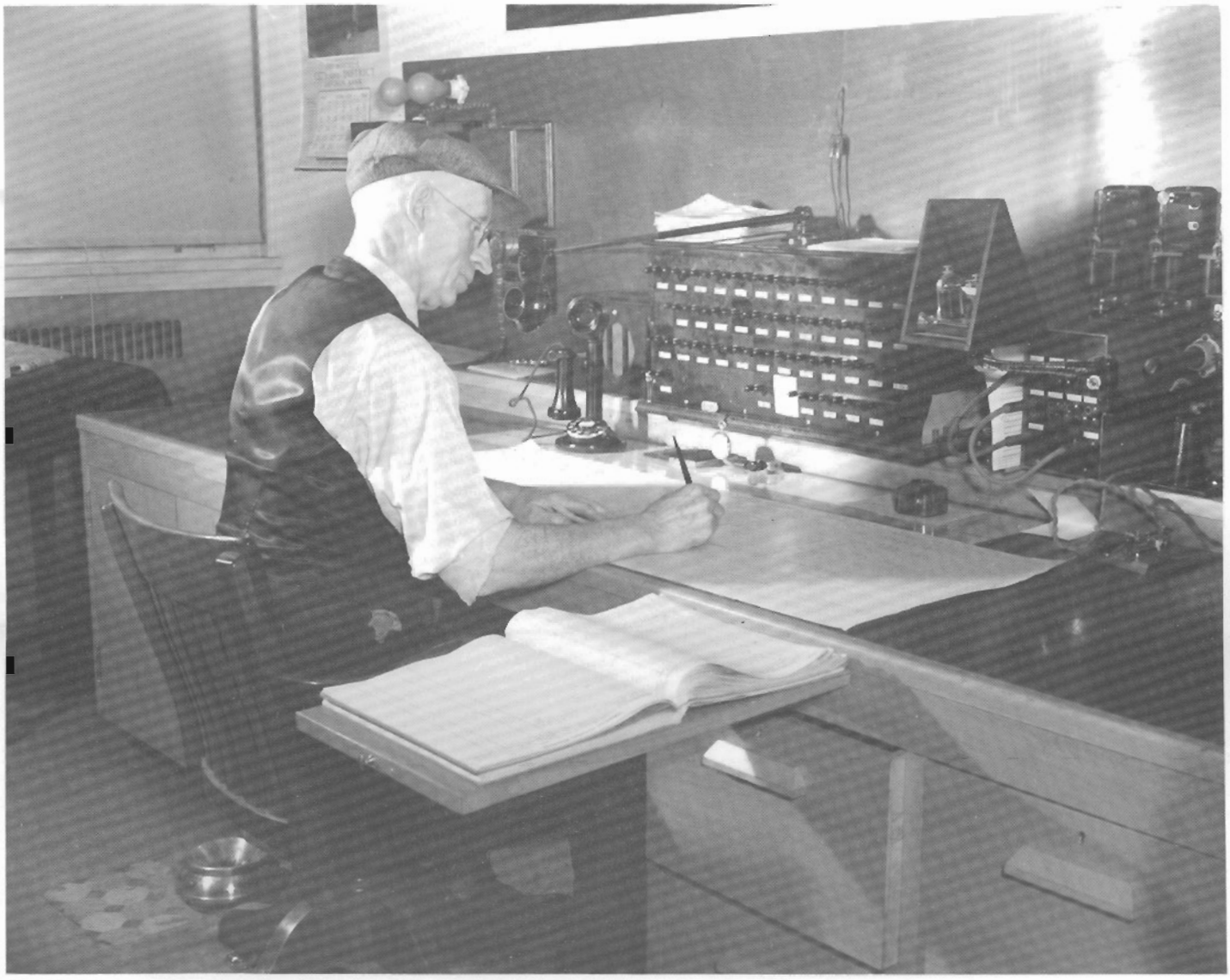
Canadian Rail

No. 425

NOVEMBER - DECEMBER 1991



CANADIAN RAIL

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Canadian Rail is continually in need of news, stories, historical data, photos, maps and other material. Please send all contributions to the editor: Fred F. Angus, 3021 Trafalgar Ave. Montreal, P.Q. H3Y 1H3. No payment can be made for contributions, but the contributer will be given credit for material submitted. Material will be returned to the contributor if requested. Remember "Knowledge is of little value unless it is shared with others".

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FRONT COVER: About 1950 a CNR train dispatcher posed for this classic photo. Note the prominent position of the telephone and the selector board, as well as the small lineboard and plug wires for patching and grounding telegraph circuits.

CNR Archives, Montreal, Photo No. X17568.

As part of its activities, the CRHA operates the Canadian Railway Museum at Delson / St. Constant, Que. which is about 14 miles (23 Km.) from downtown Montreal. It is open from late May to early October (daily until Labour Day). Members, and their immediate families, are admitted free of charge.

The Railway Telegraph and Telephone

By Robert G. Burnet

I. TELEGRAPH BACKGROUND

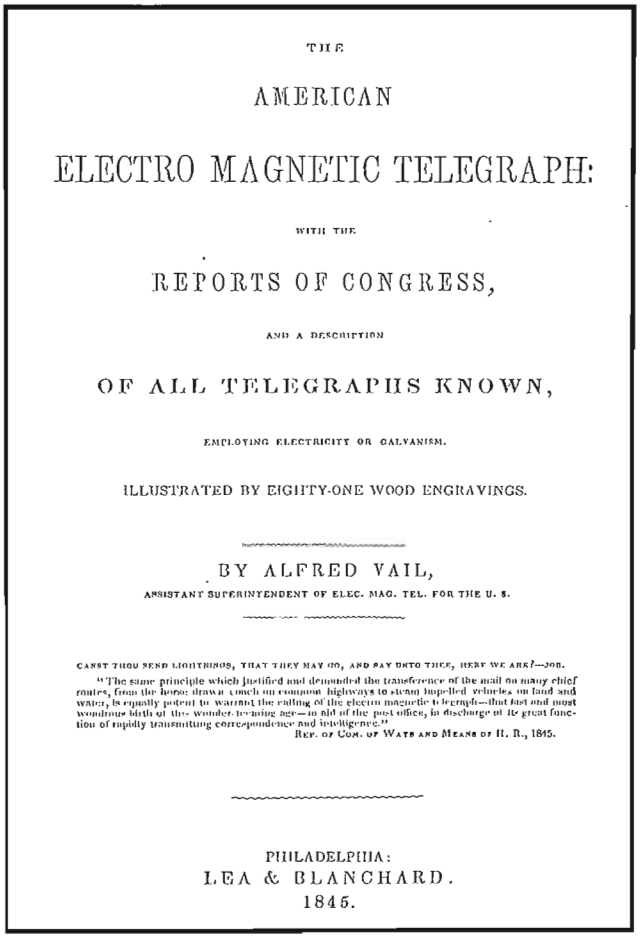
Human communication and the need to communicate has always been essential. Long ago people went to extremes to pass along news, warn others of danger, help those who were ill, and even gossip. The unassisted human voice is limited and can only travel small distances. To overcome this shortfall, drums once sent stylized secretive codes; smoke signals on hills developed, as did the semaphore flags and Roman signalling towers. But the idea remained the same - to talk and connect with other people over vast distances. Such was the case when Morse developed the telegraph, and Bell, the telephone.

Born on April 27th, 1791 in Charlestown, Massachusetts, Samuel Finley Breese Morse was the eldest of three brothers. Samuel's father, Jedidiah was a clergyman in one of Boston's Calvinistic churches and a noted geographer - his mother was Elizabeth Ann Breese. Samuel always had an interest in art, specifically painting. His talent was so obvious he attended Yale University in 1805, graduating 1810. To further develop his artistic skills, he studied in London and Paris. When the United States Capitol Building was being built, Morse applied to do interior paintings, but the President rejected Morse over a trivial personal matter. This rejection caused him to virtually abandon painting as a career. (Morse died April 2, 1872 and is buried in Greenwood Cemetery, Brooklyn, New York.)

Morse was the first inventor of the electro-magnetic telegraph. In 1831, Professor John Henry (1797-1878) published a descriptive theory on the magnetics of an electro-magnetic telegraph. He also produced an electro-magnetic telegraph to demonstrate the concept of his theory. Henry "...had discovered the electro-magnetic force which aided Morse in his discovery of how to apply that theory to an up-and-down movement of a metallic mechanism."[1] While returning to the USA from Europe aboard the packet ship "Sully", he began to question transmitting electrical current along wire. Roughly six years passed, from idea to application. In January 1838, Morse and his long time associate, Alfred Vial, sent their first telegraph from the Speedwell Village Iron Works Factory in Morristown, New Jersey. The message keyed to Morse was : "A patient waiter is no loser."[2]

After Morse became a professor at New York University, he performed a practical example of the theory. "The demonstration consisted of stringing 1700 feet of wire about the walls of the university."[3] This was positive evidence that the theory worked. In February 1838, he repeated it for the US House Committee of Congress. While Congress debated the grant, Morse applied for a patent in England. The English government turned him down, citing a scientific magazine which had published an article describing the results of Morse's electro-magnetic telegraph but did not describe the method of its operation. Morse then went to France and was granted a French patent - the US patent was granted some ten years later, but was made retroactive. On February 23, 1843, a Bill was passed by Congress, "...appropriating $30,000 for building a test line between Baltimore and Washington [some 40 miles apart]...The line was along the right-of-way of the Baltimore and Ohio RailRoad."[4] It was along this railway line that Morse first tried underground cable. A special tool had been made to dig a trench and bury the cable. The wire was placed in lead pipes, connected and sealed together. At one point the connections were tested, and a short was discovered. Morse and his colleague, Cornell, then began stringing the wire in tree branches and making temporary poles. Glass bottle necks served as the first insulators for the wire. The circuit itself was a "series circuit" where one line sends and the other is earth return. Original D.C. power was supplied by copper sulfate cells, which deteriorated rapidly when the key was in an open position, therefore, early operators were instructed to always close the key while on standby to conserve power. Finally, on May 24th, 1844, the US Supreme Court gave Morse the official decision. Annie Ellsworth - daughter of H.E. ellsworth, the Commissioner of Patents - selected the first telegram and handed it to Morse. It was from the Court building that Morse sent to Vail, as he waited in the Baltimore and Ohio Railway's Mount Claire station, the first telegram, quoting from the Bible, Numbers 23:23: "'What hath God Wrought', sig SFB Morse."[5] The North American Telegraph was now established.

It is interesting to note that Morse was not the sole inventor of a telegraph system. Many others worked on different approaches. The first electric telegraph can be traced to a detailed article written in a 1753 science magazine published in Scotland, signed "C.M." only. The writer also advised the use of insulated electrical wire to protect it from the weather; he even suggested sending a code using the 26 letters of the alphabet, however, each letter required its own wire. Two Englishmen experimenting with another form of telegraph wire were William Fathergill Cooke (1806-79) and Charles Wheatstone (1802-75). Their 1837 telegraph was called a "needle" visual telegraph, in that one could read the letters on a display board; the operator then put the letters together to form the alpha-numeric characters. Their first test line was constructed between Paddington (London) and West Drayton, along the London and North Western Railway right-of-way. By 1839, the Great Western Railway was using this telegraph system for train operations. Their "needle" telegraph showed how valuable a communication tool it could be with the capture of John Tawell. Tawell had been spotted boarding a train at Slough, after committing a brutal murder. As the train travelled to Paddington, his every move was reported by railway telegraph operators to the police. Once into Paddington Station, he was arrested. The needle telegraph of Wheatstone and Cooke had been the key player in his arrest. It also established their telegraph as a viable tool. Interestingly, Wheatstone and Cooke had examined Morse's electro-magnetic telegraph, but had dismissed it as not being commercially profitable to develop, and they dropped it in favour of their own.



THE

AMERICAN

ELECTRO MAGNETIC TELEGRAPH:

WITH THE

REPORTS OF CONGRESS,

AND A DESCRIPTION

OF ALL TELEGRAPHS KNOWN,

EMPLOYING ELECTRICITY OR GALVANISM.

ILLUSTRATED BY EIGHTY-ONE WOOD ENGRAVINGS.

BY ALFRED VAIL,

ASSISTANT SUPERINTENDENT OF ELEC. MAG. TEL. FOR THE U. S.

CANST THOU SEND LIGHTNINGS, THAT THEY MAY GO, AND SAY UNTO THEE, HERE WE ARE?—JOB.

"The same principle which justified and demanded the transference of the mail on many chief routes, from the horse drawn coach on common highways to steam impelled vehicles on land and water, is equally potent to warrant the calling of the electro magnetic telegraph—that last and most wondrous birth of this wonder-teeming age—to aid of the post office, in discharge of its great function of rapidly transmitting correspondence and intelligence."

REP. OF COM. OF WAYS AND MEANS OF H. R., 1845.

PHILADELPHIA:
LEA & BLANCHARD.
1845.

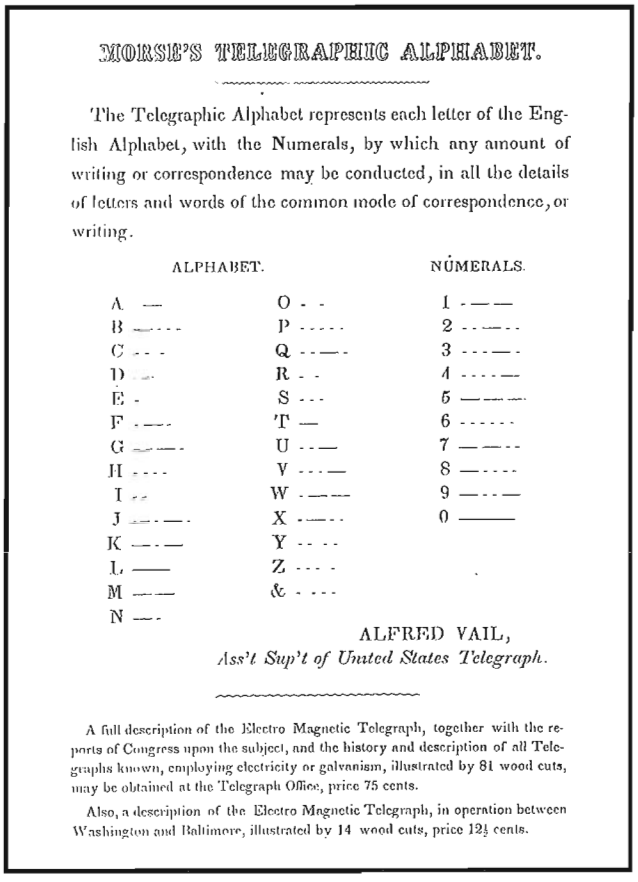
The title page of one of the earliest books on the telegraph. The book was written by Alfred Vail and published in 1845.

Collection of Fred Angus.

In the USA and Canada, the telegraph had a different beginning. The telegraph was first used on the Baltimore and Ohio Railroad on May 24, 1844. Later, the Erie Railroad became the first railroad to use the telegraph to dispatch trains, which came about accidently on September 22, 1851. Superintendent Charles Minot was on a train in a siding waiting for a late train to pass. Minot learned from the commercial telegraph operator, that it had not yet reached Goshen, 13 miles away. Minot sent a wire to the Goshen agent to hold the train until his own train proceeded to Goshen. The locomotive engineer refused to proceed upon such an order and Minot took the throttle. The advantage of the telegraph for speeding up train operations was proved and was gradually adopted. About half a century later the telegraph was supplemented by the use of the telephone circuit. (Dots and Dashes, May 1943 - C.N.R.'s Telegraph's publication / G. Horner) By 1861, telegraph wires spanned the continental USA from Missouri to San Francisco, replacing the fabled Pony Express on October 24, 1861. It is significant to note that the US military exploited the telegraph for improved military communications. The Union Army, during the American Civil War made effective use of mobile telegraph units. In Canada, Louis Riel unwittingly helped to establish the telegraph with the Rebellions out west in the 1880s.

In short, Morse invented the telegraph key and Code. A total of 62 persons claimed to have invented a telegraph, but Morse made the first practical application of Henry's electro-magnetic theory. The Morse Code itself, developed with Alfred Vail's assistance, lasted virtually unchanged until the mid-1920s.[6]

Around 1855, Morse wanted to prove how fast and efficient his key and Code were at the Paris Exposition. The first telegraph Morse invented was like a teletype machine, in that paper was pulled through under a punch. As the tape moved along a guide, a large "V" was imprinted on it. By counting the "V"s and making note of their relationship and spacing to one another, it was possible to translate the "V" back into a numeral or letter, and in turn a word. Several months before the Exposition though, Jimmy Leonard, age 15 and his friend Joseph Fisher, successfully demonstrated receiving 55 words in one minute. This feat was brought to Morse's attention and he was astounded. What Leonard was doing was reading Morse's Code by sound rather than deciphering coded tape - these two teenage boys invented the first practical "sounder", the receiving part of the telegraph. As a result, Morse adapted the telegraph so that paper tape was no longer used, and thus began the long tradition of listening to the "sounder". Sound reading may have existed before 1855. One report notes, that in 1846 sound reading was practised but discouraged by Management; They wanted "...the letters decoded from the inked paper strips."[7] The



MORSE'S TELEGRAPHIC ALPHABET.

The Telegraphic Alphabet represents each letter of the English Alphabet, with the Numerals, by which any amount of writing or correspondence may be conducted, in all the details of letters and words of the common mode of correspondence, or writing.

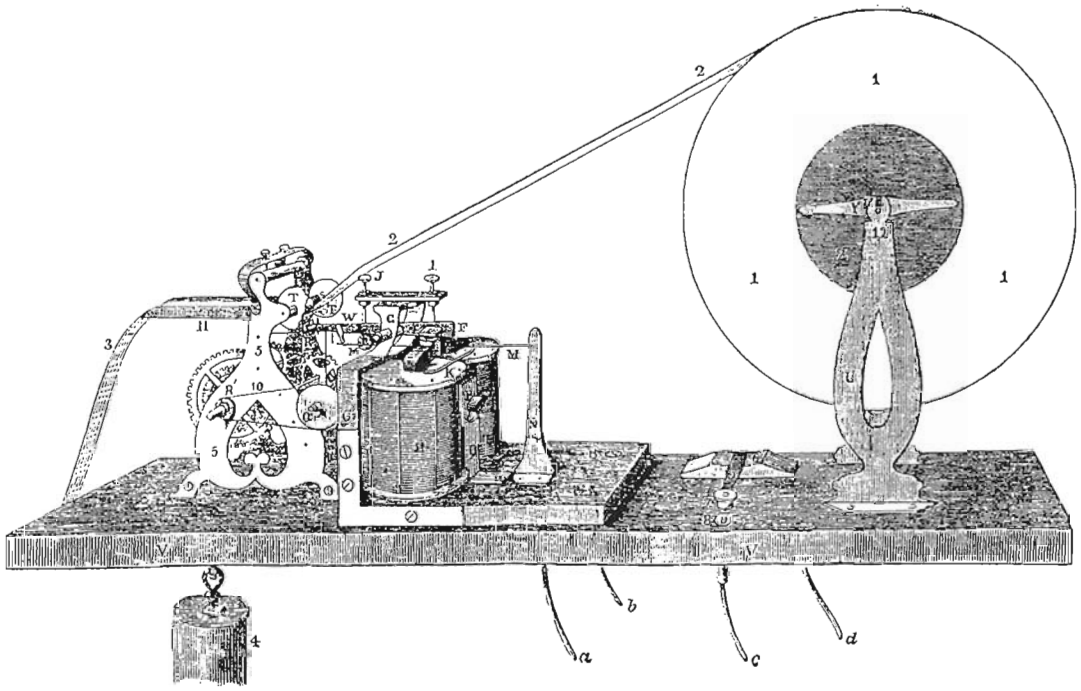
ALPHABET.		NUMERALS.
A —	O - -	1 - — —
B — - - -	P - - - - -	2 - - — - -
C — - -	Q - - — -	3 - - - — -
D — -	R - -	4 - - - - —
E -	S - - -	5 — — — —
F - - — -	T —	6 - - - - - -
G — — -	U - - —	7 — — - -
H - - - -	V - - - —	8 — - - - -
I - -	W - — —	9 — - - —
J - — — —	X — - -	0 ———
K — - —	Y — - -	
L — —	Z — - -	
M — —	& - - -	
N — -		

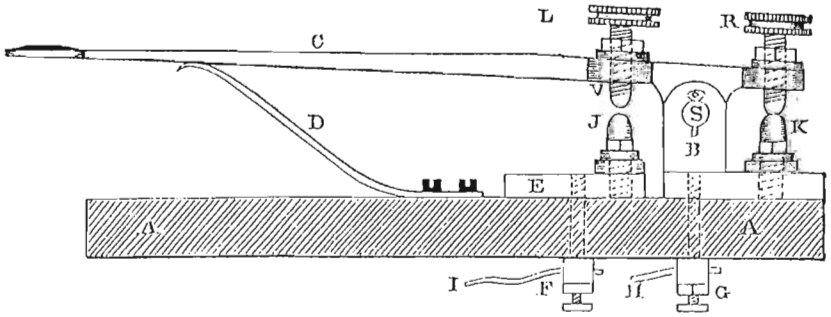
ALFRED VAIL,
Ass't Sup't of United States Telegraph.

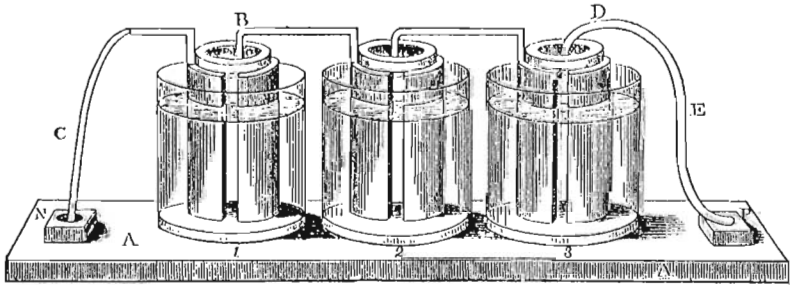
A full description of the Electro Magnetic Telegraph, together with the reports of Congress upon the subject, and the history and description of all Telegraphs known, employing electricity or galvanism, illustrated by 81 wood cuts, may be obtained at the Telegraph Office, price 75 cents.

Also, a description of the Electro Magnetic Telegraph, in operation between Washington and Baltimore, illustrated by 14 wood cuts, price 12½ cents.

MORSE'S TELEGRAPHIC ALPHABET as printed in 1845. Note the advertisement for Alfred Vail's book.







The three basic components of the telegraph: receiver, sending key and batteries, as they were illustrated in Alfred Vail's book in 1845. The receiving unit is by far the most complicated as it printed the incoming dots and dashes on a paper strip. This was greatly simplified when the sounder was developed. The design of the key, however, changed little throughout the whole era of the Morse telegraph.

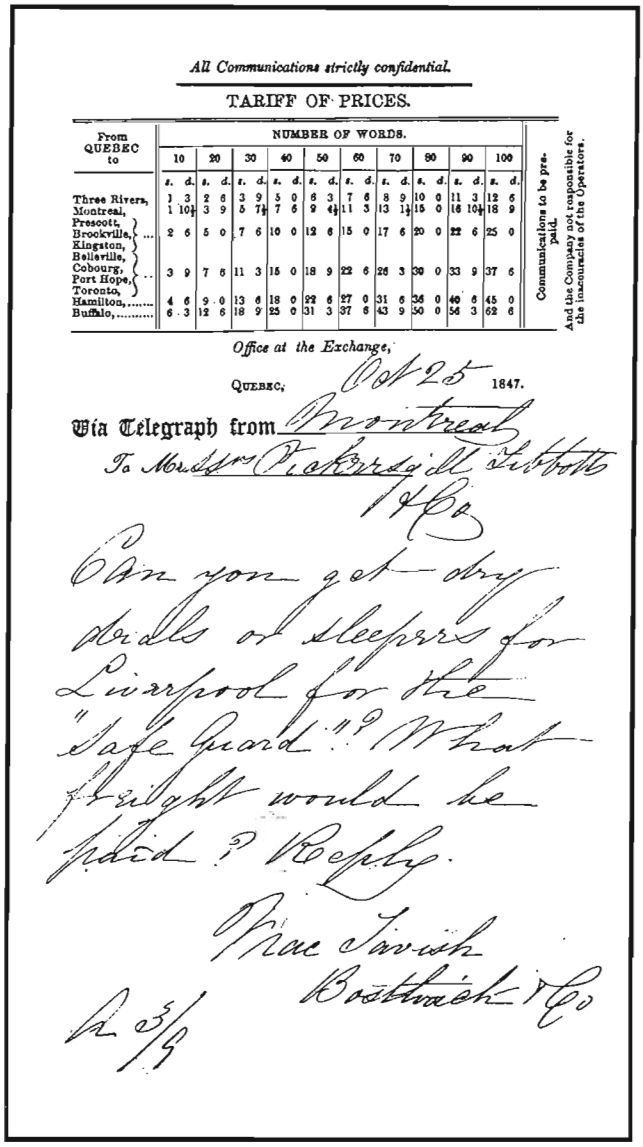
actual "sounder" receiving unit was not invented until 1856. The sounder itself is an electromagnet. Suspended above the magnet is an armature where a lever is attached with a style or pin. When the magnet is magnetized, the lever moves down and is forced back up by a spring. When the sounder lever went down it made a tapping noise. In later years, operators amplified the sound by putting empty tobacco tins behind it. Significantly, as transmissions became faster, some operators could not keep up with the sender. Someone, somewhere brought a typewriter to the telegraph office one day making it possible to record messages sent by pushing typewriter keys faster than their mind could write and translate codes. Eventually in Canada, three telegraph schools were established to train telegraphers; in Toronto, the Cassan School; in Montreal, the Elle Business College; in Quebec City, the Thomas Institute. There were over 30 telegraphy schools throughout the United States.[8]

II. RAILWAY TELEGRAPH DEVELOPMENT IN CANADA

The use and development of the telegraph for railway operations began as early as 1830. British North America consisted only of the Maritimes, Upper and Lower Canadas and the huge Hudson's Bay Company territory to the Pacific Ocean, before mention of made about telegraph communication. A telegraph-railway system had indeed been suggested in the 1830s, but nothing developed beyond an idea. It was not built until 1852, when the Grand Trunk Railway (GTR) was given the authority to build a telegraph line beside their Montreal-Toronto tracks. It is interesting to note the logo of the Montreal Telegraph Company - formed in August 1847, by Hugh Allen of 'Pacific Scandal' fame - boasting on a telegram dated October 24, 1853, "Connecting with all principle cities and towns in Canada and the United States."[9] By 1856, the telegraph was being used for Grand Trunk Railways operations, albeit on a small scale.

The next earliest instance of a railway telegraph appears about 1858. The North-West Transportation, Navigation and Railway Company was incorporated with "...powers to establish communication from one or more points on the shore of Lake Superior to any point in the interior `within the limits of Canada.'"[10] One year later the Act was amended and their name changed to the North-West Company, with the addition "...to construct a telegraph line. The Act expired through non-use."[11] In 1862, the North-West Company was again authorized to, "...establish communications `within the Northern and Western limits of Canada.'"[12]

In the early 1860s, The Grand Trunk Railway showed a keen interest in building a railway and telegraph line to the Pacific. The GTR wished to own a swath of land for their rails and poles to the Pacific, through Hudson's Bay Company's Rupert's Land. But it was not to be that simple. The Hudson's Bay Company (HBC) was well aware of world attitudes. Coupled with US expansionism and a Civil War, the HBC knew part of their land would eventually have to be given up. The HBC stated in the 1850s, it might consider parting with some of their land as long as the GTR met certain sale conditions. The Hudson's Bay and GTR maintained strong and influential positions, and both companies were not about to surrender their rights and demands. Both companies too, had English benefactors and origins. The HBC did begin to "...spar with the British and Canadian governments over legal investigations of its Charter, and on the other [hand] to await [its best] offer."[13]



All Communications strictly confidential.

TARIFF OF PRICES.

From QUEBEC to	NUMBER OF WORDS. 10	20	30	40	50	60	70	80	90	100
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Three Rivers,	1 3	2 6	3 9	5 0	6 3	7 6	8 9	10 0	11 3	12 6
Montreal,	1 10½	3 9	5 7½	7 6	9 4½	11 3	13 1½	15 0	16 10½	18 9
Prescott, Brockville, ...	2 6	5 0	7 6	10 0	12 6	15 0	17 6	20 0	22 6	25 0
Kingston, Belleville, Cobourg, Port Hope, ...	3 9	7 6	11 3	15 0	18 9	22 6	26 3	30 0	33 9	37 6
Toronto, Hamilton, ...	4 6	9 0	13 6	18 0	22 6	27 0	31 6	36 0	40 6	45 0
Buffalo, ...	6 3	12 6	18 9	25 0	31 3	37 6	43 9	50 0	56 3	62 6

Communications to be prepaid. And the Company not responsible for the inaccuracies of the Operators.

Office at the Exchange,

QUEBEC, Oct 25 1847.

Via Telegraph from Montreal

To Messrs Peters dill Stibbolt & Co

Can you get any deals or sleepers for Liverpool for the "Safe Guard"? What freight would be paid? Reply.

Mac Tavish Bostwick & Co

A 5/9

A very early Canadian Telegram. Sent from Montreal to Quebec City on October 25, 1847, it inquires about the availability of wooden railway sleepers for shipment to England.

Collection of Fred Angus.

Several interesting developments began in earnest for a railway and telegraph route west in the 1860s. Edward Watkin, (born September 26, 1819, died April 13, 1901) a former manager of the Manchester, Sheffield and Lincolnshire Railway, was hired by Glynn, Mills and Baring Brothers Company to see if the financial trouble of the GTR could be solved - he also is on record for stating that the Grand Trunk was an "organized mess - the sink of iniquity." It was Watkin who initially suggested building a joint railway and telegraph line to the Pacific through Canada. To him, this was in the best interests of the Grand Trunk. Watkin was also aware that the Canadian and English governments would not invest any finances to colonize the west. Watkin turned to the

private sector of British financiers and industrialists who were anxious to support a joint railway-telegraph system.

Watkin and the Duke of Newcastle (the Colonial Secretary), began a series of meetings in 1862. They developed a plan to acquire Rupert's Land from the Hudson's Bay Company. Watkin wanted to save the GTR, while Newcastle needed to gain political stability and security with a single, united and unified colony named Canada. Their goals, attitudes and dreams were fuelled by troubles south of the border - an all-Canadian railway and telegraph system would conveniently establish a strong communication link and barrier, albeit non-military as such, from the Atlantic to the Pacific Oceans. Watkin was intuitive enough to know the Canadian government had to take immediate action with the HBC, as American soldiers were starting to turn north and settle in British Columbia and the Prairies. Watkin took his plans to Glynn and Baring Brothers at the Colonial Office. As a result he was given the authority to establish the Atlantic and Pacific Transit and Telegraph Company. This company was charged with bridging the 3000 or so miles between Upper and Lower Canada, the Maritimes through to the Pacific.

The Hudson's Bay land had to be acquired. Watkin's Transit and Telegraph Company requested a stretch of land ten miles wide across Rupert's Land. This width would provide for a roadway first, later a railway and telegraph right-of-way, with room for expansion of facilities. Newcastle forwarded a letter in July 1862 to Beren, the HBC Governor. Newcastle outlined that he would provide "...telegraph service and of securing the means of travelling with regularity to the British territory on the Pacific."[14] Beren agreed to do this so long as adequate securities were given for the lines completion. More letters were exchanged, each time the ante being upped in favour of the other party. Finally, on June 15, 1863, an agreement of 1,500,000 pounds sterling was paid to the Hudson's bay for Rupert's Land. On July 6, 1863, Watkin went west to establish his plans.

CANADIAN PACIFIC RAILWAY COMPANY

COMMUNICATIONS DEPARTMENT

MORSE CODE

ALPHABET

Letters	Morse	Letters	Morse
A	•—	N	—•
B	—•••	O	•••
C	—•—•	P	•——•
D	—••	Q	••—•
E	•	R	•—•
F	••—•	S	•••
G	——•	T	—
H	••••	U	••—
I	••	V	•••—
J	•———	W	•——
K	—•—	X	—••—
L	•—••	Y	—•——
M	——	Z	——••

NUMERALS

Figures	Morse
1	•————
2	••———
3	•••——
4	••••—
5	•••••
6	—••••
7	——•••
8	———••
9	————•
0	—————

.	Period		•—•—•—	£	Pounds	LX
:	Colon	KO	—•—••••	/	Shillings	UT
:-	Colon Dash	KX	—•—•—••	d	Pence	D
:"	Colon Quotation	KQ	—•—••—•		Capital Letter	CX
;	Semicolon	SI	•—•—•—		Small Letter	I5
,	Comma		——••——		Decimal Point	DOT
?	Interrogation		••——••	%	Per cent	OSO
!	Exclamation		——•——	¶	Paragraph	
–	Fraction Line	E	•		Not Code	E5
/	" "	UT	••—•—		Underline	UX
—	Dash	DX	—••—••		Underline (End)	UJ
=	Double Dash	BK	—•••—•—	(	Parenthesis (Start)	PN
-	Hyphen	HX	—••••—••	)	Parenthesis (End)	PY
'	Apostrophe	QX	•——••—••	[ ]	Brackets	BX
$	Dollars	SX	•••—••—	"	Quotation (Start)	QN
¢	Cents	C	—•—•	"	Quotation (End)	QJ

Repeat when sending	DN	Break or stop sending	BK
I understand	13	Finish (No more)	30
Message to all offices	23	Regards	73
I am busy	25		

Morse code made it easier to receive and transmit quickly. Railway Morse, also called American Morse, is not to be confused with international Morse. Railway Morse differs in that some letters contain spaces in the dot-dash series - see letters Q, R, Y and Z. The dot represented the closed key; the dash requires the key to be held down, generally for the time of two dots.

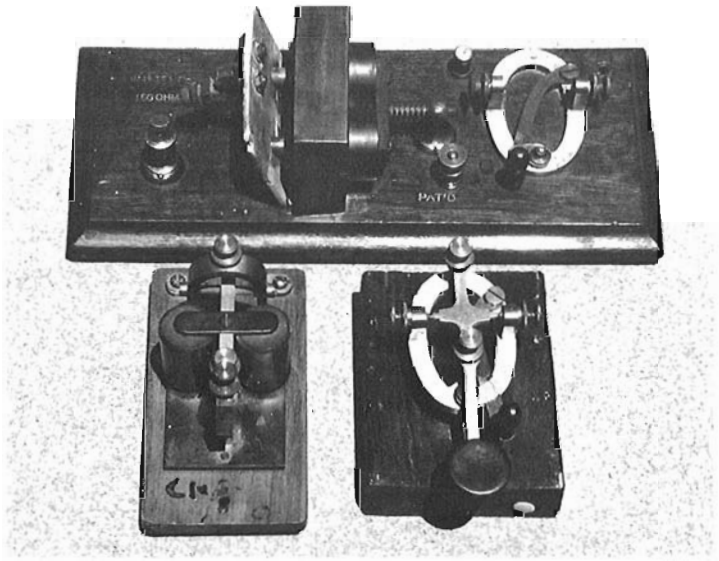
Source: W.J. "Jack" Corbett.

Under the proposal, Watkin saw a cart-path made first. Then, the telegraph line would follow alongside the route of a future railway right-of-way. Next, building settlements as were needed. He estimated that these settlements would reach the Fraser River in about 13 years after which the path would be replaced by a railway, but not until the population out west had grown to warrant its need. Watkin had also "...drawn up...the establishment of telegraphic communications between the Atlantic and the Pacific through agreements with the Montreal Telegraph Company and the United States Telegraph companies and the construction of a line from Pembina to Fort Gary to Jasper House and Fort Langley."[15] In a letter dated February 18, 1864, the HBC pointed out that they would not be "...likely to receive benefits corresponding to the cost of constructing a line of telegraph...unless `the Atlantic and Pacific Transit and Telegraph Company' are prepared to undertake the construction of a road, pari passu [with equal pace], with the telegraph line, the committee cannot...recommend acceptance."[16]

To appease the HBC, Dr. John Rae (born September 30, 1813 died July 22, 1893) was put in charge of the survey crew for the westward route, in 1864. Rae was the perfect choice: he was a surgeon, an expert boatman, swimmer, climber, and, a Hudson's Bay employee at Moose Factory. His assigned objectives were to locate the telegraph route, and examine the possibilities of a road, water and rail route. In his concluding reports to the GTR and HBC, he noted no severe constructional difficulties from Fort Gary until the Yellowhead Pass in British Columbia. However, with Dr. Rae was an unnamed official of the GTR who reported favourably on the railway route, but from St. Cloud on the USA Mississippi River the to Fort Gary and west. It was this report, not Rae's, that was in direct violation of the "...avowed purpose of establishing communications on British soil."[17]

With this report, Watkin's work was completed. The carefully detailed surveys, maps and plans through Canadian land was

defeated. Ironically, the plan failed because of internal back-stabbing within the GTR. As a result, Watkin resigned in 1869 just as Confederation was about to include Assiniboia and British Columbia. The Grand Trunk lost the western opportunity just as they had lost other interests and routes in the East.



The Bunnel Key and Sounder used by my grandfather, uncle and mother out of the GTR / CNR Port Union station. The portable key set is Western Union. Stamped on the back is: "Prepared by H. Thau", on the front is "W.U. Tel. Co., 150 ohms". Line poles were used to connect with such portable telegraph sets. The wires at the bottom end of the line pole would be attached to the three (one missing here) brass posts at the top of the set. This style was used in private, superintendant or business cars, also by telegraphers sent to work at the scene of wrecks.

The saga of the telegraph changed as a result of the Canadian Pacific Railway and the Pacific Scandal. In 1874, Prime Minister John A. MacDonald was replaced by the newly elected Scot, Alexander MacKenzie. Among other proposals, MacKenzie and his government wished to utilize water routes between the Rocky mountains and the eastern terminus on Georgian Bay. Known for his lack of action and interfering ways, he delayed this issue as long as he could. Incredibly, MacKenzie did allow for a telegraph line and its construction but only after the railway line had been determined.

On February 19, 1874, J.D. Edgar was instructed by the Canadian Government to go to British Columbia and obtain an agreement, highlighting "...the construction of the road within the time set was an impossibility, and...[to] make at once a wagon road and line of telegraph along the whole length of the railway in British Columbia and continue the telegraph across the continent."[18] These terms were removed on June 8, 1874 as the government said there was no way it could maintain the time limit British Columbia demanded. On July 23, 1874, the B.C. representative, Mr. Walkem replied to the Government: "...even a telegraph proposed would not be made until the route of the railway is settled,..."[19] Later, on September 17, 1874, the Canadian Government answered. By this time the basic agreement had been reached, with Earl Craven appointed as arbitrator. Part of his findings included "...a telegraph line [be] postponed until the road was located."[20]

As the government changed back to MacDonald, it was becoming more essential to have faster communication linking one area to another. Railway connections were a paramount need because of their speed and hauling capacity. Water routes and/or wagons could not compete. To improve areas of communication, four contracts can be cited. The initial western connections were primarily from the Red River to western Canada. Canada, Quebec and the Maritimes could use the telegraph connections between Toronto and Montreal and into the United States. The awarded contracts were:

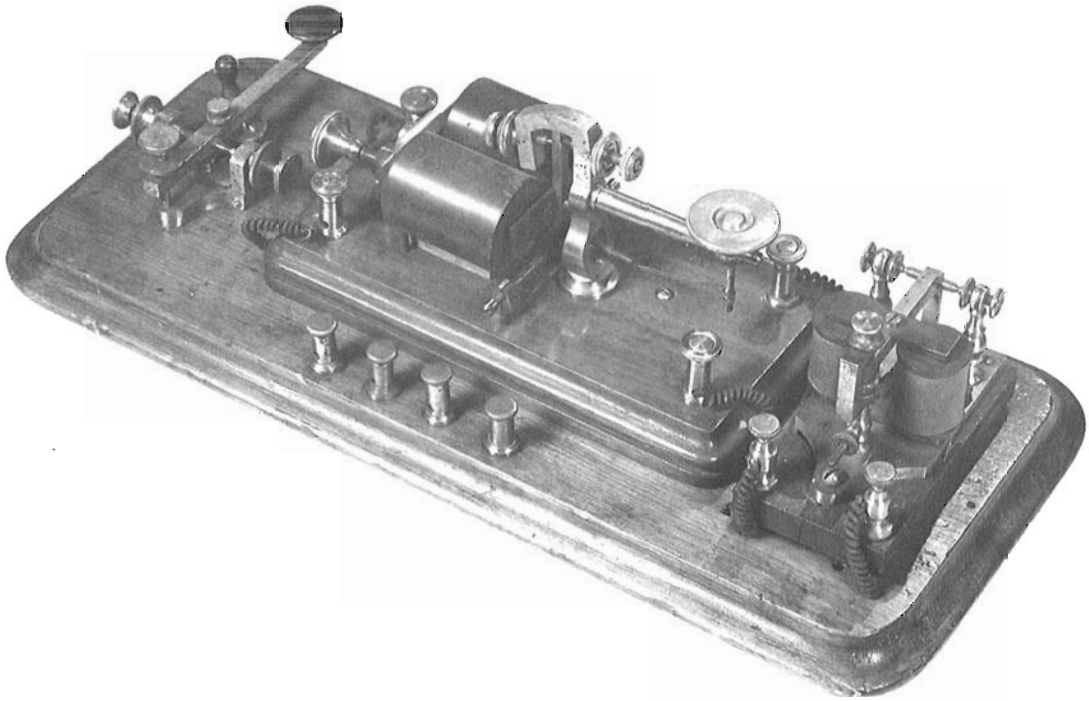
Contract 1 - October 17, 1874
Contractor: Sifton, Glass and Fleming
Area: Fort Garry to Fort Pelly.

Contract 2 - October 30, 1874
Contractor: Richard Filles
Area: Fort Pelly to Fort Edmonton.

Contract 3 - November 10, 1874
Contractor: F.J. Barnard
Area:Fort Edmonton to Cache Creek.

Contract 4 - February 9, 1875
Contractor: Oliver, Davidson and Brown
Area: Prince Arthur's Landing to Red River.[21]

The Canadian Pacific Railway (CPR) was determined to ensure railway passage to the west. An increase in CPR passenger and freight traffic, deemed it vital that there be an augmentation of railway freight and passenger cars, facilities like stations, divisional points and telegraphic communication centres linking everything together - a line of transportation and communication, co-existing along the same ideal right-of-way. By 1882, the CPR had 181 miles of one-wire telegraph lines and another 714.5 miles of two-wire lines.[22] In 1885, the CPR was "...turning a profit of $145,000 worth of dots and dashes, thanks mainly to Louis Riel and the newspaper correspondents covering his North West Rebellion."[23] Special telegraph units were used to co-ordinate the movement of the military, supplies and trains. One telegrapher was killed, another held prisoner until the Rebellion ended. At the same time, as the towns developed and grew alongside the tracks, the significance of a wider network of telegraphic communication to important towns and cities between Quebec and Ontario began in earnest in 1886. The Postal Telegraph Company, the Baltimore and Ohio Company and the Canadian Pacific Telegraph Company lines were being connected to provide almost complete North American service. The telegraph lines from Montreal also started to follow beside the Ontario and Quebec Railway (CPR) right-of-way, linking Montreal with Smiths Falls, Peterborough, Toronto. Other wires were strung along the Credit Valley Railway (CPR). By 1886, the CPR telegraph system far exceeded what the Grand Trunk used. Interestingly, the CPR with the Postal Telegraph Company constructed a telegraph line from Vancouver, B.C. to San Francisco and completed another connection to the Commercial and French Atlantic Cable Company for across Atlantic Ocean service. From this point on, the railway and telegraph were synonymous.

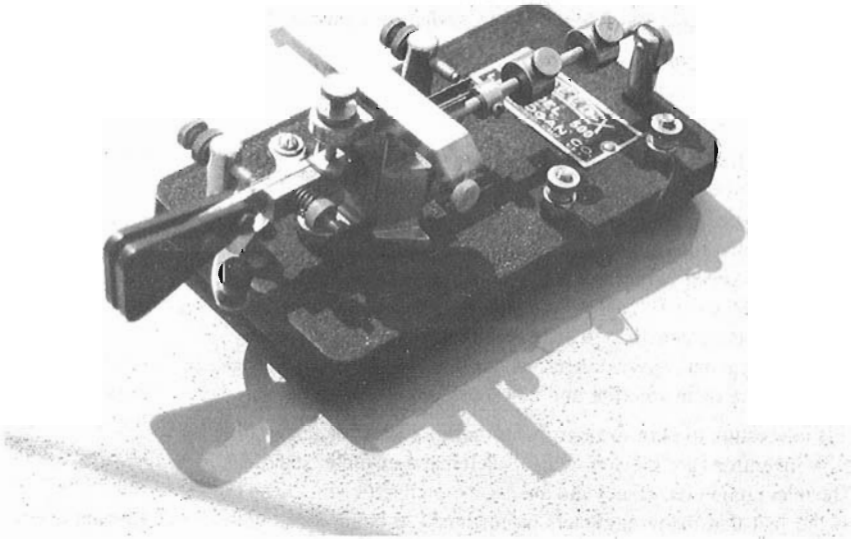


Another example of a portable telegraph unit, but from the Great North Western Telegraph Company, circa 1890.
Source: CNR Archives, Monteral, Photo No. 46394.

III. RAILWAY TELEGRAPH USE

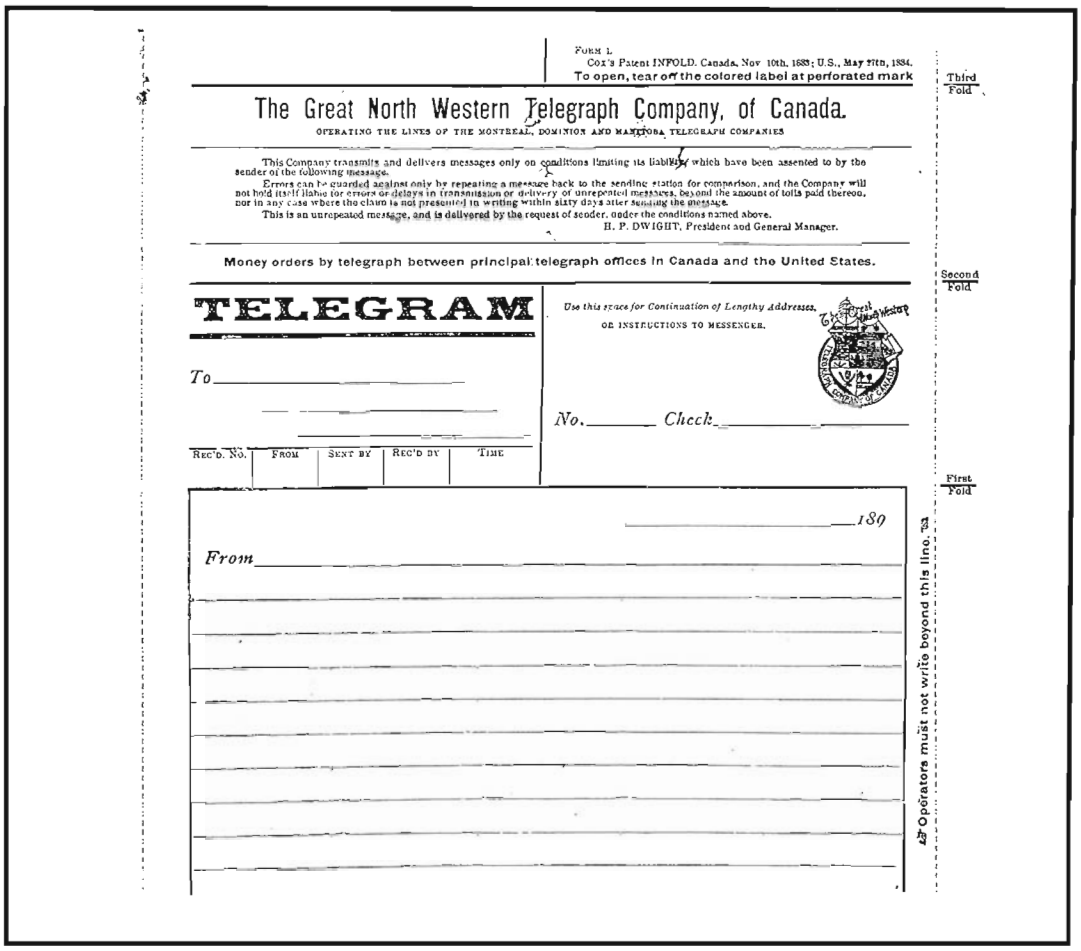
When Morse invented his Code in 1838, there was no pressing need for this faster form of communication in Canada. Verbal orders were committed to memory with specific problem spots noted on paper. Trains moved by unreliable watches, preset timetables which spanned many different time zones, unspecified rules of operation, and, luck. Signal communication was minimal, using only hands and arms, flags, and a ball on a pole - when high, the track was clear hence "highball", and when it was lower, stop or slowdown was represented. Trains no doubt waited for hours in-the-hole for an oncoming train. In many cases that oncoming train may not have kept to its schedule due to mechanical failure, track damage, fuel depleted, and so on. It is certain that only those operating the train knew exactly where they were on the run - no one else could know.

As the telegraph gained notoriety in Britain and the United States, communication between trains and people, railway safety and train operations became vital. More trains were running in 1850 Canada: it became increasingly difficult



Vibroflex telegraph key or "bug" developed after 1900 as a means to speed up transmission of orders and telegrams. It did not fully replace the Bunnell key/ sounder The "bug" was preferred by some as it operated sideways rather than the up-and-down motion of the wrist with the Bunnell key.

Source. George Horner.



FORM 1.
COX'S Patent INFOLD. Canada, Nov 10th, 1883; U.S., May 27th, 1884.
To open, tear off the colored label at perforated mark

Third Fold

The Great North Western Telegraph Company, of Canada.

OPERATING THE LINES OF THE MONTREAL, DOMINION AND MANITOBA TELEGRAPH COMPANIES

This Company transmits and delivers messages only on conditions limiting its liability which have been assented to by the sender of the following message.
Errors can be guarded against only by repeating a message back to the sending station for comparison, and the Company will not hold itself liable for errors or delays in transmission or delivery of unrepeated messages, beyond the amount of tolls paid thereon, nor in any case where the claim is not presented in writing within sixty days after sending the message.
This is an unrepeated message, and is delivered by the request of sender, under the conditions named above.
H. P. DWIGHT, President and General Manager.

Money orders by telegraph between principal telegraph offices in Canada and the United States.

Second Fold

TELEGRAM

Use this space for Continuation of Lengthy Addresses, OR INSTRUCTIONS TO MESSENGER.

To _____

No. _____ Check _____

REC'D. NO.	FROM	SENT BY	REC'D BY	TIME

First Fold

_____ 189

From _____

Operators must not write beyond this line.

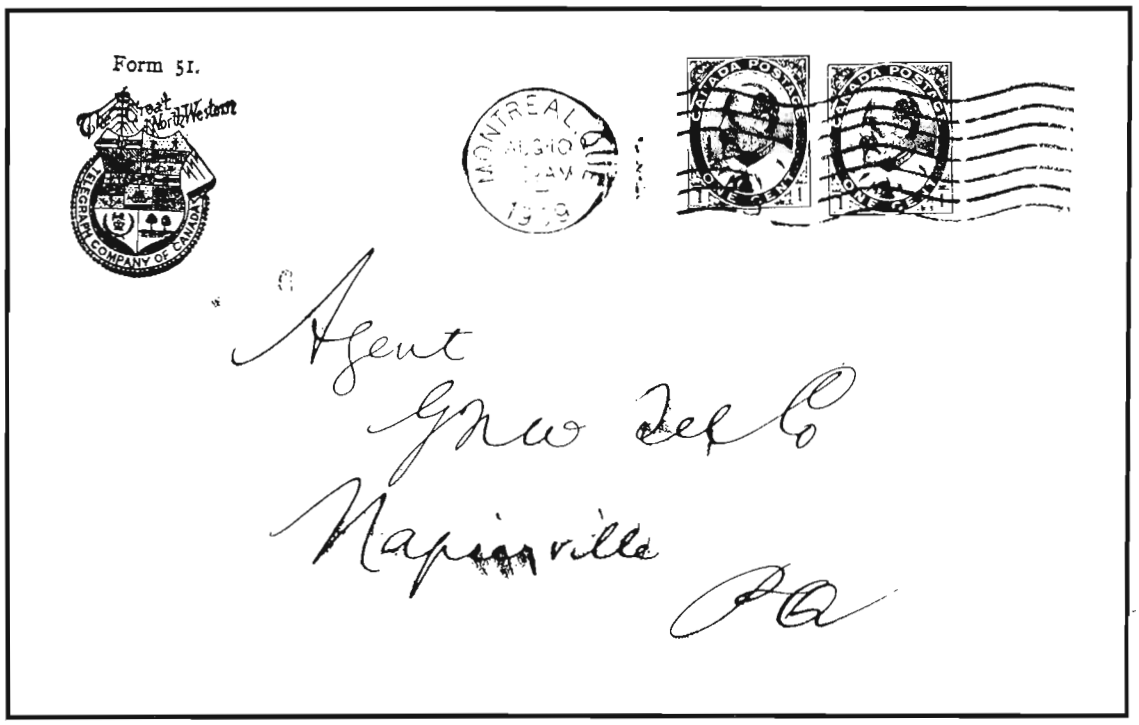
A telegram of the Great North Western Telegraph Company of Canada sent to Saint John, New Brunswick on August 2, 1899. The telegram was intended to be folded as shown and then addressed on the outside before delivery.

Collection of Fred Angus.

to operate efficiently and safely. Along the Grand Trunk Railway between Toronto and Montreal in the late 1860s, trains began operating with telegraph assistance. Train movements were done by a dispatcher through his operator(s) who contacted the required station(s) via telegraph. To compound operating problems between Canada and the USA "...some railways insisted on their own code for little better reason than to insure their singularity."[24] Typically, Canada took about 25 years longer, around 1890, before a standardized railway code of instruction and communication was accepted.

It is interesting to note some early attitudes towards the telegraph. New inventions are greeted with suspicion and misunderstanding. The telegraph in its infancy did not escape such criticism. "In spite of the fact that many engineers, accustomed to being loose with their trains, looked on the telegraph with disdain, this great forward step toward safety in train operations played a major role until superseded when block system of train control came into use about 1880."[25] William Cooke in 1837 stated, "...with a telegraph the manager in his office at Paddington could live like a spider along the line...,"[26] keeping track of his train crews. Cooke and Wheatstone felt watching the employees was a positive aspect of the telegraph system, but the Great Western Railway objected as it implied their company was slovenly, therefore GWR would not construct the telegraph line, leaving it to the inventors to foot the bill. Apparently, too, if one dreamed of being seen in a telegraph office, it foretold of unfortunate love affairs and failed marriages. Worse, if one was hapless enough to be the telegraph operator sending the bad news, he would be subject to and affected by the gossip that followed. Further, "In early days, it was customary for the towns people to gather about the [telegraph] office to secure any news coming over the wire. In fact, if there were items of importance, a bulletin would be displayed outside."[27]

Canada seems to follow rather than lead - so true for the telegraph. In England and the USA, the telegraph of 1844 was also commercial. The first recorded non-railway use for a telegraph message occurred when Queen Victoria gave birth to Prince Alfred. In England, it was an hourly ritual to send out the time according to Greenwich Mean Time. This was somewhat true in Canada, but at first it was officially for railway use only. The Canadian Time Signal



An envelope addressed to the Agent at Napierville Quebec on August 10, 1909. Note the complex logo of the Great North Western Telegraph Company. Although the contents of the envelope have disappeared, it was likely an important message. As per Rule 321 of the GTR operating Rules, "Telegrams addressed to officials must be put in an envelope, sealed and properly addressed in each and every case. The contents of all telegrams must be held as confidential". The GNWT Company was taken over by CNR Telegraphs.

Collection of the author.

originated from McGill University, Montreal. Later the signal was transmitted from the Dominion Observatory in Ottawa, however, the working train timetables reflected the signal from Montreal. It was also sent along railway circuits, not the commercial ones. The Montreal Telegraph Company, was the first Canadian commercial company, formed in 1847. By 1890, telegraph poles and wire construction went hand-in-hand with railway lines. In point of fact, by 1896, "...the electric telegraph [had] become a necessity to our political, commercial and social life. It tells...of the million incidents that make up our national life."[28] With the CPR expanding their commercial business, the system had its faults. It was known to be unreliable when first installed. Typically: "As the line has been down since Saturday between Hays Lakes and here", read the December 6, 1880 issue of the Edmonton Bulletin newspaper, "we are without telegrams for this issue. A man will leave tomorrow to repair it, and by the next week we hope to be able to give that latest news from the East up to date."[29] As the Canadian railways expanded, train operations grew in the late 1880s. Messages of a personal nature were rarely sent along the wire. Early messages were primarily in the business of railroading: warning or calling for maintenance crews, order up extra trains, informing crews on the whereabouts of other trains. The telegraph also provided services to rural areas and small towns. In emergencies, station operators could be relied on for help, learn of eventful news, gossip (though unofficial) and send messages about important people or dangerous cargo. Because a telegraph message was faster than the mail, the railway station took an unofficial role as an information centre, as well as a place for rural gatherings, to learn of news or, wait for a train.

It is significant to note that stations were clearly distinguished by the presence or lack of a telegraph. Smaller stations had only a station agent at the key - smaller stations maybe no one at all. A station however, was elevated in status if it had its own telegraph operator who was kept separate from the station master and/or agent. the operator often received the priveledged location in the tower where he could closely eye the tracks, and, community. In the 1880s, a commercial telegraph company tried to acquire rights beside the CPR tracks. Van Horne felt the price the company offered was not enough to warrant joint use of the railway telegraph lines and poles. He stated that, "...as the CPR was putting up its own lines and enjoying its own operators as an adjunct to train operations, it should rightfully operate its own commercial service. As a consequence, the CPR offices began commercial messages in 1883."[30] Later, with the increases in telegrams two messages could be sent simultaneously, one in each direction over the same wire. One method was "Differential Duplex Circuit" using relays and allowing two operators to send messages over one wire; "Bridge Duplex Circuit" was similar to Differential, and Edison's Quadruplex Circuit which could handle four message transmissions.

Pole construction was essential for the telegraph. Stated earlier, Morse strung lines in tree branches and made temporary poles.

EXCLUSIVE CONNECTION WITH WESTERN UNION CABLE SERVICE

CANADIAN NATIONAL TELEGRAPHS

J. R. WHITE, GENERAL MANAGER
TORONTO

CLASS OF SERVICE DESIRED	
FULL RATE	
DAY LETTER	
NIGHT MESSAGE	
NIGHT LETTER	

PLACE X OPPOSITE SERVICE DESIRED

CHECK | RECEIVERS NO. | TIME FILED | CHARGE TO DEPT. OR ADDRESS

Send the following message, subject to the terms on back hereof, which are hereby agreed to
(PLEASE PRINT NAME AND ADDRESS)

19

Form 1204 Can.

CLASS OF SERVICE
This is a full-rate Telegram or Cablegram unless its character is indicated by a symbol in the check or in the address.

WESTERN UNION

NEWCOMB CARLTON, PRESIDENT — J. C. WILLEVER, FIRST VICE-PRESIDENT

SYMBOLS	
BLUE	Day Letter
NITE	Night Message
NL	Night Letter
LCO	Deferred
CLT	Cable Letter
WLT	Week End Letter

The filing time as shown in the date line on full-rate telegrams and day letters, and the time of receipt at destination as shown on all messages, is STANDARD TIME.

25JB H 42 BLEU

AMHERST NS 527P JUN 7 1927

HILL BROS

STSTEPHEN NB

VICTORY NINE FIFTEEN COTTON PRAIRIE BLOSSOM EIGHT EIGHTY FIVE COTTON BRAN THIRTY SIX SHORTS THIRTY EIGHT MIDDLINGS FORTY FIVE DAISY OATS EIGHTY FOUR WIRE ME ORDER AT ONCE TO MONCTON NB CRACKED CORN TWO THIRTY FEED CORNMEAL TWO THIRTY MARKET VERY STRONG

T N KIRBY

603P

Book ... Fifty bbls Victory Hundred Corn bal Feeds etc will specify
Hill Bros

CANADIAN PACIFIC TELEGRAPHS

MONEY TRANSFERRED BY TELEGRAPH

DIRECT CONNECTION WITH
POSTAL TELEGRAPH - CABLE CO.
COMMERCIAL CABLES - - IMPERIAL CABLES

C.D. 1M
This is a full-rate Telegram or Cablegram unless otherwise indicated by signal in the check or in the address.

TELEGRAM		CABLEGRAM	
FULL RATE		FULL RATE	
DAY LETTER	DL	CODE	CDE
NIGHT LETTER	NL	DEFERRED	LC
NIGHT TELEGRAM	NM	NIGHT CABLE LETTER	NLT

W. D. NEIL, GENERAL MANAGER OF COMMUNICATIONS, MONTREAL.

STANDARD TIME

2S3 S 17 RUSH XU

HALIFAX NS SEPT 28 1936 543p

CANADIAN PACIFIC RAILWAY COMPANY'S TELEGRAPH

FORM T.D. 1 M

TELEGRAM

All Messages are received by this Company for transmission, subject to the terms and conditions printed on their Blank Form No. 2, which terms and conditions have been agreed to by the sender of the following message. This is an unrepeated message, and is delivered by request of the sender under these conditions.

J. McMILLAN, General Manager of Telegraphs, Montreal.

I3S R 20

FR NEWYORK NY JAN I3TH I926

EROY T HILL

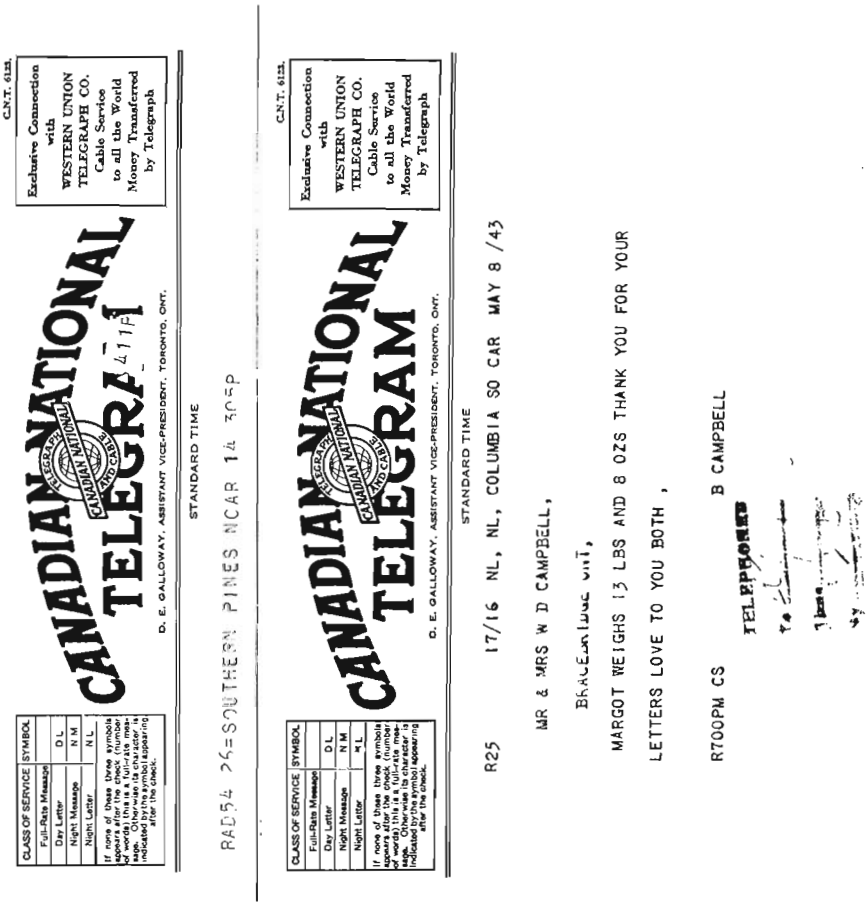
CARE HILL BROS STSTEPHEN NB

RANSYLVANIA BERTH ONE F FORTY THREE AT SIX HUNDRED DOLLARS AVAILABLE TELEGRAPH COLLECT IF POSITIVELY WANTED REMITTING PAYMENT IN FULL

FRANK C CLARK

5P

... One F Forty ... mailing check



A SELECTION OF TELEGRAPH FORMS FROM THE COLLECTION OF THE AUTHOR.

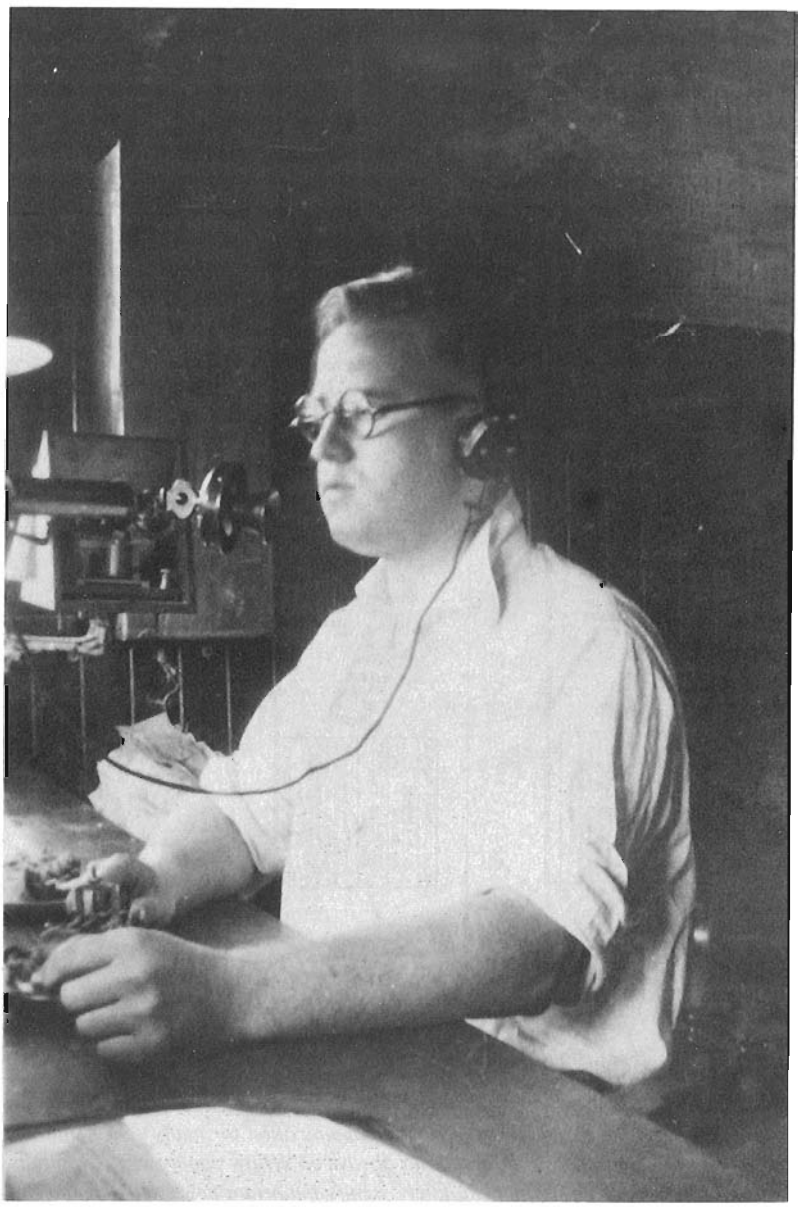
The telegram was the major means of fast communication for many years, until long-distance telephone became economical for general use. The telegram, usually but not always on yellow paper, was a familiar sight to people all across North America. The receipt of a telegram would immediatelely signify important news, either good or bad, and these illustrations of telegram forms should bring back memories of those now vanished days.

PAGE 192, TOP: Two CPR logos, ten years apart (1926 and 1936). Both messages were typewritten, with confirmation written on the telegram.

PAGE 192, BOTTOM: The upper telegram logo is a later CNR form on which the customer would fill in the message. The lower Western Union telegram has a 1927 message from Hill Brothers coffee in New Brunswick.

PAGE 193, ABOVE: Two CNR Telegraph Company logos from 1943. The top message was completed by the CNR teletype, while the lower message was done on a typewriter. Both the messages are from Bracebridge, Ontario.

The poles were crude and of poor quality: "...Geore [sic] B. Prescott [was] the leading telegraph engineer of the time. The lines were usually built in haste, the posts generally set while filled with sap, often without taking off the bark. As a consequence, in a few years, they rotted off at the surface of the earth, and then had to be replaced by others in the same manner."[31] This method of pole construction lasted 15 to 20 years. Later dried poles were used, often treated with creosote, painted or heavily coated in fat or oil. Poles too, were placed about 13 feet from the nearest track with crossarms no more than eight feet from the nearest rail. The wires would parallel the tracks and contour of the land, maintaining uniformity of height. Pole tops were either "roofed" or "gained" [32]. The pole's horizontal crossarm, was made to hold the weight of the wires. On the crossarm the first circuit was always the dispatcher's, then a message circuit followed by a block circuit for station to station and/or local business. A major railway might use from five to seven crossarms, heavy branches two or three, lighter branches one with ten pins and a short line might have one crossarm with six pins. The span between poles ran from 88 to 150 feet apart with 60 to 26 poles per mile respectively, though this was approximate. The average distance seems to be 100 feet apart with 53 poles per mile. Where possible, having wires cross over the tracks was to be avoided; when they did, it required about 18 feet or more of vertical clearance.



A family photograph of Spencer McCalpin in 1930 at Danforth (York) station, operating a "bug". Note the telephone equipment. George Homer notes that it was likely the yard office just east of the passenger station. George Horner and Spencer were lifelong friends, working together at Danforth, Toronto Terminals and Mimico Yard.

To summarize the development of the telegraph, John Pendleton, writing in Our Railways, 1896 edition, best states it:

"The telegraph, though it occasionally blunders. is the swiftest and most zealous of all railway servants. It gives word of warning to the signal man, a hint of danger to the driver, a peremptory instruction to the station-master in emergency; it speaks even to the shunter amid the maze of waggons, and to the platelayer busy with his gang on the creosoted sleepers and rusty rails in the lonely cutting. It marshals goods trains, stops expresses, orders special trains, helps every official on the line; and is helped in its turn by the telephone, which in many a crowded depot forwards and supplements the telegraph message."[33]

OPPOSITE PAGE: This composite photograph details various early pieces of telegraphic equipment used by the Grand Trunk Railway of Canada.

Source: CNR Archives, Montreal, Photo No. 47513,

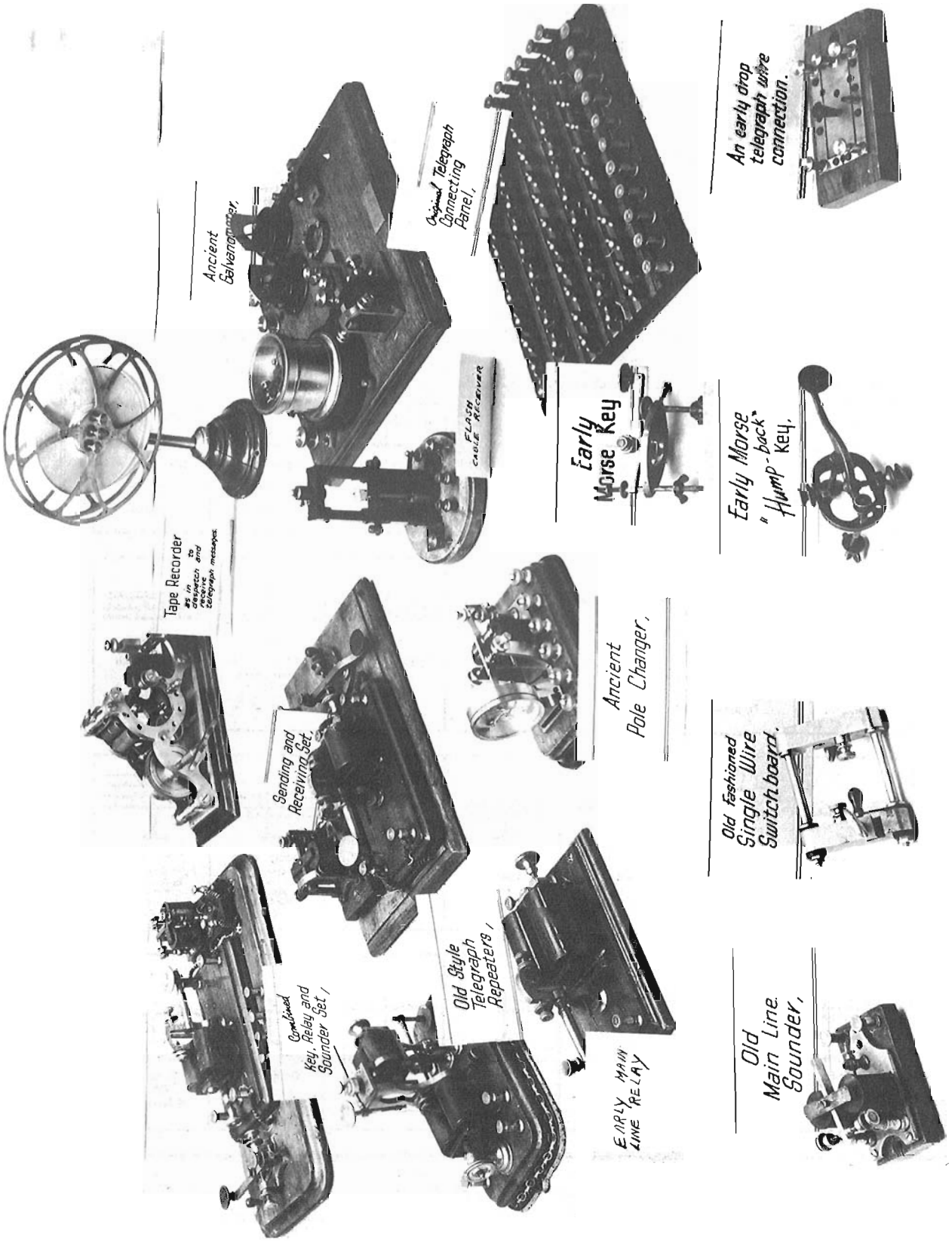
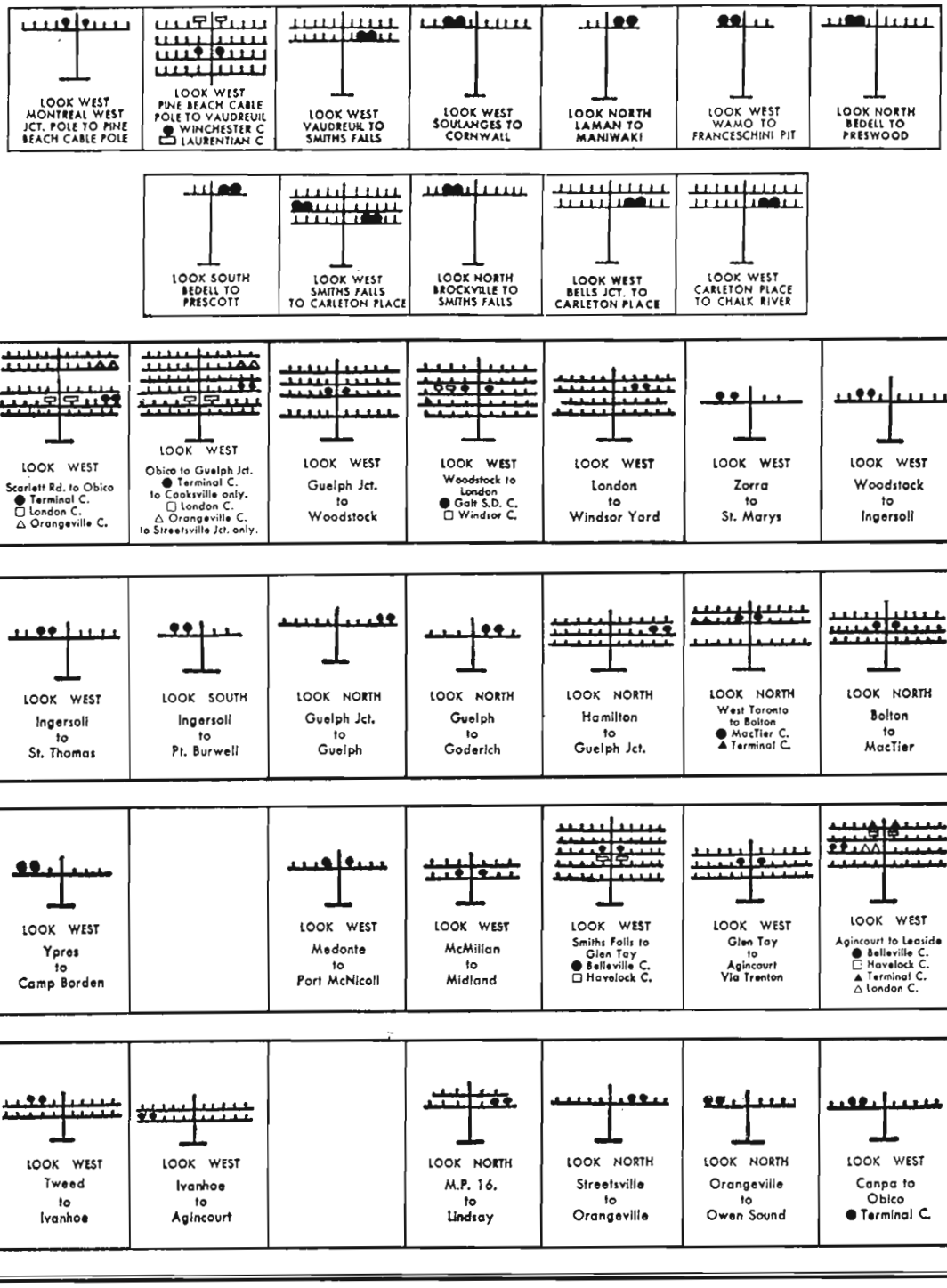

Tape Recorder
as in dispatch and receive telegraph messages
Ancient Galvanometer,
Original Telegraph Connecting Panel,
An early drop telegraph wire connection.
FLASH CABLE RECEIVER
Early Morse Key
Early Morse "Hump-back" Key.
Sending and Receiving Set.
Ancient Pole Changer,
Old fashioned Single Wire Switch board.
Combined Key, Relay and Sounder Set /
Old Style Telegraph Repeaters /
EARLY MAIN LINE RELAY
Old Main Line Sounder,

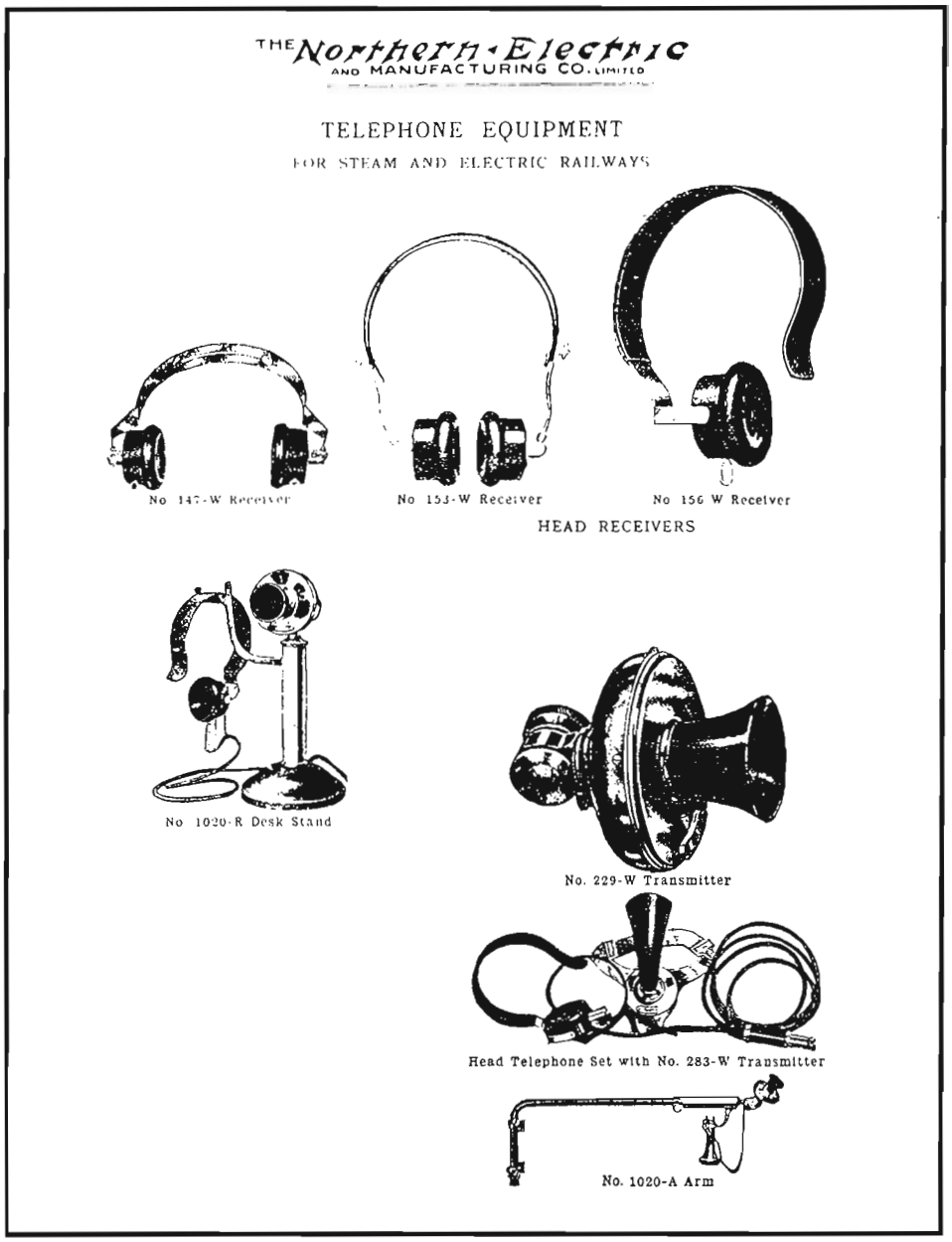
DIAGRAM SHOWING LOCATION OF TRAIN TELEPHONE WIRES—EASTERN REGION.
FACE IN DIRECTION NAMED, COUNT CROSSARMS FROM THE TOP, DOWN.



The symbols on the crossarms show where the dispatcher's lines are so one could connect the line pole and hook it up to the portable telegraph or telephone set. The blank spaces are areas which have been officially abandoned and likely poles, wire and tracks have been removed. Source: CP Rail Employee Timetable No. 43, October 26, 1969.

IV. RAILWAY TELEPHONE BACKGROUND

The previous study about the telegraph is essential in understanding the development of the railway telephone, as the telegraph and telephone went hand-in-hand for decades. The telephone was a Canadian invention, developed in Brantford, Ontario by Alexander Graham Bell, born in Scotland on March 3, 1847 (died: August 2, 1922). Bell always wanted to help those who could not speak and/or hear. Edison's invention of the Quadruplex Circuit - permitting the transmission of four messages on a single telegraph wire - led Bell into further experiments involving the voice. Morse had shown signals could be sent along a wire - Bell wanted to use the human voice. As a comparison, Morse made very little money from the telegraph due to lawsuits and the attitude of the United States government; Bell leased his invention and even sold stocks to companies and individuals, collecting a fee for the telephone's use. As Morse spent some ten years fighting lawsuits, Bell was in court over 600 times to fight patent infringements. Like Morse, Bell had to convince people that the telephone was a better way to communicate over distance. Once the telephone was functional, it operated better locally in towns and cities than long distance because of many technical problem,s yet to be solved. When it actually came to discussing phone service, the argument was: Why duplicate it when the telegraph was already present, efficient and sufficient.



Three common types of headsets used by GTR, CPR and CNR telephone operators. The desk stand phone, transmitter, headset and arm was typical dispatcher-operator phone equipment.. Source: Bell Canada, Montreal, Document No. 10304-1, 1913.

The telephone was recognized on March 10, 1876. When Bell first created this tool, it was originally known as the "harmonic telegraph," permitting a greater number of telegraph messages to be sent along one wire. Bell's original idea was to have numerous sending keys in the telegraph office, all connected to one circuit. His telegraph would use different frequencies of pitch when sending. The receiver at the opposite end of the signal, would decode this message and frequencies. However, as ingenious as the system was, it was unreliable; it did prove that several signals of differing pitch could be sent along one wire, including the human voice. The first voice message was "Mr. Watson, come hers: I want you.", however, this was only a one-way transmission within the same building.

The transition from the telegraph to the telephone was less politically motivated. There appears to be no governmental interference with establishing phone lines. This can be attributed to Bell transferring for $1.00, 75% interest in the telephone patent to his father, Alexander Melville Bell. A.M. Bell then employed agents to find subscribers for their own private telephone line. Dominion Telegraph Company also tried to secure a five year license with Bell at a $100,000 price tag. The Dominion Telegraph could not raise the money, as a result, Bell sold to the National Bell Telephone Company of Boston, in 1880, which later became A.T. & T.

V. RAILWAY TELEPHONE DEVELOPMENT AND USE

In 1909, W.E. Harkness, a Scales Engineer for the US Western Electric Company, made a presentation to the St. Louis Railway Club. Harkness expounded the use of the telephone over the telegraph. His presentation was lengthy, but many salient points were highlighted why the telephone exceeded the telegraph in functional use:

1) "...the enactment of state and federal laws limiting the working day of railroad employees...to nine hours.";

2) "...15,000 additional operators would be required" as there was a shortage of good telegraph operators. In order to hire this many men and women, it would cost the railways some $10 million (US) dollars to operate the railroad, and,

3) "Still another reason for the introduction of the telephone is the decreased efficiency of the average commercial and railway telegraph operator." Harkness believed telegraphers would seek out better opportunities in the electrical industry, or, have an'attitude' towards the younger student operator, fearing job loss especially if they were better.[34]

Harkness added that "...beyond a doubt [railway operations] can be rendered by telephone with equal safety, reliability, and accuracy, and further, with greater speed...".[35] He must certainly have found himself not only trying to sell the product, but trying to alter hardened telegraphic attitudes.

Many advantages existed for the phone. Some notions were contrived to sell the product to the biggest potential market at the time, the railways. Railway dispatchers were under "...both mental and physical strain, due to his efforts to keep things moving and prevent delays to traffic and the almost incessant operation of the telegraph key."[36] The dispatcher, using a key, had to translate, transmit, then re-translate code, letter-by-letter, then send it out himself or through an operator(s) to the right location. Mental work included manual and mental skills of a superior nature - also true for an operator. With long hours, errors were extremely possible. Disasters could ride on one incorrectly decoded or coded letter or number. Early arguments even went to the stress of unconsciously anticipating a message before it had been completed, and this appears to have been a common tendency. However, it was pointed out that the telephone provided direct vocal communication, resulting in faster efficiency and accuracy for operational needs, not to mention the implied safety factors. Like the telegraph, the telephone encodes messages electrically, but the phone can also take sound waves and their undulating waveforms and turn it into electrical waves and vibrations by using the diaphragm in the mouthpiece. A message over the phone is encoded instantaneously from transmission. The basic network comprises of a terminal device, a pair of copper wires connected to a local switching centre, trunk cables connecting switching or exchanges within a community.

Other components surfaced. The noise of the sounder was monotonous and tedious. As George Horner relates as a CNR operator out of Danforth Yard (also known as York), in Toronto, other distractions included the arrival and departure of all types of trains, whistles blasting outside the telegraph window signalling a crew member, the pounding of the 4100 series push engines in the Yard as well as people waiting and talking around you as one worked the key. Occasionally messages or orders would get scrambled. When the orders were repeated as required and an error was caught, it meant clarifying it again to ensure accuracy. Interestingly, Mr. Horner also related a unique telegraphic event: "While working in the railway telegraph office in Toronto, called "C" Office on a cold February night in 1942, I experienced a once in a lifetime phenomenon.

"The office was alive and very noisy as ten telegraphers sent and copied messages, all amplified with Prince Albert tobacco cans behind every sounder. Between 50 and 60 relays were also chatting away. Then it started to happen: one wire went dead, five minutes later another; three or four minutes passed and another wire went dead, and this continued on as if someone was outside with a wire cutter and was snipping the wires one by one. In one hour and thirty minutes, the office was completely silent, the time was 11:30 P.M. Ten operators sat talking to each other, unable to work.

"A phone call to the wire chief revealed the cause of the problem, which he had no control over - it was the aurora-borealis or more commonly called the `Northern Lights'. Although this problem frequently occurred in Northern Ontario, it was very unusual for it to have such a far reaching effect so as to cripple the entire communications network in southern Ontario too. Commencing about 2 a.m., the wires started to return to service and by 3 a.m., all wire were working normal."

Telegraph and telephone lines connected most stations. The telegraph and early telephone systems acted like a party line as all stations could hear messages being sent and received. An operator had to be on duty, literally, all the time as one in the early system never knew if a message was for this station or the next. The telephone provided an improved way for the dispatcher to reach an individual station or all stations using specific switching and selecting equipment. The telephone also provided a ringing tone, which was much preferred and did not irritate as the sounder apparently did. The telephone was more private in conversation, using a personal earpiece.

The telephone was far superior in speed. "The highest speed attained by an expert telegraph operator is around 50 words per minute while with the telephone a speed of 100 words a minute may be attained without the skill required by the average telegraph operator."[37] Direct vocal communication was almost instantaneous and more accurate. The telegraph involved mental memory work, decoding and encoding telegrams - the telephone required none. The skilled telegraph operator could transmit between 15 to 50 words per minute. This converts between 10 and 40 hertz or cycles per second. In essence, the telegraph operated at a low transmission frequency, sending digital signals - dots and dashes in on/off sequences of electricity, not unlike today's computers. The voice is an undulating analog signal which varies frequencies of pitches between 250 and 3400 cycles per second or hertz. Bell discovered that low frequency telegraph and higher frequency voice waves could be transmitted along the same single wire. As Bell developed his telephone, he further discovered the many messages could go along one wire at the same time, increasing the speed of communication.

The Hamilton and Dundas Street Railway was the first Canadian company to dispatch trains by telephone. This was first done in 1878, while this photograph dates from 1895. Note the engine in front, the steam whistle and stack ring on top, and the coupling device. The cars behind the engine are the original H & D passenger coaches. The location appears to be Dundas.

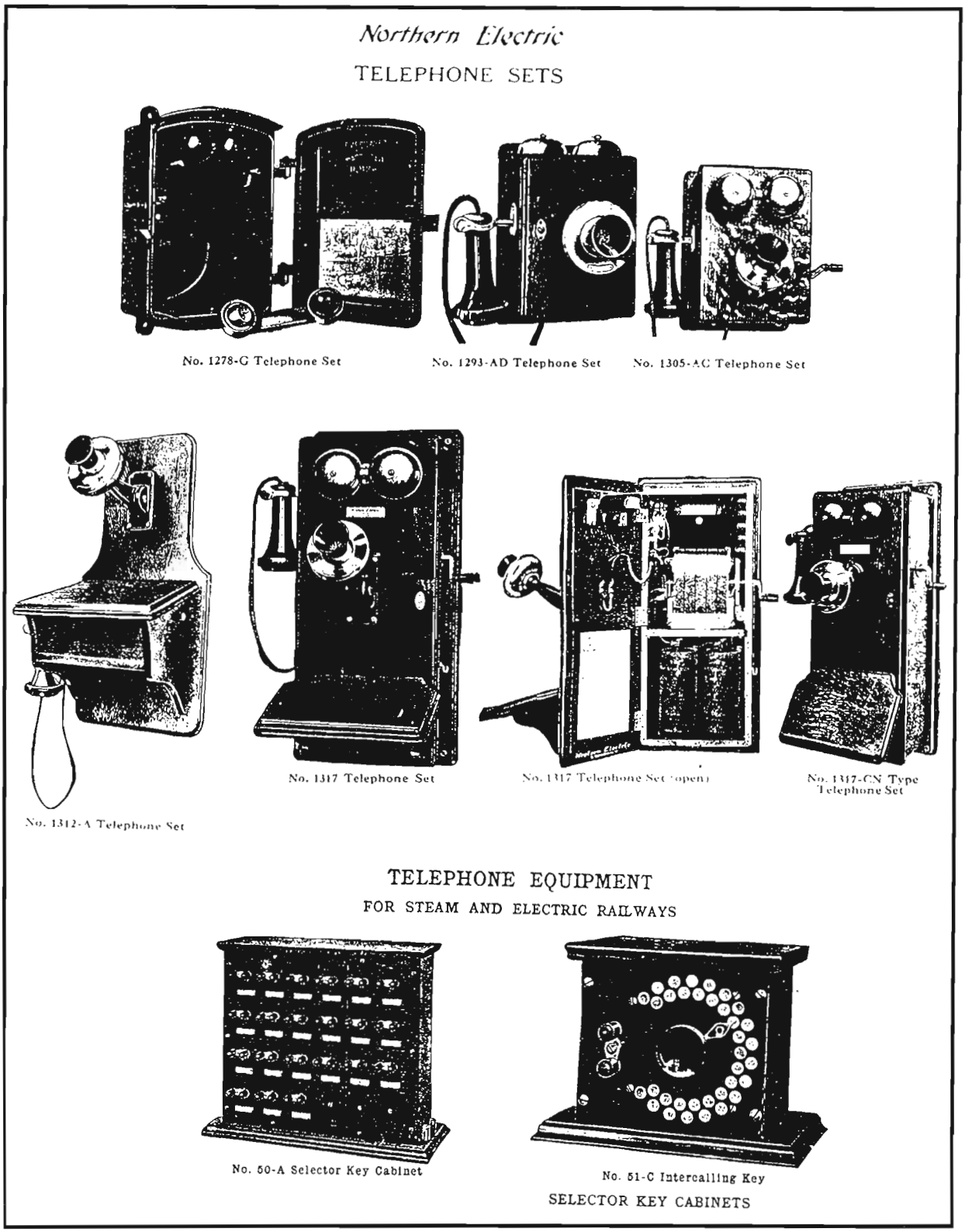
Source: Bell Canada, Montreal, photo No. 8534A.

The telephone did have disadvantages. In its infancy stage, not all voices could be transmitted. No scientific evidence was presented to explain this, but a concerted effort to have this problem resolved was suggested, if "...employees with suitable voices [were hired than] employees who could send good Morse."[38] Other alleged drawbacks included, a slowdown in transmission of the voice when the weather was cold. Also, telegraph operators were "...subject to paralysis of the arm due to continued use of certain muscles in the wrist when sending."[39] It was suggested that the telegrapher wrap his arm in a cold ice pack to relieve the pain.

Unique telephone attitudes developed. In using the telephone, "...people were made uneasy by the very notion. Hearing voices when there was no one there was looked upon as a manifestation of either mystical communication or insanity."[40] Some even considered the telephone a fad, others thought of it as a toy, while some used the familiar excuse that nothing practical would come of it. A more interesting pose considered it bad luck. People believed that if you receive a telephone call, it foretold of strange people who would cause you harm. Because of the technical problems with the early receiving equipment, it was once believed that shouting into the mouthpiece would assist the person on the other end to hear you better. Common too, was the belief that if you could not hear the caller, the receiving individual was threatened with gossip and even a failed marriage. By the 1880's, telephone companies began sending their customers notices. Their suggestions included: "Don't use the wire for clothes lines...Persons who eat onions must stand four feet from the transmitter...[and for those who felt the telephone was magical] No mistakes in grammar will be rectified in transmissions."[41]

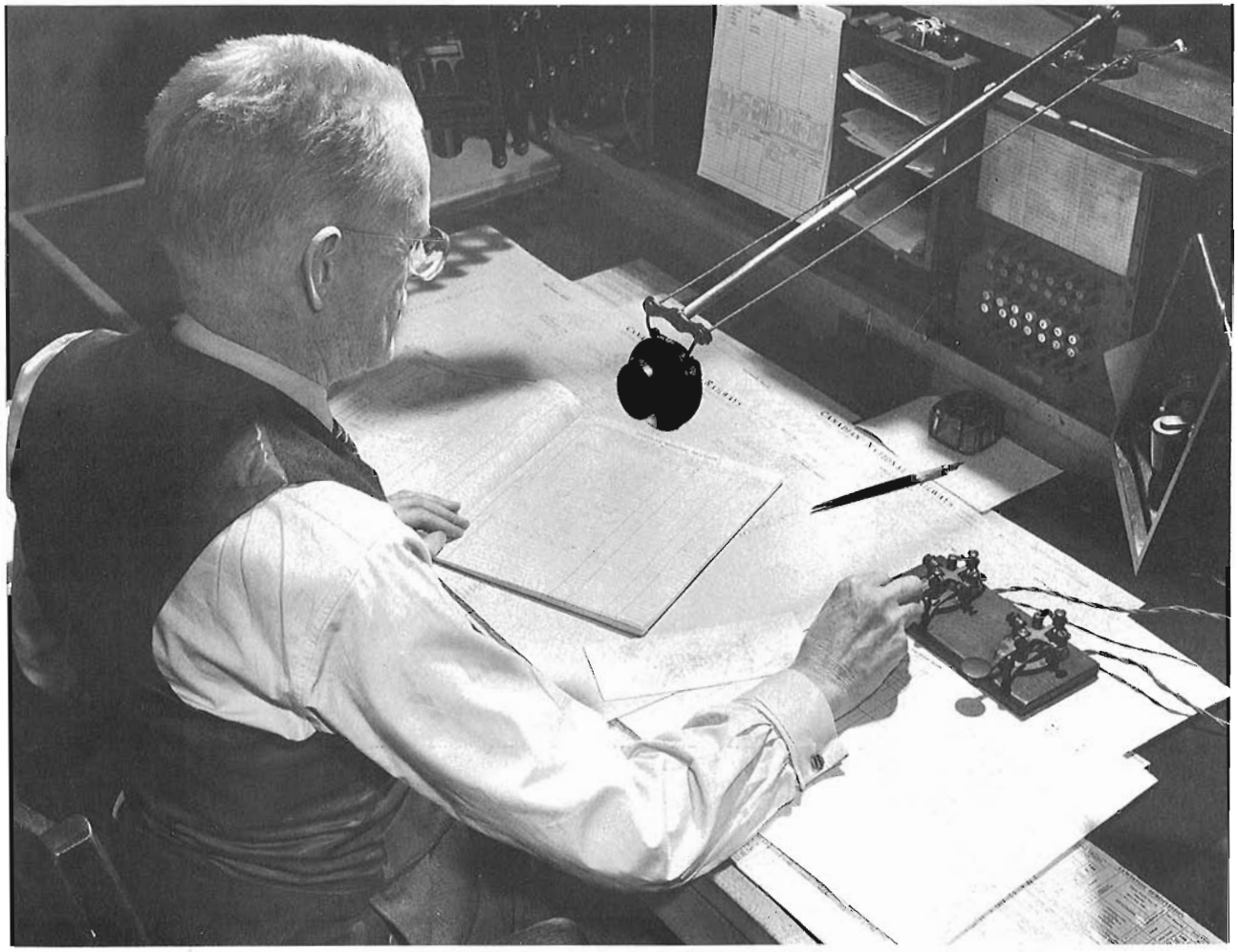
On August 10, 1876, Bell applied to the Dominion Telegraph Company (DTC) for permission to use their telegraph lines between Paris, Ontario and Brantford. Thomas Swinyard, the General Manager of the DTC, refused Bell permission. He believed Bell was a "crank."[42] Lewis B. McFarlane, Swinyard's assistant, persuaded his boss to at least try the experiment. After much consideration, permission was granted. The test was successful. The publicity from this experiment firmly planted the phone's future.

The first commercial long distance service was constructed along the railway line between Hamilton and Dundas, Ontario, in 1879. The Hamilton and Dundas (Street) Railway - incorporated in 1875-6 - was the first known railway to use the telephone for dispatching trains in Canada. In Hamilton by the end of 1878, 40 telephones were in the area. One line on the pole was reserved for commercial



TOP ROW: Wall telephone used about 1920. MIDDLE ROW: Wall telephones about 1920. Last one is CNR style BOTTOM ROW: Two styles of selecting equipment used by the dispatcher and/or operator to call individual or a block of stations.

Source: Bell Canada, Montreal, Document no. 10304-1, 1920.



This photo of a Montreal train dispatcher was taken about 1950. Note the solid telephone transmitter arm and dual telegraph key. The train sheets, train order book and the blotter are timeless now. Note the selector box with the buttons to call individual stations.

Source: CNR Archives, Montreal, Photo No. X32489.

subscribers, the other wire for the hamilton and Dundas dispatcher. It has been recorded, that the telephone users could listen to private and railway conversations. Hugh Baker, the president of the Hamilton District Telegraph Company appealed to Bell to test the circuits for himself and note the interference of the two systems operating on the same pole. Bell apparently did tests on this problem, however, party-line listening was a common occurrence.

It is significant to note, that the Ontario, Simcoe and (Lake) Huron (Union) Rail-road Company used a telephone. The OS and H was chartered in 1850, to operate trains between Toronto and Barrie. Its more familiar and lasting nickname was the Oats, Straw and Hay Railway because of its farming tonnages. The OS and H Railway reached Collingwood on June 2, 1855 and was apparently "..the best and most completely equipped railway in Canada, if not in all North America."[43] This railway provided the only link to western Canada in the late 1850s. MacKenzie, it will be recalled, wanted to develop a system of railway, water and river routes, but when he was replaced with the re-elected John A. MacDonald, the CPR started construction and MacKenzie's idea died. The Ontario, Simcoe and Huron Railway, later renamed the Northern Railway in 1858, had several historical firsts; which included operating the first steam locomotive in Upper Canada in October, 1852 named the "Lady Elgin". A more relevant first"...was perhaps its use [use of the telephone] earliest applications to trains."[44] These phones were placed between the locomotive and the van in 1880. With the telephone "...direct and personal communication with the conductor or engineer and in case of emergency to obtain firsthand conditions."[45] with the use of a phone.

Once the railways began using the telephone and saw its significant advantages, other factors affecting service developed. The railways and city subscribers discovered that the length of the phone line had a bearing on operability over greater distances. Signals were generally good for 75 to 100 miles but then it needed to be amplified or boosted to keep it moving. A co-related problem was

Glass telegraph and telephone insulators of the Great North Western Telegraph Company of Canada, the Grand Trunk Pacific Telegraph Company and the Bell Telephone Company of Canada.

the size and type of wire. It was finally resolved that copper wire, hard drawn to withstand the weather, was best when it was 210 pounds per mile. Copper wire would last fifty years whereas iron wire may only last 15 to 20 years before being replaced. Other common wire types used were galvanized iron and bronze. It was also discovered that two wires or a metallic circuit was best for signal receiving and transmitting. Telegraph wire tended to be rubber insulated and needed to be away from the phone lines because it "...reduces volume and affects articulation...[and]...lead-covered paper insulated telephone cable...should be used..."[46], because of its superiority.

As an aside, copper wire has caused other operational problems. The theft of 9-gauge copper telegraph-telephone wire is a problem since it fetches a significant price. During the Depression,telegraph wire by the mile was often stolen and sold. Constable Pat Stoneburgh, CP Rail Police investigations noted, that during a recession when people are hard pressed for money, the railway telegraph lines tend to get hit. Because of today's technology, the pole and lines are disappearing at an alarming rate, in favour of radio. But some areas are still being vandalized. Constable Stoneburgh added that as late as January 1991 in Cambridge, Ontario, thieves took approximately 20 pole lengths of copper wire along CP Rail's Galt Subdivision. The value of this wire today would be between $8,000 and $10,000. Most of the telegraph-phone lines along the railway use "open wire" or insulated bare wire in the construction process, making it easy to sell. Also, antique dealers and railway treasure hunters have been known to climb the poles and steal the glass insulators, especially those with railway and telephone initials of full company names, whether wires are present or not.

In June, 1934 the CNR Telegraph Company put this poster up in its stations. As Constable Stonburgh noted, thieves still take the insulators, or they are smashed by individuals. This often seriously disrupts important railway operations.

Source: 6218 Museum, Fort Erie, GTR Ridgeway Station.

The galvanic battery was finally created. Early telephone signal transmission and receiving was erratic. The battery helped to send a much stronger undulating current. Later, the Blue Bell Battery Company developed a dry cell battery which lived longer and was more trustworthy. For the railway telephone, it required ten battery cells - four assigned to talking and six for signalling. The batteries were mated in series for added power. Also they had to be "...placed near the set but out-of-the-way where it is unexposed to mechanical injury and dampness but accessible for inspection and renewals."[47] This design was true for the station and later the trackside telephones - also known as dispatcher line phones.

On October 28, 1909, the Montreal Herald newspaper, reported that the Canadian Pacific Railway was starting to use telephones to assist in train dispatching.[48] The clipping is interesting as it shows direct dispatching circuits used on the CPR. This actually began about 1907-8

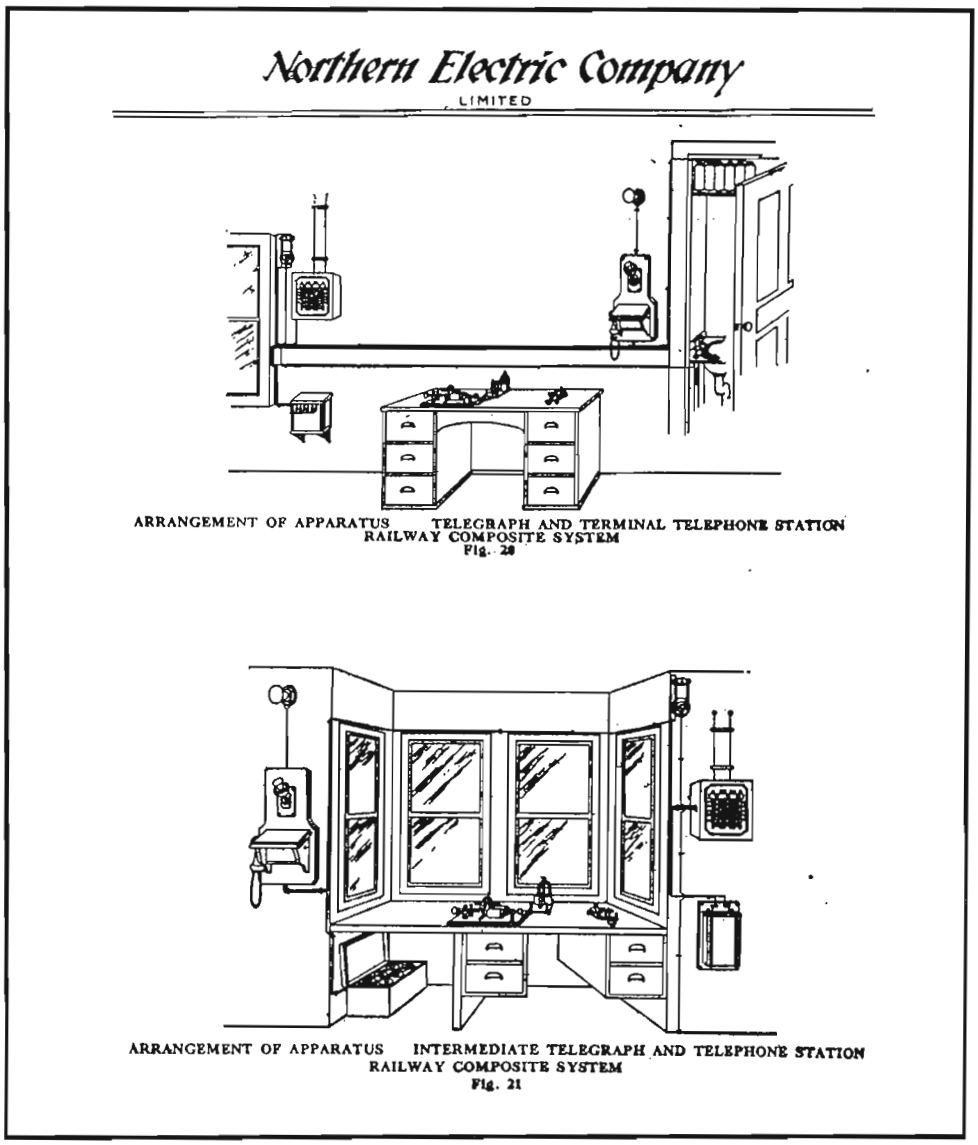
TRAIN DISPATCHING BY TELEPHONE

C.P.R. Now Operates All Trains Between Sudbury and Manitoba by That Method.

The Canadian Pacific has now completed the installation of the telephone to replace the telegraph in the dispatching and operation of trains, practically all the way from Sudbury, Ontario, to Brandon, Manitoba. This embraces practically the whole of the Lake Superior division, and as this part of the system, particularly that which lies along the north shore of Lake Superior, is a hard one to operate in winter, the substitution of the telephone for the telegraph shows the confidence of the managers and engineers in the greater efficacy of the telephone in the operation of trains. It is believed that the ultimate economic superiority of the telephone over the telegraph will be demonstrated.

The result of the gradual introduction of the telephone for despatching purposes has been eminently satisfactory, and it is now declared to be only a question of time before it is carried all the way from the Atlantic to the Pacific. Upwards of a thousand miles have, it is stated, already been installed.

From Montreal Herald, October 28, 1909.



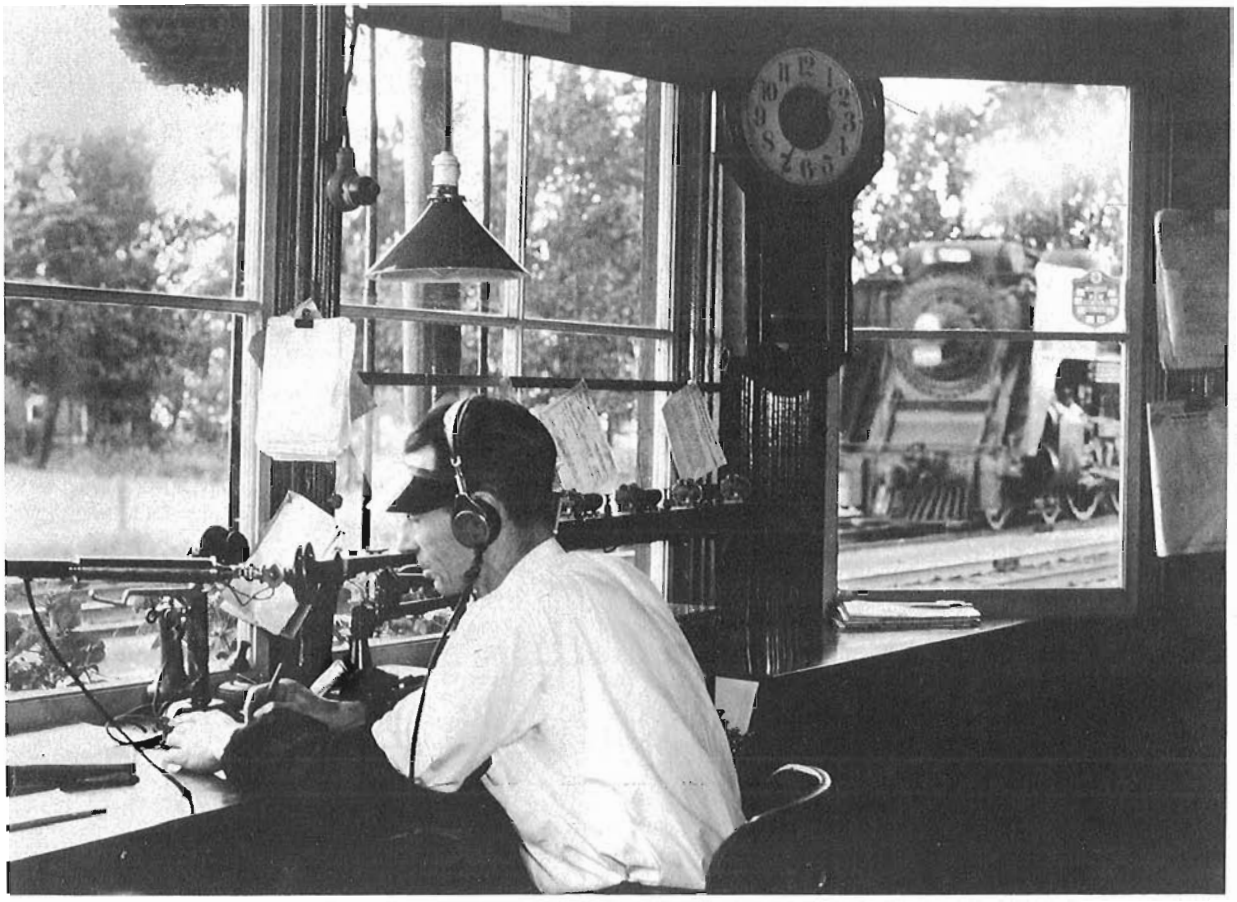
Two designs for the composite telegraph / telephone. Top: Storage batteries are on the top shelf of the cupboard. Bottom: Batteries are under the bay window desk. Testing equipment is on the wall, directly opposite the telephone.

Source: Bell Canada, Montreal, Document No. 3853, undated.

The dispatcher's telephone still was the cause of serious complaints. The railway dispatchers found that signals were often full of interference. By 1927, the "carrier current device" had been developed and virtually eliminated this problem. The device was used "...to carry 10 Morse Code cyphers and two telephone messages over the same wire at the same time."[49] In early 1900, it appears customary for the train dispatcher to have three to five operators working with him. The dispatcher used a transmitter which hung from his neck and looked like an upturned cow's horn. He, too, would wear either a single or double receiver set over his ear(s). The whole design held the dispatcher tethered to the power supply and various controlling switches. Some equipment used a single or double foot pedal for controlling signalling equipment to his operator or directly to a station. The operators were similarly mated to their phone equipment. When the dispatcher needed a specific operator along the line, he would open a switch, lighting his panel. The station operator answered the ringing line. The signal sent was a continuously ringing bell, however, this produced unnecessary anxiety as well as draining power supplies. Eventually, the system was modified around 1915-29 where only selective ringing occurred and/or halted automatically after a specific time span or number of rings. The pulsating ringing gained more attention without its stressful, constantly persisting ringing, however the ringing bell was much preferred over the tapping of the key's sounder. A more serious technical difficulty arose when a number of stations were connected to the same circuit. Power boosting and proper copper wire was essential to improved operation. Even the type, style and transmitter-receiver circuit caused significant problems which warranted the use of telegraphic messages as late as the 1940s.

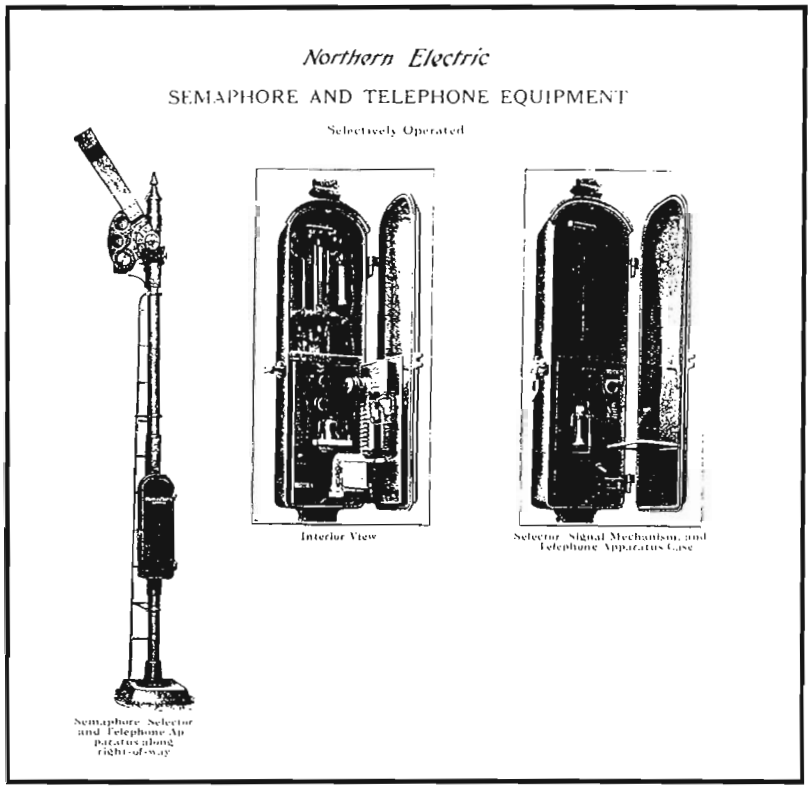
The 1910 Northern Electric Catalogue shows many different styles of telephones and headsets available. Canadian Pacific, Grand Trunk and Canadian National Railways preferred three styles. One style was a special transmitter arm which was on a long, solid metal rod. At the end was the transmitter and receiver approaching the operator/dispatcher's face. Generally it was fixed to one location on the wall and could not swing aside. The second style was the headsets which were worn over one or both ears, with a mounted mouthpiece on the desk. Again, the mouthpiece could be solidly fixed or moveable. And the other telephone equipment commonly seen was the "flexiphone" which had the operator/dispatcher wear a single ear piece receiver over the head and the mouthpiece transmitter mounted on a swinging, moveable and flexible "X"-like arm. This was the most popular type in stations while more desk oriented jobs tended to be solid fixtures.

A demand for faster communication was needed about 1915, between dispatcher -operator-train crews. As a result, the Northern Electric Company introduced a composite telegraph-telephone system: "Our railway composite telephone and telegraph system has been designed for the purpose of enabling telephone and telegraph messages to be transmitted simultaneously over grounded telegraph lines. It is adapted to simple Morse circuits where interruptions in the telegraphic current are of comparatively low frequency and where the charge in potential of the current due to



ABOVE: George Horner immediately recognized the operator as Herman Snider; the location is CNR's Gananoque Junction station about 1942. Note the operator's head set, two styles of telephone, the long solid transmitter arm and desk phone. The telegraph is not quite as permanent.

Source: CNR Archives, Photo No. X14346.



LEFT: Early examples of dispatcher trackside line telephones.

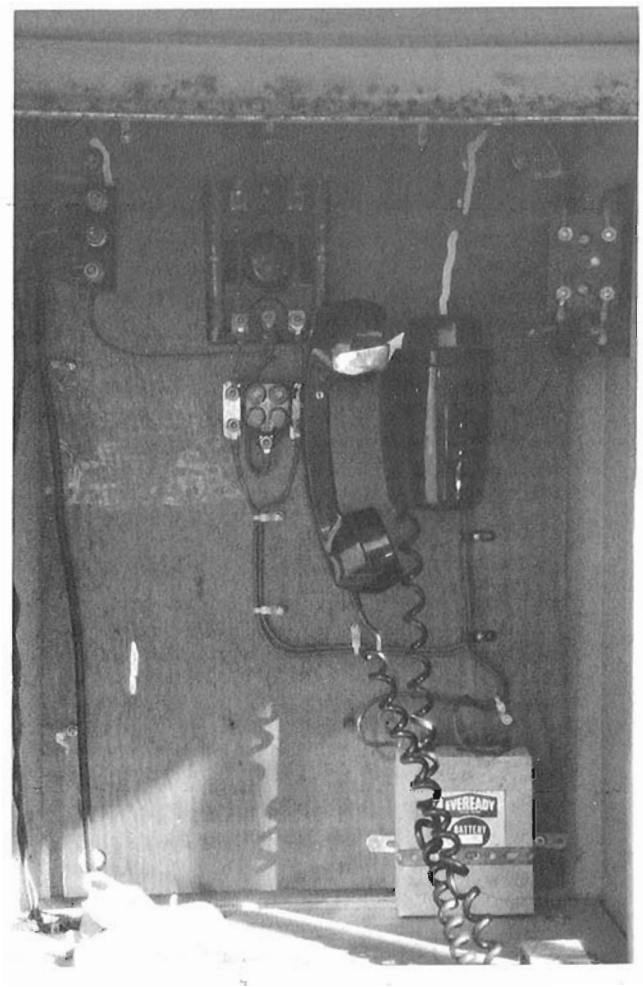
Source: Bell Canada, Montreal, document No. 10304-1, 1913,

A CPR trackside dispatcher's line phone from about 1930; however CP has modernized the circuits. It was used until about 1990. On the telephone transmitter is a button with instruction "push to talk"· this sent a high frequency current to the dispatcher's howler to alert him. At the base of the phone is the battery container holding three lantern batteries. Note the single piece ear set. To the left of the battery box is the device which completes the electrical circuit when the door is opened and the shelf dropped. In trouble spots, quite often an alarm signal is attached to the circuit alerting the dispatcher of an illegal entry. Note: This telephone still operates on the author's model railway.

Inside the dispatcher's trackside telephone are the "reminder instructions" for its use.

the operation of the telegraphic apparatus is not excessive... It is not suitable for use on duplex or quadruplex lines, or where machine sending is employed."[50] Tied with this system were three types of telephone stations: (a) the two terminal stations at either end of the rail line of where the telephone line ends; (b) intermediate stations located between the terminals and, (c) portable sets intended for use in an emergency or awaiting. For this system to function, no changes were necessary to the telegraph system, however, the telephone required a condenser which would prevent the telegraphic current from leaking to the ground and affecting telephone operations and creating interference. The telephone has a signal button on the box face and when pressed, sent a high frequency current along to the howler. The howler was a telephone receiving unit with a horn, so the station agent could readily hear it. Its volume could be adjusted by moving the howler's diaphragm, closer of further away from the magnets. With composite technology, the length of the telegraph line plus the number of intermediate stations, could successfully be used, but, it was conditional. The telegraph line depended on such characteristics as length, gauge, material and amount of wire used. Uncovered copper wire operated best, however, wire covered in paper was more efficient than that covered with insulated rubber, as rubber created a high electrostatic charge. In short, the ordinary telegraph lines of up to 100 miles, with five intermediate stations, would operate effectively.

In age old railway tradition, the station operator was the operational link to the train crews. Using the telegraph, the dispatcher sent his orders. They would be coded and then decoded from memory and sent out to the stations as needed. Once the operator received the orders via telegraph, he or she (as there were many women telegraph operators) would then key back the orders to the dispatcher's operator for verification. Once approved, the station agent or station telegrapher would then complete and time the orders on



The obvious changes to the telephone are evident with this photo of a modern trackside line telephone. Note the differences: the smaller modern phone hand set, the single battery and the board clip. The circuit switch, for use when the door opens, is at the top right side. The previous instructions for use are identical here as well. It is with great appreciation to the Cooks steel crew that this photo was taken for the purposes of this article.

form 19Y or type them. The semaphore signal was put into position so the engineer knew whether he was to stop, slow down, or just keep going. If there were orders to be hooped up, the semaphores were set up so the train adjusted speed accordingly. This whole procedure was very time consuming and riddled with error potential, With respect to the telephone, there was little doubt as to the accuracy of a message. Also, it was faster and much less time consuming. Where there might be doubt, letters, and/or words were spelled out letter by letter or the numbers written in letters followed by the number, that is, six thirty 630. The orders were then repeated as given and any errors corrected, then signed with the dispatcher's initials. the dispatcher then notated the order complete and the time in his train order book. (This was common with the telegraph as well except that there was an added burden to code and decode). Eventually the telephone would replace five operators with one.

It is significant to note that Canadian National Railways (CNR) began transmitting radio programs to their passengers on board trains in 1923. Marconi had harnessed wireless communication with electromagnetic waves. Further, the CNR's president, Sir Henry Thornton, bought the Western Union Telegraph Company. Western Union had some 6670 miles of telegraph lines at some 188 offices in eastern Canada alone by 1928. When the CNR was incorporated, it not only had the world's largest railway system, but CN Telegraph offices were connected to some 11335 miles of telegraph-telephone wire. After much research and development between Canadian National Railways and the Bell Telephone Company of Canada, the CNR presented another technological feat: "...for the first time in any part of the world, for a two-way telephony from moving trains."[51] now existed. This service began on Sunday, April 27, 1930 aboard the inaugural run of the 'International Limited' - "...which was hailed then as the...world's fastest passenger train operating over a 334 mile run between Montreal and Toronto in 360 minutes."[52] Typically, the Grand Trunk had experimented with this very idea as early as 1910, but the GTR failed because "...of the difficulty of establishing a physical link between moving train and any fixed contact point."[53] - Note: one-way telephone communication from moving trains was successfully being used in Germany; the CNR and Bell had taken advantage of their work and developed two-way instantaneous talk.

Small Railway communities began using telephone. Significantly, the largest work force was the railway. For example, in Halifax there existed about 400 telephones in 1888, but only one in Etobicoke, Ontario (a city suburb of Toronto), in 1903. The phone provided the railway with another way to get their employees to work. Up to this time, Call Boys with bicycles were hired to notify and/or awaken sleeping train crews at home. However, a railway ruling came into effect where all employees who lived more than two miles from a yard, were required to have a phone. In 1906, The Grand Trunk decided to build a major freight yard west of Toronto and call it Mimico. For nearly 50 years, Mimico was a solid railway town. Even before developers and building contractors built homes in the area a GTR locomotive, one coach and van would pick up railway crews at designated locations around Toronto, but this method was not beneficial. In these first new homes, 48 were equipped with a telephone. As time progressed, more railway families received phones and the way of the Call Boy began to diminish. By 1916, Mimico and New Toronto had become a big urban centre.[54]

The railway telephone superseded the telegraph. By 1940, the telephone was a full partner in railway communication and operations. It now had other immediate and emergency uses, such as the excerpt from the poem "RED", by F. W. MacKenrat:

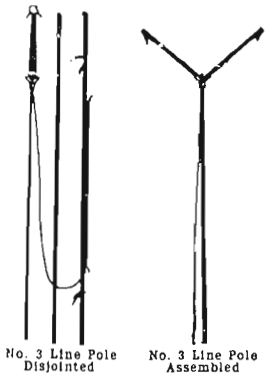
> Verse 12:
>
> 'The boys got busy and hung up the phone,
> The dispatcher had answered in a very bad tone,
> "Go back with your engine as quick as you can,
> And keep on going until you pick up your man!"[55]

The telephone used here to communicate with the dispatcher, was the dispatcher's trackside line telephone. The trackside or dispatcher's line phone played other roles. George Copeland, a retired CPR fireman/engineer notes: "The trainman or brakeman used the

THE Northern Electric AND MANUFACTURING CO. LIMITED

TELEPHONE EQUIPMENT

FOR STEAM AND ELECTRIC RAILWAYS



No. 3 Line Pole Disjointed — No. 3 Line Pole Assembled

LINE POLES

Made of hickory and are adapted for use in connection with metallic circuits; the spreaders are of sufficient length to engage wires spaced a distance of 2 feet apart. Connectors are provided with a cleaning device. Equipped with 100 feet of 2-conductor cord.

Used with Nos. 1330-E, 1331-E, 1332-E, N3-A, and 1332-E portable telephones.

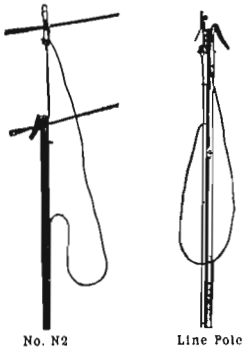
Trade No.	Mfrs. No.	Price Each
089495	3	$7.84

No. 4 Line Pole

Similar to No. 3, but arranged for connecting the portable telephone to the line wire of a grounded circuit. Equipped with 10 feet of single-conductor cord.

Used with No. 1314-A portable telephone.

Trade No.	Mfrs. No.	Price Each
089496	4	$7.23



No. N2 — Line Pole

RICHARDSON LINE POLES

Arranged for use in connection with metallic circuits. Can be connected to line wires in either horizontal or vertical planes which are spaced any distance up to 5½ feet. The adjustment of one-wire clamp is controlled by a cord. The length of the cord connecting the line to the telephone set is 100 feet.

Used with Nos. 1330-E, 1331-E, 1332-A, 1332-E and N3-A portable telephones.

Trade No.	Mfrs. No.	Price Each
089497	N2	$8.78

Line pole styles with interesting prices and explanations.

Source: Bell Canada, Montreal, document No. 10304-1, 1913 and 21110, 1920.

dispatcher's phone the most. This crew member would then relay the orders back to the engineer. These phones are attached to every turnout which called for a change of direction of change onto the mainline. They were also located at every train order station for immediate contact with the dispatcher. A typical example for use of the dispatcher's line telephone were the CP freights heading to Hamilton along the CNR Lakeshore line. The freight would have to make a full stop at North Queen Street. The trainman would detrain, cross the road and call the CNR operator-leverman at Canpa [abbreviation for CANadian PAcific]. We would have to wait there until the CNR operator called back and gave us verbal permission to proceed. We'd start the train when the trainman gave us a slow ahead hand wave, and we'd crawl towards CN Canpa. This routine lasted until 1980 or so; now its all done by radio and better timing". It is noteworthy that the Union Pacific Railroad were the "...earliest to use siding telephones together with signals."[56] around 1905 or 1908. Mr Copeland added: "The silver metal instrument huts provided another means of communication, but not for moving trains. A flashing white light at night or a horn blasted by day, alerted a crew that the dispatcher watched them. This occurred in extreme conditions. The crew then went to the nearest available dispatcher's trackside phone and called. It was also for track crews, telegraph construction men, bridge workers and idle trains in-the-hole. In the van, a portable telephone (and telegraph set) was kept for use by the conductor or trainman in case of emergency. The line pole had bare wire clips at the top which hung onto the wire beside the glass insulators. At the base of the line pole, the conductor took a clamp and attached it to the portable telephone unit. The conductor would first identify himself, give the train number, and the dispatcher would then issue the necessary orders. Note: portable telegraph units were used in a similar fashion. The diagram of the telephone lines is printed in every Employee Timetable. By locating the area the train was in, the trainman would use the picture, match up the pins, hook up the wire to his set and call the dispatcher.

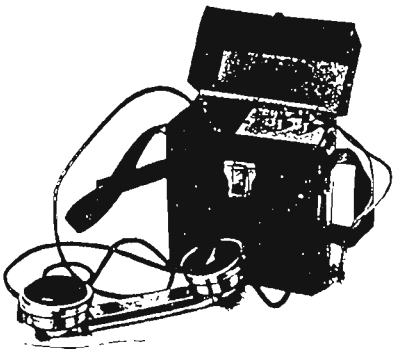
VI. CONCLUSION

Morse strove and achieved the use of the telegraph, and it was the first machine to transmit and receive messages over great distances. Bell sought to improve and supplement the telegraph, by successfully introducing almost instantaneous human voice communication. On the railway, the telegraph provided the first viable and essential medium of dispatching and communicating with others. By the 1940s, the telegraph and telephone were inseparable mates. However, after World War II, the telegraph, which had dominated railway dispatching and communication for a century, began a fast decline, becoming a backup system to the telephone, then, fading out completely by the early 1970s. Today, radio and even satellite telecommunication is beginning to replace the telephone.

THE Northern Electric AND MANUFACTURING CO. LIMITED

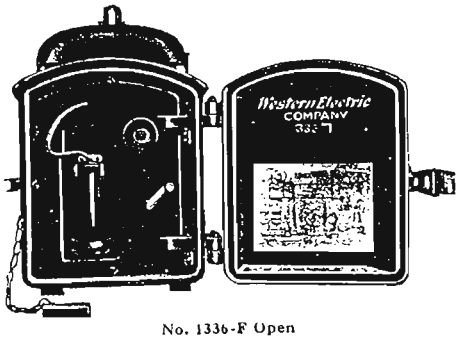
Portable Telephone Sets

No. 1330-F Portable Set



No. 1332-A Portable Set

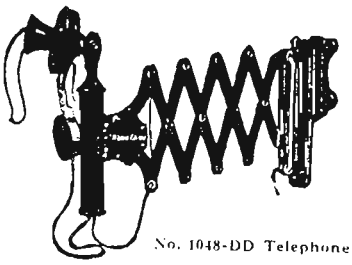
No. 1336-F Closed



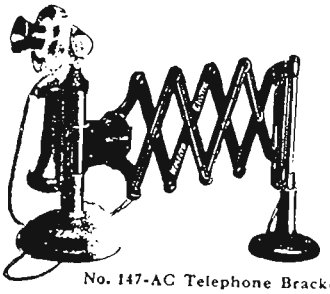
No. 1336-F Open

Northern Electric

TELEPHONE ARMS AND BRACKETS



No. 1048-DD Telephone Arm



No. 147-AC Telephone Bracket

TOP AND MIDDLE ROWS: Portable sets used in the van or on telegraph poles.
BOTTOM ROW: Two styles of flexiarms with telephone at the end.

SOURCE: Bell Canada, Montreal, document No. 10304-1, 1913 and 21110, 1920.

CHRONOLOGY OF EVENTS PERTAINING TO TELEGRAPH AND TELEPHONE DEVELOPMENT

("*" Indicates a Canadian Event)

1753 -	Earliest published article about an electric telegraoph.
1791 - April 27	Samuel F.B. Morse born (died April 2, 1872).
1831 -	Professor John Henry details electro-magnetic theory.
1837 -	C. Wheatstone (1802-1875) and W.F. Cooke (1806-1879) experiment with electro-magnetic key but are not convinced about its use.
1838 - January 8	Morse and Vail present dot-and-dash code.
1844 - May 23	First experimental message sent by telegraph between Baltimore and Washington. The text was: "WHAT HATH GOD WROUGHT".
1844 - May 24	Morse wins grant from Congress.
1844 -	Baltimore & Ohio Railroad begins using telegraph for train operation.
1845 -	Capture of English murderer John Tawell; this helps establish the "needle" telegraph in England.
1846 - October *	Toronto, Hamilton and Niagara Electro-Magnetic Telegraph Company begins operation.
1846 - December 19 *	First political message sent from Toronto Mayor to Hamilton Mayor - a businessman also inquires about an unpaid bill.
1847 - *	Montreal Telegraph Company, controlled by Hugh Allan, connects with Ottawa, Sackville N.B., Buffalo N.Y., Detroit Mich. and Portland Maine.
1847 - March 3	Alexander Graham Bell born in Edinburgh Scotland (died August 2, 1922).
1850 - (circa)	American Telegraph Company (Agency).
1851 - (circa)	New York, Newfoundland and London Telegraph Company opens.
1851 - April 8	Western Union Telegraph Company opens (Agency).
1851 - September 22	Erie Railroad first uses telegraph for train dispatching.
1852 -	Norton Telegraph Works Company (Agency).
1853 - *	Grand Trunk Railway obtains power to construct telegraph lines.
1855 - June 2 *	Northern Railway (OS & H) reaches Collingwood.
1858 - *	North-West Transportation, Navigation and Railway Company given power to establish telegraph lines, but fails in 1862.
1858 - August 5	First Atlantic cable cable completed; however it failed after only a few weeks.
1862 -	L.G. Tillotson & Company (contact keys and Victor instruments).
1862 - May 24	First use of telegraph in warfare, in American Civil War.
1863 - June 15 *	Agreement reached to purchase Hudson's Bay Company Rupert's Land.
1863 - July 6 *	Watkin heads west to initiate plans.
1864 - Summer *	Dr. John Rae begins survey for telegraph-railway route.
1866 - July 27	Completion of first successful Atlantic cable at Heart's Content, Newfoundland.
1868 - *	Dominion Telegraph Company gives Montreal Telegraph Company a "Price War" competition for telegrams.
1869 -	Western Electric (Manufacturing) Company (keys, sounders, relays).
1869 -	Chester Patrick and Company (general, plus keys, sounders and relays).
1874 - October 17 *	Contract 1 awarded for western telegraph construction.
1874 - October 30 *	Contract 2 awarded for western telegraph construction.
1874 - November 10 *	Contract 3 awarded for western telegraph construction.
1875 - February 9 *	Final western telegraph contract.
1875 -	Anderson Brothers (made practice sets).

1876 -	W.E. Day & Company (Agents for practice telegraph sets).
1876 - March 10	Bell's telephone made public.
1876 - August 10 *	Bell applies to Dominion Telegraph Company for long-distance line.
1878 -	J.H. Bunnell (1843-1899) standardizes key / sounder design.
1879 - *	Hamilton & Dundas (street) Railway Company is first in Canada to use telephone for train dispatching..
1880 - *	Northern Railway uses telephone between locomotive and van.
1880 - *	Bell Telephone Company of Canada founded.
1880 - *	Great North Western Telegraph Company connects Ontario and Quebec. Western Union takes over in 1881 and consolidates Canadian telegraph companies. The Canadian Northern Railway took over when the GNWT Co. went bankrupt, and it became the basis of the CNR Telegraph Company.
1882 - *	CPR has 895 miles of railway telegraph lines.
1883 - *	CPR begins commercial telegrams and news service.
1883 -	U.S. Postal Telegraph Company (Agency).
1885 - *	CPR Telegraph Company begins expanded commercial service between Lale Superior and Rockies / breaks Western Union monopoly.
1886 - *	North American Telegraph Company (Agency - U.S.A.).
1886 - *	CPR Telegraph Company makes connections with east-west U.S. coasts.
1890 - (circa)	Railways standardize Morse Code and Uniform Operating Code.
1894 - *	CPR Telegraph Company connects with Associated Press to distribute news along lines.
1896 -	Foote, Pierson and Company (general line-keys, sounders, relays).
1900 - (circa)	Horace G. Martin Company ("bugs"), also Vibroplex Company Inc. ("bugs").
1906 - *	Grand Trunk Railway builds Mimico Yard - uses telephones over call boys.
1907 - *	CPR Telegraph Company attempts to quadruple prices charged to three Winnipeg newspapers. They object, so CPR cuts them off, as well as one in Nelson B.C.
1909 - February 12	W.E. Harkness makes telephone presentation to St. Louis Railway Club.
1909 - October 28 *	CPR begins using telephone for train dispatching.
1910 - *	Board of Railway Commissioners of Canada established. It is designed to watch telegraph-telephone messages and fees charged for transmissions.
1910 - *	CPR Telegraph Company loses to Board over 1907 decision to raise prices. As a result it drops the news revenue business.
1923 - *	CNR begins radio service on passenger trains.
1924 - *	Northern Electric Company introduces Public Address system in Toronto.
1927 -	Telephone Carrier Current developed to stop signal intereferance.
1930 - *	CPR begins exchanging telephone-telegraph traffic with the U.S. Postal Telegraph Company.
1930 - April 27 *	CNR begins two-way telephone transmission on "International Limited" between Toronto and Montreal.
1935 - February 14	Austen G. Cooley perfects transmission of photographs using the telephone lines. This is the first facsimile system.
1940 - (circa) *	Telephone full partner on the railway.
1950 - (circa) *	Telegraph use diminishing as telephone, teletype, Deskfax (facsimile) and radio start to dominate.
1950 - *	CPR phases out Morse code to convey railway orders and replaces it with telephone and teletype in Jackman / only commercial messages with telegraph.
1960 - *	CN-CP Telecommunications was formed.
1972 - May 30 *	CP Telecommunications closes its last remaining Morse commercial circuit at 1:15 A.M., from Batiscan, Quebec. The final message was: "THIS IS THE LAST TELEGRAM VIA MORSE CODE IN CANADA. WHAT HATH GOD WROUGHT?".

NOTES

[1]Dots and Dashes, September-October 1968, Pg 3

[2]Yonder Comes the Train, Pg 346

[3]Dots and Dashes, September-October, 1968, Pg 3

[4]Ibid. Pg 5

[5]Dots and Dashes, July-August-September, 1973, Pg 5

[6]Ibid. July-August-September, 1989, Pg 5

[7]Ibid. July-August-September, 1987, Pg 5

[8]Ibid. January-February-March, 1988, Pg 5

[9]Growing Up with Canada, Pg 15

[10]History of the Canadian Pacific Railway, Innis, H.A., Pg 38

[11]Ibid. Pg 39

[12]Ibid. Pg 40

[13]History of Transportation in Canada, Vol. 2, Glazebrooke, G.P., Pg41

[14]Ibid. Pg 39

[15]Ibid. Pg 40

[16]Ibid. Pg 42

[17]Ibid. Pg 44

[18]History of the Canadian Pacific Railway, Innis, H.A., Pg 83

[19]Ibid. Pg 85

[20]Ibid. Pg 85

[21]Ibid. Pg 88

[22]Ibid. Pg 133

[23]Dots and Dashes, July-August-September, 1974, Pg 4

[24]A History of the Canadian National Railways, Stevens, G.R., Pg 157

[25]Yonder Comes the Train, Pg 350

[26]The Railway Station, Richards J., MacKenzie, J.M., Pg 303

[27]Dots and Dashes, July-August-September, 19754, Pg 9

[28]Canada Moves Westward 1880-1890, Batten, J., Pg 38

[29]Van Horne's Road, Lavallee, O., Pg 290

[30]Dots and Dashes, April-May-June, 1977, Pg9

[31]Dots and Dashes, April-May-June, 1977, Pg 9

[32]National Model Railroaders Association, April 1964, Pgs D6u.01 to D6u.03

[33] The Railway Station, Richards, J., MacKenzie, J.M., Pg 304

[34] The Telephone for Train Dispatching, Harkness, W.E. Pg 1-2

[35] Ibid. Pg 2

[36]Ibid. Pg 4

[37]Ibid. Pg 6

[38]Ibid. Pg 8

[39]Ibid. Pg 8

[40]The Telephone - The First Hundred Years, Brooks, J., Pg 37

[41]Dots and Dashes, January-February-March, 1974, Pg 3

[42]The Canadians -Alexander Graham Bell, Petrie, A.R., Pg 32

[43]History of the Canadian National Railways, Stevens, G.R., Pg 125

[44]Ibid. PG157

[45]The Telephone for Train Dispatching Harkness, W.E. Pg 9

[46]Ibid. Pg 17

[47]Composite Telephone and Telegraphs for Railway Service, Northern Electric, Pg 8

[48]Montreal Herald, October 28, 1909

[49]History of the Canadian National Railways, Stevens, G.R., Pg 331

[50]Composite Telephones and Telegraphs for Railway Service, Northern Electric, Pg 1

[51]History of Canadian National Railways, Stevens, G.R., Pg 334

[52]C.N.R. Magazine, Vol XVI, #6, Dennison, M. PG 5

[53]Ibid. Pg 6

[54]Etobicoke - from furrow to borough, Heyee, E., Pf127

[55]Canadian Rail, Issue #389, November-December, 1985, Pg 207

[56]The Telephone for Train Dispatching, Harkness, W.E., Pg 9

APPENDIX A

Uniform Code of Operating Rules -- Rules with respect to Telegraphs and Telephones

The first Standard Code was adopted about 1889 by the General Time Convention, later becoming the Association of American Railroads. Using the telegraph for train orders, the Code was designed to give uniform train rules for any train movement. As the telephone was introduced and improved, it was found more adaptive to the railway's needs, the Code was again revised. Rule books differ, sometimes considerably from railway to railway and one edition to the next. When rules were subject to interpretation, it was the Rules Examiner or Superintendent who was the judge when a dispute arose. These rules applied to mainlines, branch lines and so on. The following is a list of the more typical U.C.O.R.; of particular note is rule 206. Examples are from CNR's U.C.O.R., August 25, 1951:

[Timetables]

"RULE 6. The following symbols when used in the timetable indicate: ...P Telephone...(page 14)

[Movement of Trains and Engines]

"RULE 85a. (Single Track) When a section passes another section of the same schedule, unless authorized by train order, the leading train must notify opposing trains affected until the next available point of communication is reached and the train dispatcher advised. (Page 47)

"RULE 94. A train which overtakes another train so disabled that it cannot proceed may pass it, if practicable, and if necessary will assume the schedule and take the train orders of the disabled train, proceed to the next available point of communication, and there report to the train dispatcher. The disabled train will assume the right of schedule and take the train orders of the last train with which it has exchanged, and will, when able, proceed to and report from the next available point of communication. Trains affected which are met or passed under these circumstances must be notified. (Page 52)

"RULE 94a. When a train, unable to proceed against the right or schedule of an opposing train, is overtaken between open train order offices by a train having right or schedule which permits it to proceed, the delayed train may, after proper understanding with the following train, precede it to the next available point of communication where it must report to the train dispatcher...(Page 53)

"RULE 104 Para 13. If it is known or suspected that the points, or any parts of a switch are damaged or broken, the switch must be protected, section foreman notified, and report made to the proper authority from the first available point of communication. [Recall telephones are attached to most locations where this could happen with exception of yards.] (Page 62)

[Rules for Movement by Train Orders]

"RULE 206 Para 5. In transmitting and repeating train orders by telephone the number in the address will be pronounced and then spelled letter by letter. All stations and numerals in the body of an order must first be plainly pronounced and then spelled letter by letter, thus: AURORA A-U-R-O-R-A, and one nought five o-n-e n-o-u-g-h-t f-i-v-e. (Page 70)

Para 6. When train orders are transmitted by telegraph the train dispatcher must write the order into the train order book as the first office repeats, and check and underscore each word and figure at each repetition. When transmitted by telephone he must write the order as he transmits it, and check and underscore each word and figure at repetition. (Page 70)

[Rules Governing Opposing and Following Train/Engine Movements]

"RULE 267. Instructions or information received by telephone from the train dispatcher must be repeated to him before being acted on, stating time and occupation of the employee and his train or engine number. The train dispatcher must make proper record immediately. (Page 123)

[Automatic Block Signals]

"RULE 509. When a train or engine approaches a stop signal indicating stop it must stop before reaching the signal and not more that 100 yards from it. If not immediately cleared it must communicate with train dispatcher, and upon receiving advice that there is no conflicting train movement may proceed at restricted speed to the next signal...(Page 140)

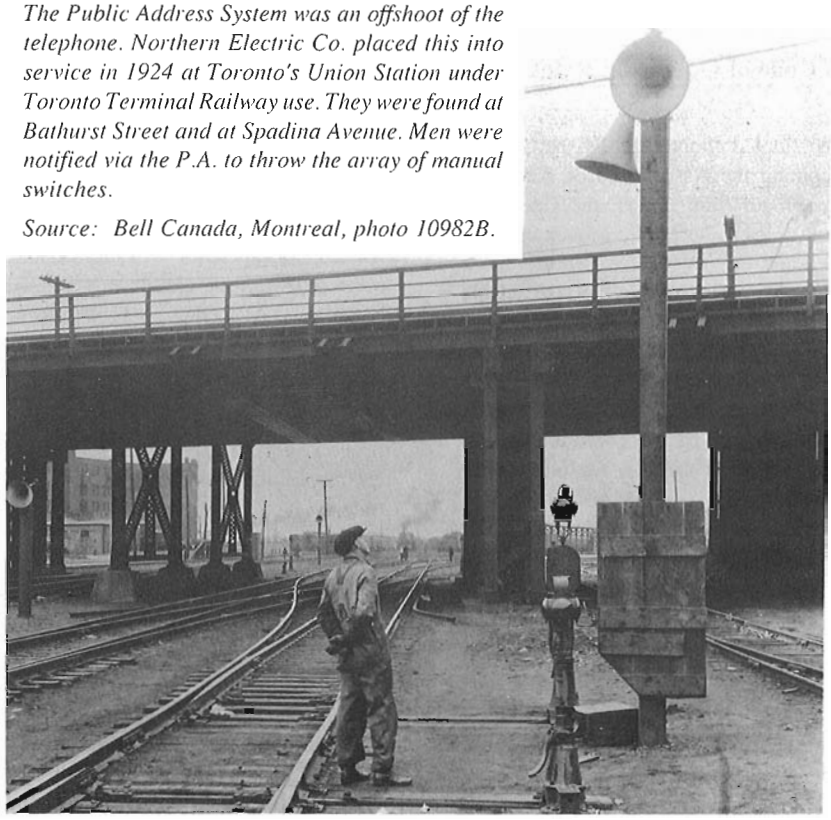
"RULE 510. Block signals or switch indicators which are evidently out of order must be reported to the train dispatcher from the first available point of communication. (Page 142)

[Interlocking Rules]

"RULE 671. While an interlocking station is closed, should a signal for an open route indicate stop, train and engine crews must know that the route for their train is properly lined and be assured they are protected against movements on conflicting routes, after which train may proceed at restricted speed. The fact must be reported to the superintendent from the first available point of communication.The following General Instructions specify telephone/ telegraph rules. They are taken from the CNR book, October 28, 1962.

The Public Address System was an offshoot of the telephone. Northern Electric Co. placed this into service in 1924 at Toronto's Union Station under Toronto Terminal Railway use. They were found at Bathurst Street and at Spadina Avenue. Men were notified via the P.A. to throw the array of manual switches.

Source: Bell Canada, Montreal, photo 10982B.



APPENDIX B

General Instructions Covering Train, Engine, Yard and Other Operating Employees Connected With the Movement of Trains, Locomotives and Cars

[General]

"4. In CTC, telephones are located in vicinity of all main track switches. In CTC, electric horn and white light to summon employees to telephone must be answered promptly. (Not applicable to employees on moving trains.) (Page 2-3)

[Instructions Governing the use of Railway Radio]

"4. Radios shall not be used for transmission of train orders except as may be authorized by the Chief Train Dispatcher, as occasions demand, and when so used, rules governing the transmission of train orders by telephone must be observed. (Page 8)

"[Handling Dangerous Commodities]

...Particulars of cars found leaking and set out enroute must be reported to Superintendent from first available point of communication. (Page 63-4)

[Laws Pertaining to Hours of Servive U.S. Territory]

"19. When instructions cannot be obtained on account of no open telegraph offices, wires down, or other such causes, conductors and enginemen must reduce train load, or take such action as in necessary to insure reaching a terminal or relay point and obtaining relief before having been on duty 16 hours. (Page 89)

[Train Dispatchers and operators]

"23. No operator, train dispatcher, or other employee who by the use of the telegraph or telephone, dispatches, reports, transmits, receives or delivers orders pertaining to or affecting train movements, shall be required or permitted to be or remain on duty for a longer period than: First, 9 hours in any 24-hour period in all towers, offices, places and stations continuously operated night and day. Second, 13 hours in any 24-hour period in all towers, offices, places and stations operated only during the daytime, except in case of emergency, when the employees named in this proviso may be permitted to be and remain on duty for 4 additional hours in any week. Any tower, office or station will be considered, continuously operated night and day if such place is open as a telegraph office more than 13 hours during any 24-hour period, regardless of time it opens and time it closes. Any tower, office or station will be considered operated only during the day time if such place is open as a telegraph office not to exceed 13 hours during any 24-hour period regardless of time it opens and time it closes. (Page 90-91)

APPENDIX B1

General Instructions Pertaining to the Movement of Trains, Engines and Cars. Canadian Pacific Railway, April 27, 1958. Source: George Copeland

[Connivance in Illegal Transportation by Railway Employees]

16. (Final Paragraph) If an agent, yardmaster or conductor (and particularly the latter in connection with cars loaded at flag stations and outlying sidings) has reason to believe that a shipment is falsely billed and contains contraband, although classified as some other commodity, he will immediately inform his Superintendent by telegraph, giving full particulars, including car number. (Page 58)

17(b). To all conductors, enginemen, trainmen, and other employees: - Conductors, Enginemen, or Trainmen who discover or receive notice of the existence and location of a fire burning upon or near the right-of-way, or of a fire which threatens land adjacent to the right-of-way, shall report the same by wire to the Superintendent, and shall also report it to the Agent or persons in charge at the next point at which there shall be communication by telegraph or telephone, and to the first section employees passed.. Notice to track forces of such fire shall also be given immediately by engine whistle signal 14(r)[000000] U.C.O.R. (Page 59)

17(e).[This discusses the actions to be taken by Agents, Dispatchers and Operators when receiving the fire location. They use the "wire" to notify the Superintendent.] (Page 60)

17(f).[This discusses that section Foremen, extra gang foremen, bridge foremen, telegraph or other construction gangs, and other track employees, are to fight the fire and "...additional help shall be immediately requested by telegraph or telephone message to the Superintendent or Roadmaster."](Page 61).

APPENDIX C

Rules and Rates of Pay for Telegraphers. Grand Trunk Railway System Operating Rules, June 18, 1911. Source: G. Horner

The more significant and interesting Rules are reproduced here.

317. The first duty of an Operator is to make himself thoroughly familiar with the Rules, and obey them. (Page 159)

318. Operators having other duties in connection with the telegraph must attend to those of the telegraph first. (Page 159)

320. In addition to the office call, operators will sign their own private signal in sending or receiving telegrams, and such letters, with time of sending, must be shown upon each telegram. Each telegram received must show on its face the office call from which it was sent, the time received, and the signal of sending and receiving Operators. (Page 159)

322. None but officers of the Company and employees of the office are to be allowed within it. Students will not be allowed in offices without written permission from the Superintendent. and they must not be allowed to practice upon the main wires, answer calls, or transact business until authorized to do so by the Chief Dispatcher. (Page 159)

323. The greatest care must be exercised in sending or receiving orders regarding the movement of trains by telegraph. (Page 159)

327. Operators must read all messages carefully before sending to prevent delay in sending. No message will be transmitted from dictation or otherwise than from legible copy. When difficult words occur in messages, transmission must be slow and distinct. (Page 160)

330. Verbal messages regarding the safety of trains or bridges must not be sent when possible to avoid it. Communications of this character must be made in writing to avoid mistakes. (Page 160)

339. The local battery must be kept clean and in good working order. The liquid should always cover the zinc, the loss by evaporation being replaced with clean water. A portion of the solution must be dipped off occasionally replaced with water. The blue solution should always cover the copper but never reach the zinc. It is much easier to keep a local battery in good order if the vitriol is supplied in small quantities as it is consumed. As a deposit of copper is constantly forming, the accumulation should be removed when necessary. (Page 162)

343. Correct time will be sent daily at 11 o'clock A.M.. Eastern Time; all business will be suspended on the time circuits and connections made with the McGill Observatory clock at Montreal for two minutes. This signal clock will break the circuit once every second, except the 50th second, when line will remain open for ten seconds, the signals again being transmitted from 10.59 to 10.59 and 50 seconds, when there will be another pause of 10 seconds, the line closing at 11 o'clock A.M. (Page 163)

Canadian National Railways, Rules and Wages for Telegraphers, June 16th, 1927

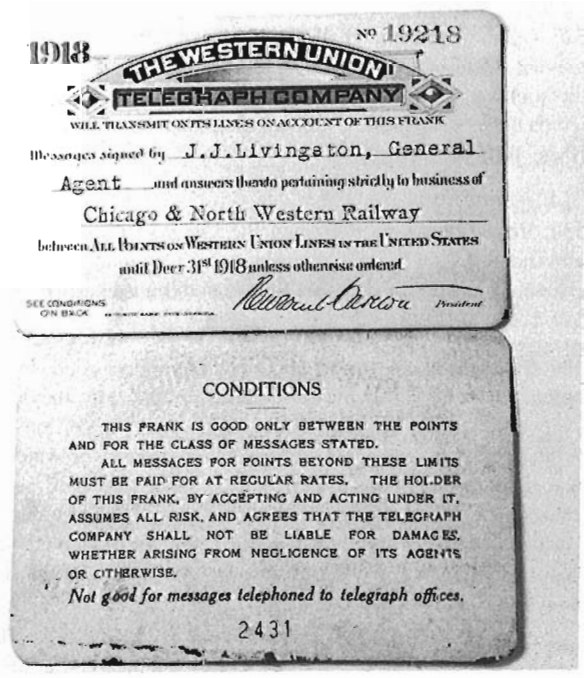
"Article 8 - Exemptions

(a) Telegraphers will be exempted from shovelling snow, stencilling cars, shifting coal ashes, tending to flower gardens, scrubbing stations, cleaning chimneys, unloading, cutting or piling fuel, cleaning and disinfecting cars or cleaning outbuildings, handling Government mails, and any other work not incidental to the usual work of a telegrapher. Special consideration will be given to cases where it is shown that attending to heaters in cars at Terminals or Junctions, or calling crews, constitutes a hardship or unduly interferes with the other duties of the agent or operator. (Page 16)

Article 9 - Attending Lamps, Pumping Engines and Windmills

(a) Telegraphers will, without extra compensation, keep train order signal lamps clean and in good condition and lighted when required.

(b) Telegraphers who attend pumping engines or windmills, which work will be optional with them, will be paid $10.00 per month for attending to pumping engines and windmills or pumping engines only, and $5.00 per month for attending to windmills only. (Page 17)



Frank passes were issued to the telegraph / telephone employees. Here is shown, the face of a 1918 Chicago & North Western Railway Frank Pass with the back of 1919. The CNR and CPR Telegraphs issued similar card type franks to railway officials and Members of Parliament. This gave them the authority to send messages over the commercial wires without charge.

Southern Ontario District. Belleville Division

STATION	POSITION	RATE PER MONTH
Lyn Jct.	Agent	133.00 HFL
Mallorytown	Agent	133.00 HFL
	Operator	122.00
Lansdowne	Agent	137.00
Gananoque Jct.	Agent	134.00
	2nd Operator	122.00
	3rd Operator	122.00
Findley	Agent	129.00
	N. Operator	122.00
Kingston	Agent	129.00
Kingston Jct.	Tkt. Agt. & Opr.	156.00
	2nd Operator	138.00
	3rd Operator	138.00
Collin's Bay	Agent	129.00 HFL
Ernestown	Agent	130.00 HFL
	N. Operator	122.00
Napanee	Agent	178.00
	1st (sic) Operator	148.00
	2nd Operator	140.00
	3rd Operator	140.00
Marysville	Agent	129.00 HFL
Shannonville	Agent	129.00 HFL
Belleville	Agent	245.00
Belleville Yd.	1st Operator	162.00
	2nd Operator	162.00
	3rd Operator	162.00
Belleville "B"	1st Operator	164.00
	2nd Operator	164.00
	3rd Operator	164.00

(Page 56, and so on...)

NOTE: HFL means "Free House, Fuel and Lights.

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Acknowledgements:

- Copeland, G., retired CPR fireman / engineer, Telephone use and line pole information and Railway Operating Rules (fired steam excursions of the 136, 1057 in the 1970s), Toronto

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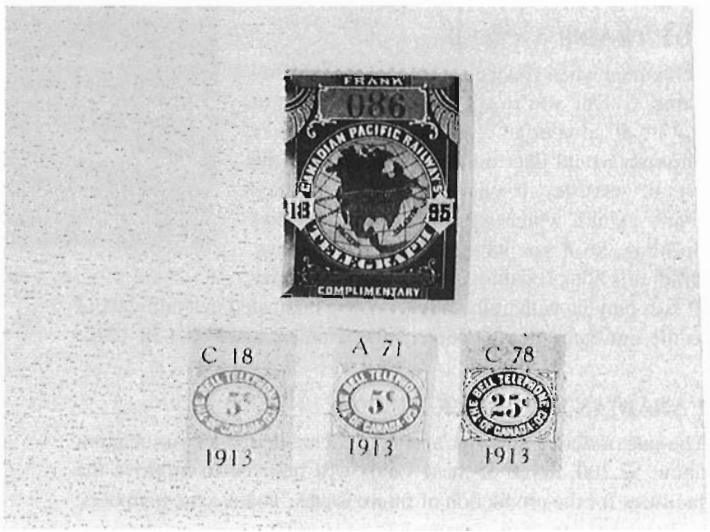
RIGHT: Franks were different colours for their issued year, value and series number. The CPR Frank is from 1895, serial number 086. The frank passes were in the form of booklets containing the stamps. Complete booklets exist but are very scarce. The CPR issued franks from 1887 to 1936. All were black except for 1902, 1903, 1904. The Canadian National, Canadian Northern, Grand Trunk Pacific, Bell Telephone and others also issued franks. Samples of 1913 Bell Telephone franks are also shown. All are different colours.

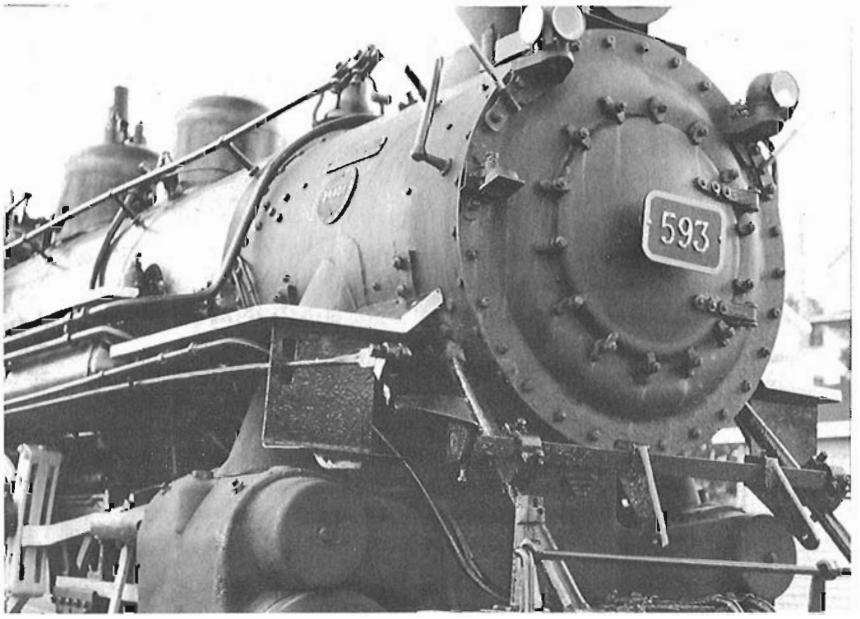
Interestingly, the United States issued a 3 cent postage stamp in 1944 to mark the centennial of the telegraph. Canada never issued one, but did produce a stamp to commemorate the centennial of the telephone in 1974.



CRHA Communications

RAILWAY PRESERVATION IN NEWFOUNDLAND

Our member, Mr. Dyson Thomas sends these photos, taken on July 2, 1991, of the historical museum train preserved at Corner Brook, Newfoundland. Number 593 is the only remaining steam locomotive of the Newfoundland Railway, and the complete train is an extremely impressive and worthy preservation project, especially so in view of the abandonment of the railway in Canada's easternmost province.



TOY TRAINS WANTED

Remember when you were a kid playing with toy trains? Maybe you're still playing with them or they're all in your attic. The Canadian Railway Museum would like to show today's youth the toys of yesterday. It will be the subject for next year's exhibit which will be held in the Hays Building. So if you have unusual railway toys, children's books on this subject, or even pictures of kids playing with trains, and would be interested in lending them to the museum, please contact Julie Clement at (514)-638-1522.

CANADIAN RAIL BACK ISSUES

The sale of Back Issues of Canadian Rail has netted the Association about $2,200. Some of these funds will be used to improve the facilities for the production of future issues. Thank you, members.

Several members are interested in acquiring issues that are not available from our stock - mainly in the series before issue number 200. If anyone who may be willing to dispose of such copies would like to write to "Back Issues", and list the numbers of issues for disposal, we would be glad to put the two interested parties in touch with each other. Please write to Back Issues, 120 Rue St-Pierre, St. Constant, Que. J5A 2G9.

ANNUAL AWARDS FOR 1991

This announcement of the Canadian Railroad Historical Association Annual Awards for 1991 is for the fifth year of the program. The results of previous awards have been featured in past issues of Canadian Rail, in the newsletters of the Divisions and in other rail publications.

The purpose of the awards is to recognize and honour individuals whose endeavours in 1991 have contributed significantly to the recording and / or preserving the artifacts of historical value of Canada's railways.

The Awards Committee has been very impressed by the calibre of the selections made by the nominators, and wants to thank them for the interest shown and the time required in making their nominations.

The categories of awards scheduled for 1991 are as follow:

1. LIFETIME ACHIEVEMENT AWARD: To a person for a significant contribution over a period of years.

2. ARTICLE AWARD: (a). For an article published in Canadian Rail, or a Division Newsletter. (b). For an article published in any other periodical or magazine.

3. BOOK AWARD: For a book published in the award year (1991), and the previous year (1990).

4. PRESERVATION AWARD: To a person or a group of people, for an outstanding preservation activity in the award year.

Recipients of awards will receive certificates bearing the Association's name, its corporate seal, the name of the recipient, and the signatures of the Association's President and the Chairman of the Awards Committee.

Nominations will be accepted from members and other persons interested in Canadian railway history. Submissions should bear the name of the nominee and the reasons for that person's nomination, with concise statements as to the accomplishments of the nominee, which will be helpful to the Panel of Judges in reaching their decisions. A copy of the nominated work should be submitted with the nomination, where possible.

Nominations should be submitted as early in 1992 as possible, but not later than March 31. The names of the recipients of Awards will be announced as soon as the decisions of the Judges are known, and will be published in Canadian Rail. Awards will be presented to all recipients at an official function of the Association.

The members of the Panel of Judges are:

Dr. Derek Booth - Professor, Bishop's University, Lennoxville, Quebec.

Mr. Ray Corley - Author, researcher and well known railway equipment authority, Toronto, Ontario.

Mr. Gerard Frechette - Educator, Montreal, Quebec.

Mr. Allan Graham - High School Teacher, Alberton, Prince Edward Island.

Mr. Colin Hatcher - Education Consultant, Government of Alberta, author, Edmonton, Alberta.

Mrs. Ruby Nobbs - Historian and author, Revelstoke, British Columbia.

Awards Committee:

Mr. Walter J. Bedbrook - Chairman, Compartment 132, R.R. 2, Picton, Ontario, K0K 2T0.

Dr. Robert V.V. Nicholls, Merrickville, Ontario.

Mr. R. Dyson Thomas, Saint John, New Brunswick.

Mr. Hadrian Evans, Calgary, Alberta.

Many excellent articles about Canadian railways have appeared in publications in 1991. Several books have been published during the past two years, all of which should be considered for awards. Interesting preservation activities have been undertaken as well, all of which the Canadian Railroad Historical Association, with the help of your nominations, wishes to acknowledge by the presentation of these annual awards. Your participation is eagerly and earnestly requested. Please attach the form, or reasonable facsimile, with your nominations and send them to the address indicated thereon.

To: CANADIAN RAILROAD HISTORICAL ASSOCIATION ANNUAL AWARDS
Compartment 132, R.R. 2, Picton, Ontario K0K 2T0

My nomination for the following award(s) is/are:

LIFETIME ACHIEVEMENT AWARD ( )

PRESERVATION AWARD ( ) The attached documents support my nomination(s).

ARTICLE AWARD (a) _____ published in
Title of Article

_____ for _____ 1991
Canadian Rail / Div. periodical month

ARTICLE AWARD (b) _____ published in
Title of Article

_____ for _____ 1991
Name of magazine month

BOOK AWARD _____ published in 1990-91
Title of Book

The attached documents support my nomination(s).

Submitted by: _____

BACK COVER: The inside of a signal tower in the Toronto area about 1924. On the shelf in front of the leverman is a small P.A., which notified him on lining switches for a routing.

Source: Bell Canada, Montreal, photo No. 10982A.

Canadian Rail

120, rue St-Pierre, St. Constant, Québec
Canada J5A 2G9

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