1	--	Union
Tunnel City, Wis.-Raymore	2.7s	4	1	--	--	Union
Austin, Minn.-C.G.W. Jct	1.1s	4	1	8	--	Union
D.& R.G.W.						
Utah Jct.,Colo.-R.I. Jct	4.0s	6	2	10	4	G.R.S.
I.C.						
Wickliffe, Ky	1.1s	4	2	8	--	Union
Hardy, Miss.-Grenada	4.3s	3	--	3	3	Union
L.& N.						
Coolidge, Ky.-Blackey	15.0s	8	4	16	5	G.R.S.
Arklow, Ky.-Morton	9.0s	7	3	17	2	G.R.S.
Henderson, Ky.-Cedar Hill, Tenn.	108.0s	74	36	145	47	G.R.S.
M.P.						
Middlebrook, Mo.-Poplar Bluff	82.7s	38	18	56	57	G.R.S.
Gulf Coast, Tex.-Dyersdale	15.3s	--	3	12	4	G.R.S.
N.Y.C.						
Mattoon, Ill.-Pana	37.8s	40	20	57	26	G.R.S.
Wayneport, N. Y.-Mortimer	12.3s	2	--	--	20	G.R.S.
Mortimer, N. Y.-Genesee Jct	1.6d	4	--	--	2	G.R.S.
Genesee Jct., N. Y.-Chili Jct	9.8s	2	--	--	10	G.R.S.
N.Y.C.& St.L.						
Liberty, Ind.-St. Marys, Ohio	62.0s	54	16	53	24	Union
P.& P.U. Jct., Ill.-Farmdale, Jct	4.0s	4	1	5	2	Union
N.& W.						
Jack, Va	1.8d	6	6	6	--	Union
Jack, Va.-Petersburg	6.6s	5	1	7	5	Union
Bluestone, W. Va.-Powhatan	9.5d	14	13	12	12	Union
Tug, W. Va	1.8s 1.2d	13	9	14	--	Union
Tug, W. Va.-Farm	2.6d	6	4	6	--	Union
Tug, W. Va.-Big Four	8.4d	4	4	4	7	Union
Iaeger, W. Va.-Caretta	20.1s	17	7	24	12	Union
P.& W.VA.						
Connellsville, Pa.-West Belt Jct	53.0s	41	3	58	20	Union
St.L.-S.F.						
Dillon, Mo.-Pacific	72.0s	31	14	49	20	Union
Springfield, Mo.-Willow Springs	90.0s	26	7	35	38	Union
S.A.L.						
Atlanta, Ga.-Dallas	27.0s	18	10	27	9	Union
Hamlet, N. C.-Eulonia, S. C	71.3s	40	19	60	22	Union
Remount, S. C.-Yonges	23.3s	19	9	30	11	Union
T.& N.O.						
Austin, Tex.-Pershing Jct	1.6s	3	1	10	2	Union
T.& P.						
Big Sandy, Tex.-Mineola	22.5s	16	8	22	12	G.R.S.
Union						
'BR' Tower, Pa.-Curry Hollow	1.7s 3.2d	12	4	[illegible]	--	Union
U.P.						
Los Angeles, Calif	7.2d	87	6	16	5	Union
Wabash						
N. T. Jct.,Ill.,-Tolono	31.2s	19	9	26	22	Union
W. P.						
Portola, Calif.-Jung, Nev	177.0s	86	37	115	88	Union
Totals	1381.6s 73.6d 3.5t					
Miles of road	1494.7	1082	430	1309	674	
Miles of track	1539.3					

AUTOMATIC INTERLOCKINGS INSTALLED IN 1950

Railroad	Location	Number of Signals	Manufacturer
A.& S.	Monsanto, Ill.	4	Union
		1*	
C.N.	Abbotsford, Que.	4	G.R.S.
	Ramshaw, Minn.	4	G.R.S.
	Holmfield, Man.	4	G.R.S.
C.G.W.	New Hampton, Ia.	5	Union
	Gladbrook, Ia.	4	Union
	Reinbeck, Ia.	4	Union
	Dodge Center, Minn.	4	Union
C.I.& L.	Reynolds, Ind.	4	
C.M.St.P.& P.	Byron, Ill.	4	Union
	Silver Bow, Mont.	4	Union
G.M.& O.	Delevan, Ill.	4	G.R.S.
I.C.	Gibbs, Tenn.	6	Union
I.T.	Worden, Ill.	4	
L.V.	Wilkes-Barre, Pa.	7	G.R.S.
M.& St.L.	Belmond, Ia.	2	Union
	St. Louis Park, Minn.	4	Union
M-K-T	Walnut, Tex.	4	Union
N.Y.C.			
B.& A.	Palmer, Mass.	4	G.R.S.
N.& W.	Charles Town, W. Va.	4	Union
S.A.L.	Charleston, S.C.	6	Union
	Savannah, Ga.	6	Union
	Savannah, Ga.	5	Union
T.& N.O.	Mathis, Tex.	4	Union
*Switch Machine	Total	106	



The Milwaukee took up second track on 67 miles

installed complete centralized traffic control rather than conventional automatic block. The cost for the C.T.C., over and above that for automatic block, was reduced considerably by installing C.T.C.—controlled switch machines and signals at only 18 of a total of 34 sidings.

Even where the traffic comprises only 10 to 12 trains daily, some roads "cut the cloth" to achieve the benefits of train operation by signal indication under C.T.C. control without disproportionate investments. For example, on 238 miles of single track between Ravenna, Neb., and Alliance, the Burlington operates four passenger trains and six to eight freights, totaling 10 to 12 trains daily. Here the road installed a simplified form of C.T.C. including a power switch and complete arrangement of dispatcher-controlled signals at the east end of a siding, for example, while at the west end there is a spring switch with a single signal to direct trains to depart from the siding. The power switch is at the east end of one siding and at the west end of the next, if grades or other local conditions do not dictate otherwise. About half of this project—Ravenna to Seneca, 131 miles—was completed in 1950. A somewhat similar modified form of C.T.C. was installed in 1950 on 90 miles between Springfield, Mo. and Willow Springs, on the St. Louis-San Francisco.

Station-to-Station Automatic Block

On sections of road not previously signaled, where the traffic is not considered by some roads to be heavy enough to warrant C.T.C., simplified automatic signaling was installed primarily as protection. For example, the Rock Island has 103 miles of single track between Vinton, Ia. and Manly, on which the traffic is relatively light, approximately 8 to 10 trains daily. This section of track, however, is part of a through route, and the trains include the St. Louis-Twin City "Zephyr-Rocket" passenger trains. No signaling had been in service on this 103 miles previously, and authority was granted for the most simple form of automatic block signaling protection. As installed, the block signaling is of the two-aspect type, with blocks from siding to siding, and no provision for following moves between sidings. An important 1950 feature, new on the Rock Island for this type of signaling, is that intermediate signals are arranged to provide double braking distances between opposing-intermediates, thereby eliminating overlaps within siding limits, and thus permitting trains to occupy the main track in station limits when making a meet. The signals between sidings are controlled by coded track circuits, thus obviating line wire control circuits. In brief, this 1950 Rock Island project is an excellent example of simplified automatic block signaling designed for single track lines handling relatively light traffic and where the primary objective is to obtain maximum safety, rather than to increase track capacity or facilitate train movements.

Taking Up Second Track

Modern locomotives, changes in the types of traffic handled and other circumstances have made it practicable to handle present-day traffic on single track equipment with modern centralized traffic control on some sections where double track had been in service for years. Therefore, on extended territories, some roads have removed second track and installed C.T.C. on the remaining single track.

NEW INTERLOCKINGS INSTALLED IN 1950

Railroad	Location	Number of Home Signals	Number of Switches	Manufacturer
A.& M.B.& T.	Memphis, Tenn.	13	13	G.R.S.
A.T.& S.F.	Waynoka, Okla.	19	15	Union
A.C.L.	Pembroke, N. C.	5	3	Union
	Bruce, Va.	2	--	Union
B.& O.	Cleveland, Ohio	5	--	G.R.S.
	Rushville, Ohio	11	--	G.R.S.
	Chicago, Ill.	4	--	G.R.S.
	New River Jct., Ohio	5	3	G.R.S.
	North Dayton, Ohio	7	--	G.R.S.
	Martinsburg, W. Va.	6	7	G.R.S.
	Halethorpe, Md.	8	--	G.R.S.
B.& M.	Salem, Mass.	3	11	G.R.S.
C.V.	Burlington, Vt.	2	2	G.R.S.
C.& O.	Columbus, Ohio	76	41	Union
C.B.& Q.	Kansas City, Mo.	75	32	G.R.S.
D.& R.G.W.	Springville, Utah	6	--	G.R.S.
D.& H.	Ballston, N. Y.	3	7	G.R.S.
Erie	Lanesboro, Pa.	5	5	Union
	Susquehanna, Pa.	8	6	Union
	Sparrowbush, N. Y.	4	2	Union
I.C.	Chicago, Ill.	24	--	G.R.S.
K.C.S.	Texarkana, Tex.	3	1	G.R.S.
L.V.	Richards, Pa.	5	3	G.R.S.
L.& N.	Guthrie, Ky.	8	--	G.R.S.
M-K-T	Waxahachie, Tex.	3	1	Union
	Pershing, Tex.	3	1	G.R.S.
M.P. Lines	Flinton, Ill.	4	2	G.R.S.
	Hoisington, Kan.	3	1	G.R.S.
	Houston, Tex.	34	14	G.R.S.
	Settegast, Tex.	12	4	G.R.S.
N.C.& St. L.	Aulon, Tenn.	18	13	G.R.S.
	Bruceton, Tenn.	5	3	Union
N.Y.B. Transp.	Westchester, N.Y.	120	62	Union
	179th St., Queens, N.Y.	21	6	G.R.S.
N.Y.C.	Higbridge, N. Y.	4	6	G.R.S.
B.& A.	Post Road, N. Y.	3	6	G.R.S.
N.Y.C.& St. L.	Cleveland, Ohio	5	3	Union
	Madison, Ohio	8	4	Union
N.& W.	Roanoke, Va.	77	56	Union
	Columbus, Ohio	38	31	Union
Pennsylvania	Columbus, Ohio	10	9	Union
P.& L.E.	McKees Rocks, Pa.	2	6	Union
Southern	Knoxville, Tenn.	5	3	G.R.S.
T.& N.O.	El Paso, Tex.	39	27	Union
U.P.	Council Bluffs, Ia.	14	6	Union
	Totals	733	417	

INTERLOCKINGS REBUILT IN 1950

Railroad	Location	Number of Home Signals	Number of Switches	Manufacturer
A.T.& S.F.	Joliet, Ill.	3	1	Union
	Ethel, Ill.	3	1	Union
	Congo, Ill.	5	3	Union
	Argentine, Kan.	--	2	G.R.S.
	Marceline, Mo.	8	2	Union
	Turner, Kan.	1	1	Union
	Temple, Tex.	12	4	Union
	Anaheim, Calif.	4	--	Union
A.C.L.	Selma, N. C.	6	--	Union
	Fayetteville, N. C.	12	5	Union
	Fayetteville, N. C.	6	--	Union
	Pembroke, N. C.	8	3	Union
	Dillon, S. C.	6	4	Union
B.& M.	Salem, Mass.	8	3	G.R.S.
	Worcester, Mass.	7	3	G.R.S.
	Northampton, Mass.	--	7	G.R.S.
C.N.	Ste. Rosalie, Que.	2	1	G.R.S.
	Hope, B. C.	4	2	G.R.S.
C.& O.	Russell, Ky.	2	2	Union
C.& E.I.	Steger, Ill.	5	2	Union
C.M.St.P.& P.	Green Island, Ia.	--	2	Union
C.& N.W.	Mayfair, Ill.	9	3	G.R.S.
C.R.I. & P.	Chicago, Ill.	--	6	Union
D.M.& I.R.	Holman, Minn.	4	2	Union
	Missabe Jct., Minn.	3	--	G.R.S.
Erie	Susquehanna, Pa.	8	6	Union
G.N.	Boylston, Wis.	5	3	G.R.S.
G.M.& O.	Mazonia, Ill.	5	3	G.R.S.
I.C.	Tolono, Ill.	13	5	G.R.S.
L.V.	Geneva, N. Y.	9	5	G.R.S.
Me. C.	Calais Jct., Me.	1	2*	
M.St.P.& S.S.M.	Oskosh, Wis.	2	--	G.R.S.
N.Y.C.	Wayneport, N. Y.	11	15	G.R.S.
	Chili Jct., N. Y.	4	2	G.R.S.
	Bergen, N. Y.	4	6	G.R.S.
	Girard Jct., Pa.	18	4	G.R.S.
	Hammond, Ind.	2	3	G.R.S.
N.& W.	Petersburg, Va.	1	1	Union
	Bannon, Ohio	2	2	Union
P.E.	Slauson, Cal.	12	18	G.R.S.
	Watts, Cal.	10	7	G.R.S.
Pennsylvania	Chicago, Ill.	4	9	Union
	Airline, Ind.	4	--	Union
	Davis, Ind.	2	2	Union
	Upper Sandusky, Ohio	2	3	Union
	Mohican, Ohio	--	5	Union
	Lucas, Ohio	--	5	Union
	Akron, Ohio	18	17	Union
	Mingo Jct., Ohio	17	2	Union
			6	
P.& L.E.	McKees Rocks, Pa.	4	29	Union
	Connellsville, Pa.	3	2	Union
St.L-S.F.	Neosho, Mo.	6	2	Union
	Springfield, Mo.	6	2	Union
Southern	Dundee, Va.	12	8	G.R.S.
	Danville, Ky.	8	3	G.R.S.
T.& N.O.	El Paso, Tex.	52	34	Union
	Totals	363	270	

*Electric switch locks

SPRING SWITCHES INSTALLED IN 1950

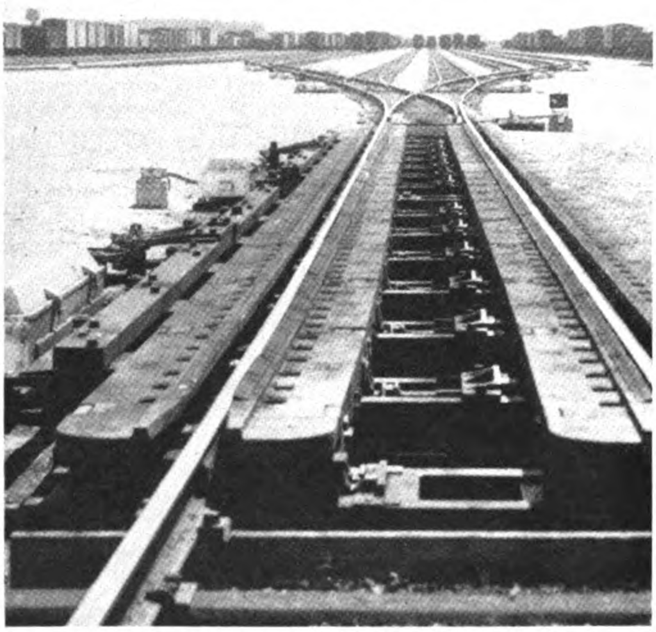
Railroad	Number of Spring Switches Installed	Number of Facing Point Locks	Signals Installed as Protection
A.T.& S.F.	61s	1	123
	5y		
A.C.L.	21s	22	54
	1y		
B.& O.	1s	1	3
B.& M.	5d	--	18
	3y		
C.N.	1y	--	5
	1s		
C.P.	2y	--	2
C.& O.	1d	1	---
C.B.& Q.	11s	12	9
C.& I.M.	1s	--	1
C.I.& L.	2s	--	1
C.M.St.P.& P.	1s	1	2
	1y		
C.N.S.& M.	2c	--	---
C.& N.W.	1d	1	10
	2j		
	1s		
C.R.I.& P.	1s	1	5
	1d		
C.& S.	2s	2	2
E.J.& E.	1s	--	2
	1y		
Erie	1s	1	3
G.N.	25s	26	82
	1d		
	2y		
G.M.& O.	1s	1	7
	1j		
	4y		
I.C.	2y	--	4
L.& N.E.	1y	1	1
L.& N.	10s	--	40
Me.C.	1d	1	3
M-K-T.	7s	--	7
M.P.			
I.G.N.	1y	1	3
	1s	1	3
N.Y., N.H.& H.	1d	1	---
N.& W.	1y	--	1
N.P.	6s	6	18
P.E.	4d	--	8
Penna.	4s	7	9
	1d		
	2j		
P.& W.V.	15s	16	38
	1d		
St.L.-S.F.	8s	--	15
St.L.-S.W.	1s	1	2
S.P.	5s	5	12
	1y		
Southern			
A.G.S.	2s	--	2
	10s	--	10
T.& P.	15s	--	45
U.P.	14s	--	29
Totals	222s		
	26y		
	17d		
	5j		
	2c		
	272	110	578

CAR RETARDER PROJECTS PLACED IN SERVICE DURING 1950

Railroad	Location	No. of Tracks	No. of Retarders	Rail Feet Retarders	No. of Switches	No. of Track Circuits	Manufacturer
A.T.& S.F.	Pueblo, Colo.	16	6	450	16	16	Union
C.P.	Montreal, Que.	48	20	1,518	47	61	G.R.S.
I.C.	Markham, Ill.	45	21	1,683	45	39	G.R.S.
Reading	Rutherford, Pa.	18	5	495	17	10	G.R.S.
Southern	John Sevier, Tenn.	46	16	1,507	47	60	G.R.S.
	Totals		68	5,653	172	186	

For example, on 73 miles between Green Island, Ia., and Marion, the Chicago, Milwaukee, St. Paul & Pacific, in 1950, took up second track on 67 miles and installed centralized traffic control on this stretch, as well as 6.2 miles of double track. Of importance is the fact that operating officers report that train operations are being handled promptly and satisfactorily. On this project, the rail on both main tracks was due for renewal. By relaying only one track, the saving was more than $1,500,000 for new rail, fastening and labor. Furthermore, the ties removed were in good condition, and were used in the construction of a yard. A somewhat similar change, from double track to single track with C.T.C., was made in 1950, on several shorter sections on the Boston & Maine. Such a project is proposed for 1951 on 60 miles of the Erie between Buffalo, N. Y., and Portage.

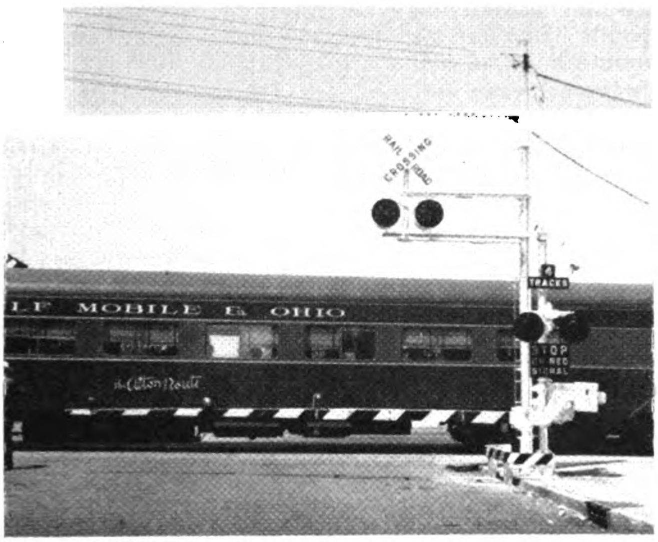
On account of the increased labor costs for switchmen and car riders, favorable consideration is now being given to the installation of power switches and car retarders in small yards, as well as large ones.



Canadian Pacific installed car retarders in a new yard at Montreal.

For example, in 1950, retarders and power switches were installed in a yard with only 16 classification tracks at Pueblo, Colo., on the Atchison, Topeka & Santa Fe.

At Montreal, Que., the Canadian Pacific built an entirely new classification yard with 42 tracks, to take over the work formerly done in four smaller yards scattered about the city. This project is the first all-new yard to include the new development known as automatic switching control of the operation of the switches leading down the hump and to the classification tracks. The use of this automatic switching, permits the introduction of a new type of control for the retarders, so that one man in a tower can control all the retarders in the entire yard. Also in 1950, these same new developments in switch and retarder controls were installed to replace previous controls in the southbound yard at Markham on the Illinois Central (near Chicago) and bids are now being made for equipment to rebuild the northbound yard and install the new control systems. The Southern is now rebuilding its John Sevier Yard near Knoxville, Tenn. to install power switches and retarders, including the new system



G.M.&O. protects all crossings in Springfield, Ill.

of control discussed above. Fifty per cent of this project was in service on December 15, and the remainder is scheduled for completion in January. Therefore this project is listed in the 1950 table herewith.

More Highway Crossing Protection

During 1950, highway crossing protection construction continued at a high level—including new projects at 1,573 crossings, involving 4,486 units, such as flashing-light signals and gates. This activity represents an all-time high. Increasing preference is being shown for automatic gates in addition to flashing-light signals at crossings where highway traffic is heavy. A total of 1,109 electric gates were installed in 1950, compared with 945 in 1949, and 775 in 1948. Especially at crossings where gatemen or watchmen have been in service, the railroads are providing better protection, in service full 24 hours every day, by installing automatically controlled flashing-light signals with gates.

More New Interlockings

New interlocking construction in 1950 included 1,150 home signals and interlocked switches compared with 863 in 1949. Three of the new plants constructed in 1950 include mechanical locking between levers; the modern practice, of using circuit locking, being employed in the remaining; miniature levers being used on 31 plants; and button-control, entrance-exit or route control on five.

During 1950 a total of 54 interlockings were rebuilt including the addition of 363 home signals and 270 interlocked switches of which 267 are power operated and three mechanical. In some instances these rebuilding projects are so thorough and extensive that the result is practically the same as an all-new installation. For example, in some cases the replacements include switch machines, signals and interlocking control machine, as well as new wiring and circuits throughout.

CROSSING PROTECTION INSTALLED IN 1950

Railroad	Number of Crossings Protected	Number of Flashing-Light Signals	Number of Electrical Gates	Sources of Funds Number of Crossings: Railroad	Public	Joint
A.& S.	1	2	--	1	--	--
A.T.& S.F.	99	196	29	72	18	11
A.& W.P.	1	2	--	1	--	--
W.A.	3	6	--	2	1	--
A.C.L.	12	24	6	2	1	9
B.& O.	48	110	10	30	2	16
Ban. & Ar.	6	12	18	6	--	--
B.& L.E.	1	2	--	1	--	--
B.& M.	28	97	39	21	--	7
C.N.	42	84	8	3	1	39
G.T.W.	19	36	16	6	3	10
C.P.	19	33	7	3	4	10
C. of G.	6	16	4	--	--	4
C.R.N.J.	3	14	6	3	--	--
C.V.	3	6	--	3	--	--
C.& O.	10	18	--	10	--	--
		5**	10			
P.M.	20	31	10	1	7	11
C.A.& E.	2	4	4	--	--	2
C.B.& Q.	79	112	72	65	--	14
C.& E.I.	9	12	6	8	--	1
C.G.W.	16	13	3	10	1	5
C.& I.M.	1	2	--	1	--	--
C.I.& L.	5	10	--	5	--	--
C.M.St.P.& P.	40	84	16	13	26	1
C.N.S.& M.	8	18	4	--	7	1
C.& N.W.	38	76	18	23	--	15
C.R.I. & P.	36	60	20	25	5	8
C.S.S.& S.B.	3	8	6*	3	--	--
C.& S.	4	9	--	2	2	--
D.& H.	1	2	--	1	--	--
D.L.& W.	20	100	61	20	--	--
D.& R.G.W.	7	6	9	1	6	--
D.T.& I.	2	8	--	2	--	--
D.M.& I.R.	1	2	--	1	--	--
D.S.S.& A.	2	4	--	--	2	--
E.J.& E.	6	14	16	5	1	--
Erie	40	102	88	36	--	4
F.E.C.	14	24	24	14	--	--
G.N.	21	41	41*	5	3	13
G.M.& O.	7	8	12	3	1	3
I.C.	34	57	18	21	3	10
I.T.	4	8	2	--	--	4
K.C.S.	22	48	--	10	5	7
L.S.& I.	1	2	--	--	1	--
L.& H.R.	1	2	--	1	--	--
L.I.	5	20	6	5	--	--
L.V.	13	26	16	12	1	--
L.& N.	24	49	22	18	5	1
Me.C.	24	53	4	10	1	13
P.T.	3	13	4	2	--	1
M.& St.L.	8	16	--	4	--	4
M.St.P.& S.S.M.	21	36	4	12	8	1
M-K-T.	20	41	--	11	--	9
M.P.	37	87	22	23	4	10
I.G.N.	19	38	6	17	--	2
G.C.L.	25	52	--	18	2	7
N.C.& St. L.	12	22	--	10	2	--
N.Y.C.	55	112	81	46	1	8
Big Four	19	43	27	11	--	8
I.H.B.	3	6	8	2	--	1
M.C.	13	28	14	8	3	2
B.& A.	3	8	2	3	--	--
N.Y.C.& St. L.	38	50	13	34	--	4
N.Y.,N.H.& H.	23	244	5	22	1	--
N.S.	5	10	--	--	--	5
N.& W.	34	78	52	32	--	2
N.P.	47	63	32	35	12	--
P.E.	10	20	--	2	5	20
Penna	68	157	80	40	16	12
P.R.S.L.	3	24	6	3	--	--
P.& L.E.	1	2	2	1	--	--
P.& W.V.	1	2	--	1	--	--
St.L.-S.F.	23	46	4	14	1	8
St.L.-S.W.	6	10	--	--	1	5
S.A.L.	17	36	2	9	1	7
S.P.	36	52	28	6	2	28
T.& N.O.	31	58	4	19	2	10
Southern	43	85	24	27	14	2
A.G.S.	2	4	2	--	2	--
C.N.O.& T.P.	3	8	4	3	--	--
N.O.T.	4	10	--	--	4	--
S.P.& S.	8	14	--	3	1	4
T.C.	5	4	--	4	--	1
T.R.A.St.L.	2	4	4	2	--	--
T.& P.	9	18	2	3	2	4
T.P.& W.	7	14	--	1	--	6
T.H.& B.	5	10	--	--	--	5
U.P.	47	95	16	32	2	13
Virg.	2	6	6	1	--	1
Wab.	32	58	26	19	4	9
W.P.	12	23	--	1	--	11
Totals	1573	3377	1109	967	195	412

* rotating stop disc
**traffic signal

Reports indicate that the railroads installed only 172 spring switch mechanisms in 1950 compared with 242 in 1949. However, mechanical facing-point locks were installed at 110 spring switches in 1950, compared with 73 in the year previous. More signals were installed in 1950, about 578 compared with 455 in 1949.

Thus, in brief, signaling construction was at a high volume in 1950, slightly more than in any previous year. Because of the necessity to save train time and reduce operating expenses by installing signaling, this construction activity will continue at a high rate in 1951, being limited only by the ability to secure materials and men to prepare plans, design projects, and do the construction work in the field.

A Progressive Year in Communications

HIGH-lighted by the adoption of microwaves for transmission of telephone and telegraph communications in lieu of over pole lines between distant points, increased train-communication activity, and the development of new train-communication power-supply systems, the railroads of the United States and Canada as a whole, during 1950, continued in a progressive manner with the installation of modern communication facilities to further aid over-all operating efficiency and improved service to shippers, consignees and passengers. While some activities in the railway communications field during 1950 were above those for 1949, others were down, as revealed by the tabulations herewith. However, if conditions in the United States and throughout the world continue as they have for the last several months, activity in general in this field during 1951 to further increase the efficiency of getting trains over the road and in and out of terminals, may possibly exceed that for 1950 by a substantial margin. This, of course, depends upon equipment availability and a number of other factors.

Much Interest Taken in Microwaves

During the year, considerable interest was shown in microwaves or beamed-radio for the transmission of communications between distant cities, and two railroads—the Rock Island and the Santa Fe—announced installations of such systems. The Rock Island project was installed between Norton, Kan., and Goodland, 106 miles, and the Santa Fe's installation will be placed in service between Galveston, Tex., and Beaumont, approximately 70 air-line miles. Principal purpose of the Rock Island's project, which is on the railroad's main line from Chicago to Denver and Colorado Springs, is to replace conventional telephone and telegraph line wires between Norton and Goodland, and thereby eliminate serious interruptions of communication service, which have been experienced in the past,

Train communication was installed in 205 road locomotives in 1950

due to severe sleet and ice storms disrupting pole lines in that territory. The Santa Fe's microwave installation is to provide additional telephone and telegraph circuits between its offices in Galveston, and Beaumont.

On the Rock Island, the beamed-radio equipment connects at Norton with the pole line extending east along the railroad, and at Goodland with the pole line extending west. Between these terminal stations, there are four unattended automatic repeater or relay stations to provide communication for intermediate points. The microwave system thus handles local communications, as well as through traffic, such as that between Chicago and Denver. On the Santa Fe, three repeater stations will be installed between Galveston and Beaumont, with duplicate equipment at both terminals and the repeater locations, to assure continuous

COMPARISON OF COMMUNICATION FACILITIES INSTALLED ON THE RAILROADS IN THE UNITED STATES AND CANADA DURING 1950 AND 1949

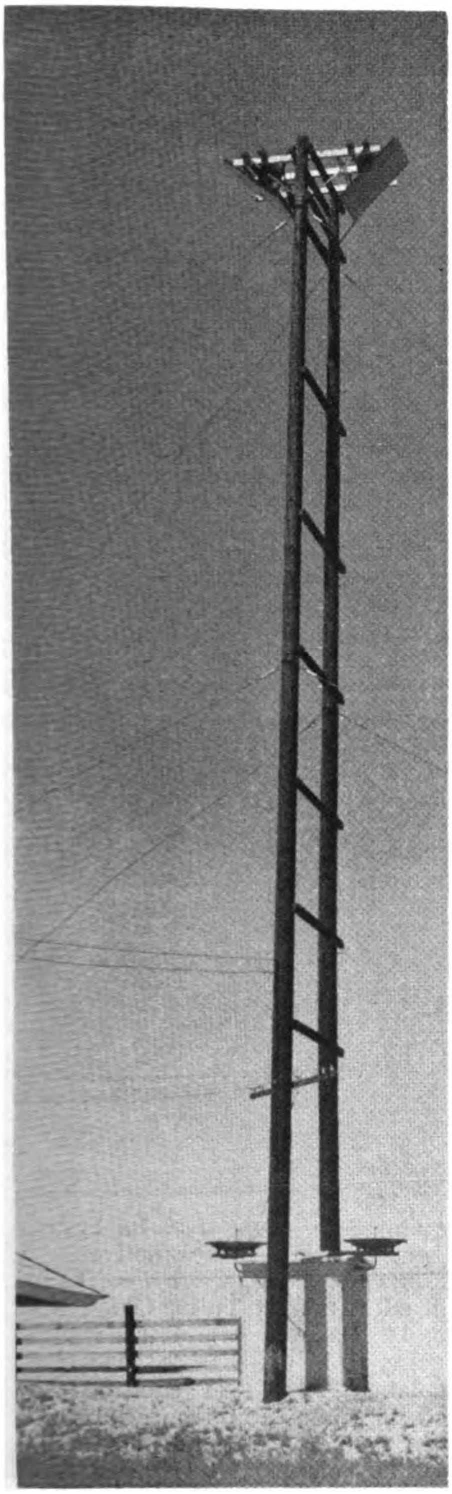
	1950	1949
Miles of new or rebuilt pole line:		
Railroad Owned	3,770.4	4,271.4
Commercially Owned	1,310.4	1,496.2
Jointly Owned	1,238.5	5,581.2
Totals	6,319.3	11,348.8
Miles of new copper line wire:		
Railroad Owned	6,646.4	10,458.2
Commercially Owned	2,019.0	5,100.2
Totals	8,665.4	15,558.4
Increase in miles of road dispatched by telephone	1,791.5	1,142.6
New mileage of long-distance telephone circuits	18,104.8	38,109.5
New mileage of telegraph circuits	58,074.6	45,061.0
New mileage of printing telegraph circuits	33,051.4	38,583.8
New mileage of communication circuits derived by use of carrier	98,380.3	113,960.2
Yard loudspeakers:		
Number of control points	104	114
Number of two-way speakers	1,140	936
Number of paging speakers	387	591
Total number of speakers	1,527	1,527
Yard radio and inductive communications:		
Number of locomotives equipped	188	129
Number of fixed stations	54	21
Road train communication:		
Miles of road	5,402.7	6,690.2
Number of locomotives equipped	205	132
Number of cabooses or other cars	183	75
Number of fixed wayside stations	29	81

operation. A detailed article on the Rock Island's microwave system was published on page 707 of the November, 1950, issue of Railway Signaling and Communications.

Promulgation of Microwave Standards

"Considerable interest has been evidenced by individual railroads and other groups in the use of microwave frequencies in the area above 300 megacycles, and one of the questions that has arisen concerns the promulgation of standards for their use," said Commissioner E. M. Webster of the Federal Communications Commission before the 1950 annual session of the A.A.R. Communications Section last October. "In its recent revision of the 'Rules Governing the Railroad Radio Service,' the commission listed specific microwave frequency bands for use on an experimental or developmental basis. No attempt was made to establish technical standards, to limit the types of communication permitted—point-to-point, mobile, etc., or to sub-allocate the bands. The availability of the microwave region of the spectrum opens up an entirely new field. While certain techniques were developed during the war for the application of microwave frequencies to specific uses such as radar," he continued, "very little was done towards the development of equipment or technique for the adoption of these frequencies to communication needs.

"After the war," Commissioner Webster said, "research laboratories and manufacturers commenced an active experimental program directed to this end. As a result, a number of manufacturers recently have placed on the market new types of microwave equip-



Tower at repeater station in the Rock Island's microwave installation. Communications are beamed vertically from equipment at base of tower to reflectors at the top

PERMANENT INSTALLATIONS OF ROAD TRAIN COMMUNICATION PLACED IN SERVICE IN 1950

Railroad and Location	Miles of Road	No. of Loco-motives	No. of Cabooses or other cars	No. of Fixed Wayside Stations	Manu-facturer	Frequency Allocated by F.C.C. Megacycles
A.& S.						
East St. Louis, Ill.-Mitchell, Ill.	21.0	1	--	---	Capehart-Farnsworth	160.05
A.T.& S.F.						
Barstow, Cal.-Winslow, Ariz.	---	--	21	--	Bendix	160.65
Needles, Cal.	---	--	--	1	Capehart-Farnsworth	160.65
B.A.R.						
Herman, Me.-Oakfield, Me.	119.0	14	8	6	Capehart-Farnsworth	159.99
C.B.& Q.						
Kansas City, Mo.-St. Louis, Mo.	277.0	--	2	--	Bendix	159.69-23
C.M.St.P.& P.						
Tacoma, Wash.-Aberdeen, Wash.	101.0	1	1	--	Bendix	160.77
C.R.I. & P.	---	18	28	--	Motorola	161.61
C.S.S.& S.B.						
South Bend, Ind.-Kensington, Ill.	75.6	8	1#	--	Bendix & Motorola	161.01 161.37
C.& S.						
Wendover, Wyo.-Texline, Tex.	467.0	3	4*	--	Bendix	159.69
Col. & Greenv.						
Greenville, Miss.	---	1	1	1	Motorola	------
D.L.& W.						
Hoboken, N. J.-Buffalo, N. Y.	396.0	2	--	--	Bendix	161.37
Erie	---	33	6	--	Capehart-Farnsworth	160.05 159.87
G.M.& O.	--	5	2	--	Motorola	161.73
K.C.S.						
Kansas City, Mo.-Port Arthur, Tex.	789.0	6	1	2	Harmon	------
L.& A.						
Hope, Ark.-Pineville Jct. La.	194.0	--	8	--	Harmon	------
Shreveport, La.-New Orleans, La.						
Shreveport, La.-Farmersville, Tex.						
M-K-T						
St. Louis, Mo.-Parsons, Kan.	378.0	4	14	--	Bendix	160.11
M.P.						
St. Louis, Mo.-Kansas City, Mo.	285.0	4	4	4	Bendix & Motorola	160.41
Pueblo, Colo.-Little Rock, Ark.	1075.0	53	60	2	Motorola	160.41
N.Y.C.& St.L						
Buffalo, N. Y.-Chicago, Ill.	523.0	3	4	--	Bendix & Capehart-Farnsworth	161.25
Penna.						
Blairsville, Pa.-Aspinwall, Pa.	60.0	--	--	1	Union	------
Alliance, Ohio-Mansfield, Ohio	92.0	--	--	2	Union	------
Pittsburgh, Pa.-Columbus, Ohio	191.0	--	--	1	Union	------
Erie, Pa.-Youngstown, Ohio	54.0					
Sherman, N. Y.-Titusville, Pa.	56.0	--	--	1	Union	------
Emporium, Pa.-Wrights, Pa.	19.0					
Ridgeway, Pa.-Grove, Pa.	56.0	--	--	1	Union	------
Cleveland, Ohio-Bayard, Ohio	68.3	32	--	1	Union	------
Homewood Jct., Pa.-Youngstown, Ohio	43.0	--	--	1	Union	------
Rochester, Pa.-Wampum Jct., Pa.						
Orrville, Ohio-Mount Vernon, Ohio	62.8	--	--	2	Union	------
S.P.						
Los Angeles, Cal.-Bakersfield, Cal.	---	8	14	--	Bendix	161.79 161.55
Tex. & North.						
Lone Star, Tex.-Daingerfield, Tex.	---	3	--	1	Western Radio	------
T.& P.						
Ft. Worth, Tex.-Denison, Tex.	---	4	4	--	Bendix	160.41
Walla Walla Val. System						
Milton, Ore.-Walla Walla, Wash.	---	2	--	2	Motorola	------
Totals	5402.7	205	183	29		

Legends: # Automobiles
* Walkie-Talkie Units

NOTE: All installations shown above are space radio, except those on the K.C.S., L.& A. and Penna., which are of the inductive type.

PERMANENT INSTALLATIONS OF YARD RADIO AND INDUCTIVE COMMUNICATIONS INSTALLED IN 1950

Railroad and Location	No. of Locomotives Equipped	No. of Fixed Stations	Space or Inductive Equipment	Equipment Manufacturer	Frequency Allocated by F.C.C.
A.T.& S.F.					
Wingfoot, Cal.	--	1	Space	Bendix	161.37 mc.
Los Angeles, Cal.	2	--	Space	Bendix	161.13 mc.
Dallas, Tex.	3	1	Space	Bendix	161.07 mc.
Chicago, Ill.	6	--	Space	Bendix	160.85 mc.
Joliet, Il.	--	1	Space	Bendix	160.65 mc.
Argentine, Kan.	1	--	Space	Bendix	160.85 mc.
Pueblo, Colo.	4	2	Space	Capehart-Farnsworth	160.29 mc. 161.37 mc.
	4*	--	-----	------	161.73 mc.
B.& O.					
East St. Louis, Ill.	1	1	Space	Bendix	160.53 mc.
Brook. East. Ter.					
Brooklyn, N. Y.	3**	1	Space	Westinghouse	------
C. of G.					
Coosa Pines, Ala.	1	1	Space	Motorola	160.65 mc.
C.& O. (Ches. Dist.)					
Presque Isle, Ohio	7	6	Space	Capehart-Farnsworth	161.31 mc. 161.41 mc.
C.B.& Q.					
Lincoln, Neb.	7	2	Space	Bendix	159.69-23
System	16	--	Space	Bendix	159.69-23
C.R.I.& P.					
Silvis, Ill.	7	1	Space	Motorola	161.61 mc.
D.& R.G.W.					
Roper, Utah	2*	1	Space	Motorola & Doolittle	160.83 mc.
	2#	3	Inductive	Aireon & Harmon	------
Des Moines & Cent. Ia.					
Des Moines, Ia.	3 1***	1	Space	Motorola	------
D.T.& I					
Flat Rock, Mich.	5	--	Space	Capehart-Farnsworth	161.43 mc.
Erie					
Weehawken, N. J.	1	1	Space	Capehart-Farnsworth	159.87 mc.
Ashland, Ohio	4	2	Space	Capehart-Farnsworth	160.05 mc.
	1**	--	Space	Westinghouse	159.51 mc.
G.M.& O.					
Venice, Ill.	--	1	Space	Motorola	161.73 mc.
Mobile, Ala.	--	1	Space	Motorola	161.73 mc.
Jackson, Tenn.	--	1	Space	Bendix	161.73 mc.
I.C.	8	1	Space	Motorola	161.19 mc.
L.A. Jct.					
Los Angeles, Cal.	1	--	Space	Bendix	------
L.& N.					
Latonia, Ky.	3	1	Space	Bendix	161.55-35
M.D.& W.					
International Falls, Minn.	2	--	Space	Bendix	------
M.P.					
Kansas City, Mo.	10	1	Space	Capehart-Farnsworth	161.49 mc.
N.Y.C.& St.L.					
Buffalo, N. Y.	6	--	Space	Bendix	161.49 mc.
Cleveland, Ohio	1	--	Space	Capehart-Farnsworth	161.49 mc.
Chicago, Ill.	8	--	Space	Capehart-Farnsworth	161.25 mc.
Penna.					
York, Pa.	6	1	Space	Motorola	160.71 mc.
Washington, D.C.	8	1	Space	Motorola	160.71 mc.
Wilkes-Barre, Pa.	3	1	Space	Motorola	160.71 mc.
	3	1	Inductive	Union	------
St.L.-S.F.					
Ft. Worth, Tex.	2	1	Space	Bendix	161.13 mc.
Tulsa, Okla.	12	1	Space	Bendix	161.13 mc.
S.A.L.					
Tampa, Fla.	2	--	Space	Bendix	159.69 mc.
Hamlet, N. C.	--	1	Space	Comco	160.89 mc.
Sou.					
Inman Yard, Ga.	--	2	Space	G.R.S.	160.89 mc. 161.07 mc.
Inman Yard, Ga.	2*	--	Space	G.R.S.	160.47 mc. 160.53 mc.
S.P.					
Los Angeles, Cal.	14	3	Space	Bendix Motorola & Capehart-Farnsworth	161.43 mc. 161.55 mc. 160.89 mc.
Fresno, Cal.	2	2	Space	Bendix	161.43 mc. 160.89 mc. 161.55 mc.
Tucson, Ariz.	2	3	Space	Bendix	161.67 mc. 161.55 mc. 161.43 mc.
Gerber, Cal.	--	1	Space	Bendix	161.67 mc.
Oakland, Cal.	--	1	Space	Bendix	161.67 mc.
Union					
Pittsburgh, Pa.	6	2	Space	Westinghouse	159.87 mc.
U.P.					
North Platte, Neb.	1	1	Space	Motorola	160.29 mc. 160.41 mc.
Pocatello, Idaho	1	--	Space	Motorola	160.29 mc.
W.P.					
Oakland, Cal.	2**	1	Space	Bendix	159.63 mc.
Totals	188	54			

Legends: * Walkie-Talkie Units
Ice Machines
** Tug Boats

ment. The individual equipment, however, differs materially in such technical respects as circuit design, method of modulation and channel width. Hence, at the present time, there appears to be no single generally-established and generally recognized system. The commission does not wish to promulgate any rules and regulations which might tend to freeze or to discourage development in this new field."

Train Communication Steps Ahead

Space radio and inductive train-communication activity in 1950 was above that for 1949, as shown in one of the accompanying tables. In line with this trend, Commissioner Webster of the F.C.C., in addressing the Communications Section last year, explained, "I am glad to say railroad radio is over the hump." Commenting further, he stated, "more than one-half of the larger railroad systems of the country are now making use of radio in connection with some phase of their operations. Many of them are using it in main-line operations on one or more divisions and are steadily extending it to other divisions. Still more are confining it only to yard and terminal operations. Many of the smaller roads are also using it in both types of operations. During the past year, the number of stations operating in the 'Railroad Service' has increased some 64 per cent."

Some Good-Sized Projects

With reference to the tabulations herewith, the railroads of the United States equipped 188 locomotives and 54 fixed stations in yard service with train-communication equipment during 1950, compared with 129 and 21, respectively, in 1949. In road service, 205 locomotives, compared with 132 in 1949, and 183 cabooses or other cars, compared with 75, were equipped with train-communication equipment, although the number of wayside stations placed in service decreased from 81 in 1949 to 29 in 1950.

NEW MILEAGE OF TELEPHONE TRAIN DISPATCHING AND LONG-DISTANCE TELEPHONE SERVICE—1950

Railroad	Increase in Miles of Road Dispatched by Telephone	New Mileage of Long-Distance Telephone Circuits
A.C.L.	71.1	425.8
B.& O.	12.0	1011.0
C.N.	160.0	4452.0
C.P.	108.0	4441.0
C.& O. (Ches. Dist.)	---	1218.0
C.& I.M.	---	126.0
C.M.St.P.& P.	178.0	307.0
C.& N.W.	57.0	---
C.R.I.& P.	32.5	---
D.M.& I.R.	---	914.0
Erie	33.3	---
I.C.	63.0	406.0
L.& N.	---	108.5
M.P.	268.7	317.7
G.C.L.	23.8	4.5
I.G.N.	4.5	4.5
N.Y.C.	671.6	335.8
M.C.	---	209.0
N.P.	---	428.0
Penna.	---	90.0
St.L.-S.F.	108.0	750.0
S.A.L.	---	524.4
Sou.	---	93.8
S.P.	---	107.0
T.& N.O.	---	120.0
S.P.& S.	---	111.8
T.& P.	---	32.0
U.P.	---	750.4
Wabash	---	59.6
W.M.	---	254.0
W.P.	---	503.0
Totals	1791.5	18104.8

The Burlington equipped 16 locomotives for system yard service; the Missouri Pacific, 10 locomotives and one fixed station at Kansas City, Mo.; the Frisco, 12 locomotives and one fixed station at Tulsa, Okla.; and the Southern Pacific, 14 locomotives and three fixed stations at Los Angeles, Cal. Of sizable road-train communication installations, the Erie equipped 33 more locomotives and six cabooses in connection with its New York-Chicago main-line radiotelephone system, which is due to be completed this year. The Bangor & Aroostook equipped 14 locomotives, eight cabooses and six wayside stations between Herman, Me., and Oakfield, 119 mi.; and the Missouri Pacific, 53 locomotives, 60 cabooses and two wayside offices, between Pueblo, Colo., and Little Rock, Ark., 1,075 mi., as well as four each locomotives, cabooses and wayside offices between St. Louis and Kansas City, Mo. Of particular interest with reference to all of these installations, is that not only is end-to-end com-

TELEGRAPH AND PRINTING TELEGRAPH PLACED IN SERVICE IN 1950

Railroad	New Mileage of Telegraph Circuits	New Mileage of Printing Telegraph Circuits
A.T.& S.F.	---	3224.8
B.& O.	544.0	544.0
C.N.	35940.0	8050.0
C.P.	16417.0	9414.0
C.M.St.P.& P.	---	2781.0
C.R.I.& P.	3467.0	---
D.& H.	605.2	421.0
D.T.& I.	---	14.0
Erie	---	33.0
I.C.	351.0	---
M.P.	---	324.0
G.C.L.	12.4	23.7
I.G.N.	9.0	---
N.Y.C.& St.L.	48.0	48.0
Penna	---	2055.9
St.L.-S.F.	---	1030.0
S.A.L.	---	107.9
Sou	161.6	1143.4
S.P.		
T.& N.O.	---	348.0
U.P.	519.4	1580.7
Wabash	---	1908.0
Totals	58074.6	33051.4

POLE LINE CONSTRUCTION—1950

Railroad	New or Rebuilt Pole Lines			Mileage of new Copper Wire	
	Railroad Owned	Commercially Owned	Jointly Owned	Railroad Owned	Commercially Owned
A.T.& S.F.	122.3	---	---	974.9	---
A.C.L.	---	---	---	---	284.4
B.& O.	---	---	---	296.0	---
B.A.R.	116.5	---	---	---	---
B.& L.E.	1.0	---	---	---	---
B.& M.	---	22.0	---	---	---
C.N.	---	---	818.0	387.0	1148.0
C.P.	4.0	---	---	635.0	399.0
Q.C.	3.0	---	---	95.0	---
C.& O.					
Ches. Dist.	318.6	---	---	28.1	---
P.M. Dist.	100.0	---	---	---	---
C.B.& Q.	142.0	---	---	---	---
C.& I.M.	---	---	---	126.0	---
C.M.St.P.& P.	500.0	---	---	200.0	---
C.& N.W.	320.0	---	---	---	---
C.R.I.& P.	43.4	180.1	---	14.0	---
D.& H.	19.0	17.0	---	75.0	---
D.T.& I.	34.0	---	---	28.0	---
D.M.& I.R.	1.0	---	---	5.1	---
Erie	125.0	---	---	12.1	---
G.N.	---	---	---	58.0	---
G.M.& O.	90.0	35.0	---	---	---
I.C.	40.0	---	---	---	---
K.C.S.	---	86.2	---	---	---
L.& A.	---	32.0	---	---	---
L.V.	25.0	---	---	---	---
L.& N.	420.0	---	---	---	---
M.St.P.& S.S.M.	194.0	---	---	---	---
M-K-T	---	61.0	---	---	---
M.P.	---	376.2	---	983.7	---
Neb.	---	67.3	---	---	---
G.C.L.	7.9	15.6	63.7	---	---
I.G.N.	11.0	---	35.8	---	---
N.C.& St.L.	90.0	---	---	---	---
N.Y.B.T.	---	---	---	1500.0	---
N.Y.C.	279.5	---	---	---	---
C.C.C.& St.L.	55.3	---	---	---	---
M.C.	41.1	---	---	---	---
P.& L.E.	2.1	---	---	---	---
N.Y.C.& St.L.	49.3	---	---	118.0	---
N.P.	129.0	---	77.0	---	---
Penna	283.0	---	---	449.0	---
P.& W.V.	13.0	40.0	---	6.0	---
St.L.-S.F.	---	---	237.0	108.0	---
Sou	1.0	---	---	39.4	187.6
S.P.	---	157.0	---	147.0	---
S.P.& S.	80.0	---	---	11.4	---
T.& P.	---	---	7.0	---	---
Union	---	---	---	5.0	---
U.P.	13.9	---	---	120.0	---
Virginian	60.5	---	---	173.0	---
Wabash	35.0	---	---	---	---
W.M.	---	131.0	---	51.7	---
W.P.	---	90.0	---	---	---
Totals	3770.4	1310.4	1238.5	6646.4	2019.0

munication provided between the locomotives and cabooses of trains, but communication is also available between the trains and wayside offices, between trains within range of each other, as well as between wayside offices in emergencies, such as during pole-line prostrations.

Power-supply equipment for train communication systems was a much-discussed subject last year, and still is, having been an important problem from both economic and engineering standpoints. Costly power supplies on rolling stock have, in some instances, limited or eliminated the installation of train communication facilities. Mechanical and electrical difficulties with certain types of power-supply units have resulted in complete power failures, or serious damage to communication equipment due to power surges. New power-supply systems, however, which have been under development for railroad use for the past few years, have recently been introduced, and show great promise from the standpoints of simplicity, initial cost, reliable operation and power production, and maintenance and the cost thereof. This one point alone is a great asset to train communication and should help tremendously with respect to its future use and development.

Among the railroads reporting the installation of new low-voltage train communication power-supply systems on cabooses were the Santa Fe, the Missouri Pacific and the Texas & Pacific. The Santa Fe installed vibrators on 21 cabooses in operation between Barstow, Cal., and Winslow, Ariz.; the Missouri Pacific, six and 12-volt d.c. Leece-Neville systems on 64 cabooses in operation between Pueblo, Colo., and Little Rock, Ark., and between St. Louis, Mo., and Kansas City; and the Texas & Pacific, similar 12-volt d.c. equipment with Dayton drives on four cabooses operating between Fort Worth, Tex., and Denison. The Colorado & Southern reported the use of dry cells, and the Bangor & Aroostook and the Southern Pacific each used Diesel engine-generator sets on their cabooses listed in the tabulations herewith. The Burlington, Milwaukee, Erie and Kansas City Southern installed axle generators.

Number of Loudspeakers Increased

The total number of two-way talk-back loudspeakers installed in yards during 1950 passed the mark for 1949, the figures being 1,140 and 936, respectively. Some of the sizable projects in this field were on the Santa Fe, which installed 38 two-way speakers, three paging speakers and one control point at Chicago; the Wabash, 63 two-way and 17 paging speakers with four control points, at Moberly, Mo.; the North Western, 37 two-ways, seven pagers and one control point in a Diesel shop at Chicago; and the Southern, 44 two-way speakers, eight paging speakers, and one control point at Chattanooga, Tenn. The Frisco, similarly, placed in service 70 two-way talk-back speakers and 10 paging speakers, with one control point, at Springfield, Mo.

With respect to new or rebuilt pole lines, 6,319 miles of railroad, commercially and jointly-owned lines were constructed during 1950, as compared with 11,349 the

NEW CIRCUIT MILES DERIVED IN 1950 BY SUPERIMPOSING CARRIER ON EXISTING LINE WIRES

Railroad	New Mileage of Long Distance Telephone Circuits	New Mileage of Telegraph Circuits	New Mileage of Printing Telegraph Circuits
A.T.& S.F.	---	---	3,224.8
A.C.L.	283.6	---	—
B.& O.	1,071.0	544.0	544.0
C.N.	4,161.0	35,940.0	6,671.0
C.P.	4,352.0	16,417.0	8,821.0
C.& O.			
(Ches. Dist.)	1,123.0	---	---
C.M.St. P.& P.	307.0	---	2,781.0
C.R.I.& P.	---	3,487.0	---
D.T.& I.	---	---	14.0
D.M.& I.R.	914.0	---	---
I.C.	406.0	351.0	---
L.& N.	108.5	---	---
M.P.	---	---	324.0
N.Y.C.			
(M.C.)	209.0	---	---
Penna	---	---	183.9
St.L.-S.F.	750.0	---	1,030.0
S.A.L.	524.4	---	---
Sou	---	---	1,143.4
S.P.	107.0	---	---
(T.& N.O.)	120.0	---	---
S.P.& S.	106.1	---	---
T.& P.	32.0	---	---
U.P.	727.8	519.4	1,056.8
Wabash	59.6	---	---
W.M.	254.0	---	---
W.P.	92.0	---	---
Totals	15,848.0	57,238.4	25,493.9

year before, and 8,665 miles of new railroad and commercially-owned copper wire were installed, compared with 15,558 in 1949. The Milwaukee constructed 500 miles of new railroad-owned line, and the Missouri Pacific 376 miles of commercially-owned. The Santa Fe installed 975 miles of new railroad-owned copper wire, the Missouri Pacific 984 miles, and the Canadian Pacific 635 miles of railroad-owned and 399 miles of commercially-owned.

An increase of 1,792 miles of road dispatched by telephone was noted during 1950, and 18,105 miles of new long-distance telephone, 58,075 miles of telegraph, and 33,051 miles of printing telegraph circuits were placed in service in the United States and Canada. The

YARD LOUDSPEAKER INSTALLATIONS MADE DURING 1950

Railroad	Location	No. of Control Points	No. of Two-Way Speakers	No. of Paging Speakers
A.T.& S.F	Chillicothe, Ill.	1	--	2
	Emporia, Kan.	1	15	9
	Chicago, Ill.	1	38	3
	Oklahoma City, Okla	1	--	4
	Pueblo, Colo	4	23	23
B.& M.	Somerville, Mass	1	--	63
C.P.	Montreal, Que	10	10	2
	Montreal, Que	1	--	2
	Montreal, Que	1	--	3
	Calgary, Alta	--	--	[illegible]
C.& O.				
(Ches. Dist.)	Presque Isle, Ohio	4	--	8
(P.M. Dist.)	South Of Erie, Mich	1	60	12
C.B.& Q	Dayton's Bluff Yard, Minn	6	--	9
	Chicago, Ill. (Freight House No. 10)	14	--	--
	St. Joseph Yard, Mo	2	--	6
C.& E.I.	Danville, Ill	1	--	22
C.& N.W.	Chicago, Ill. (Diesel Shop)	1	37	7
C.R.I.& P.	Silvis, Ill	1	50	10
D.& R.G.W.	Denver, Colo	--	12	--
D.M.& I.R.	Two Harbors, Minn	4	--	3
Erie	Weehawken, N. J	1	--	2
	Ashland, Ohio	2	6	--
G.N.	Superior, Wis	--	3	--
	Allouez, Wis	--	4	--
G.M.& O.	Venice, Ill	1	35	10
K.C.T.	Kansas City, Mo	2	--	6
L.& N.	Nashville, Tenn. (Yard)	3	2	22
	Nashville, Tenn. (Shop)	6	--	11
M.P.	Leeds, Mo	1	27	30
	Osawatomie, Kan	--	4	3
(G.C.L.)	Beaumont, Tex	1	2	4
	Settegast, Tex	2	46	12
N.Y.C.				
(B.& A.)	Springfield, Mass	1	16	--
(I.H.B.)	Chicago, Ill	1	--	1
N.Y.,N.H.& H.	Bridgeport, Conn	3	--	9
N.P.	Centralia, Wash	1	6	10
Penna	Pittsburgh, Pa	2	--	6
	Nadine, Pa	1	--	2
	Mingo Jct., Ohio	1	--	16
St.L.-S.F.	Springfield, Mo	1	70	10
Sou.	Danville, Va	1	--	12
	Danville, Va	1	5	--
	Inman Yard, Ga. (Car Repair Syst.)	3	3	--
	Inman Yard, Ga. (North Avenue)	--	4	--
	Memphis, Tenn. (Freight Car Checker)	1	2	--
	Memphis, Tenn. (Freight House)	1	8	--
(C.N.O.& T.P.)	Cincinnati, Ohio (Freight Car Checker)	5	10	--
	Chattanooga, Tenn	1	44	8
	Oakdale, Tenn	1	15	--
	Oakdale, Tenn	--	3	--
S.P.& S.	Vancouver, Wash	1	17	6
Wabash	Moberly, Mo	4	63	17
	Totals	104	1,140	387

Canadian National installed 35,490 miles of new telegraph, 8,050 miles of printing telegraph and 4,452 miles of long-distance telephone circuits; the Canadian Pacific 16,417 miles of telegraph, 9,414 miles of printing telegraph, and 4,441 miles of new long distance telephone circuits; and the Rock Island 3,467 miles of telegraph circuits. The Pennsylvania installed 2,056 miles of printing telegraph circuits, and the Santa Fe, 3,225 miles. The Chesapeake district of the Chesapeake & Ohio installed 1,218 miles of new long-distance telephone circuits; the Duluth, Missabe & Iron Range, 914 miles; and the Frisco and Union Pacific, 750 miles each.

New Carrier-Circuit Mileage

By superimposing carrier on existing line wires, the Canadian National obtained 4,161 miles of new long-distance telephone circuits, 35,940 miles of new telegraph circuits, and 6,571 miles of new printing telegraph circuits. Similarly, the Rock Island secured 3,-467 miles of telegraph circuits; the Baltimore & Ohio, 1,011 miles of long-distance telephone and 544 miles each of telegraph and printing telegraph circuits; and the Milwaukee, 2,781 miles of printing telegraph and 307 miles of long-distance telephone circuits. The Southern obtained 1,143 miles of new printing telegraph circuits by superimposing carrier on existing wires, and the Canadian Pacific, 4,352 miles of long-distance phone circuits, 16,417 miles of telegraph circuits, and 8,621 miles of printing telegraph circuits.

The Santa Fe, the Southern and the Great Northern reported the installation of telephone and passenger entertainment equipment on passenger trains. The Santa Fe equipped 59 cars, operating in miscellaneous trains between Chicago and Los Angeles, with four-channel medium-level entertainment equipment, and

Total of 1,140 talk-back loudspeakers were installed in freight yards in year 1950

six miscellaneous dining cars, operating between the same points, with luncheon and dinner music equipment. The Great Northern equipped 16 locomotives, operating on its "Empire Builder" between St. Paul, Minn., and Seattle, Wash., with train telephones. The Southern equipped 111 cars operating in four of its crack passenger trains with public address and telephone equipment. These include 39 cars used on "The Crescent" between Washington, D. C., and Atlanta, Ga.; 27 cars on its "Southerner" between the same points; 21 cars on "The Tennessean" between Washington and Chattanooga, Tenn.; and 24 cars operated on "The Royal Palm" between Cincinnati, Ohio, and Jacksonville, Fla.