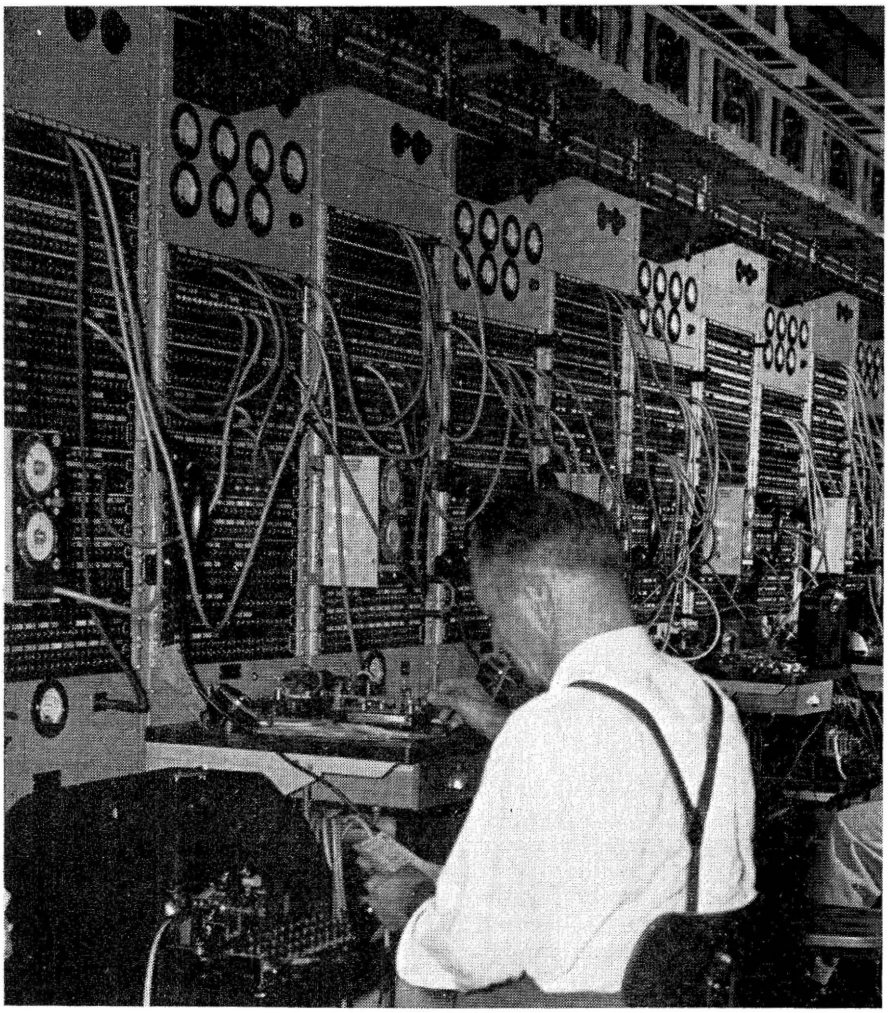
CN Telegraph Moves Into Its New Home

Technical features include copper bus bars for handling d.c. for telegraph power and special bath for cleaning Teletype machines saving about three man-days' time

A MOVE TO COORDINATE ACTIVITIES of the Canadian National Telegraphs has been recently completed in Toronto, Ont., where CNT is now in its new air-conditioned, seven-story brick building on Front street, just a block away from Union Station. Like most moves, this one was prompted by the need for more space for present facilities and for expansion.

Because CNT is different from communications departments on U. S. railroads, a brief look at its operations will be helpful. CNT provides nation-wide telegraph service in Canada, similar to Western Union in this country. They also furnish commercial Teletype service, that is, lease machines and provide circuits to firms and the government. In some areas, long distance telephone circuits are furnished for the various Canadian telephone companies, including the Bell Telephone Company of Canada. CNT supplies some extensive private telephone networks for government agencies such as the Departments of Transport and National Defense, as well as for air line and pipe line firms. Additionally, CNT participates extensively in the Canadian "Weatherfax" facsimile weather-map service and in wire-photo transmission for the Canadian press. They have circuits for carrying radio programs of the Canadian Broadcasting Corporation. Television is also in the picture, in that CNT provides TV channels over microwave radio from Windsor, Ont., east to Toronto and also east from Montreal through the Province of Quebec. In the near future TV channels will be in service across Newfoundland. Present CNT plans contemplate the use of microwave for general communications across most of Canada within a few years. In addition, CNT is the communications department of of the Canadian National Railways, hence it provides message and dispatchers' circuits, as well as long-distance and local telephone and printing telegraph service on the railroad. They are also concerned with yard and freighthouse loudspeaker systems and railroad radio, both in yards and train-to-wayside and end-to-end on freight trains. Thus CNT is much larger than if it provided only railroad communications.



Section of T&R switchboards (bias and distortion meters just above man's head)

Although the railway part of CNT is smaller than the commercial side, it is by no means "left out." To some extent the railway communications benefit from this larger CNT operation, because when contemplating new circuits or facilities, the entire service is considered—railway and commercial. For example, by having "C" railway telegraph office in the same building as "TN," the commercial office, better and faster handling of messages is achieved. Now messages travel on belts between offices in a matter of a few seconds, whereas formerly a 7-minute pneumatic tube ride was required between "C" office in Union Station and "TN" on the 12th floor of the Bay street building, a half-mile distant.

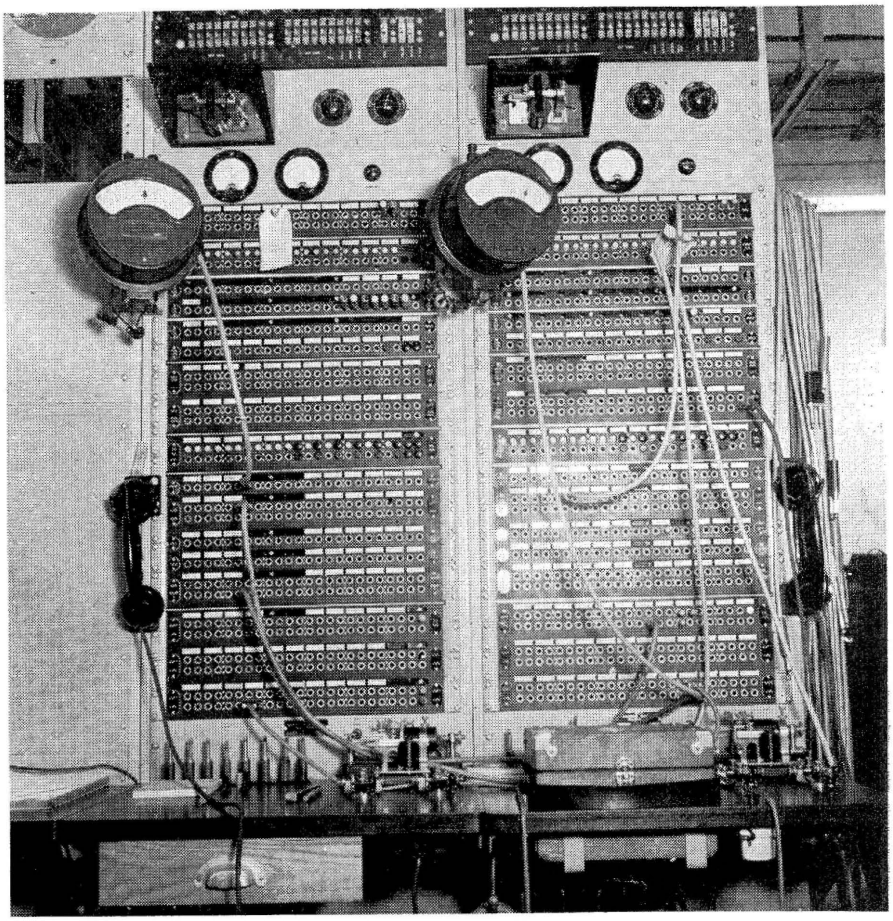
Circuit-wise, the railway service benefits by having a large commercial "brother" in the family. When new circuits are under consideration, say between Toronto and Montreal for printer service or telephone service, the railway needs are considered with those of the commercial service, so that the railway may end up with a new carrier channel between these points, which for railroad service alone would not be economically justified.

Toronto is the hub of CNT communications, railway and commercial. Circuits radiate out like spokes

of a wheel to other cities and towns in Ontario and other parts of Canada. Terminating at the new CNT office are 520 line wires, 450 carrier telegraph channels and 70 telephone channels. Of these, 25 are telegraph and 19 are long-distance telephone channels for the railway service. In addition, six dispatchers' circuits also terminate at Toronto.

Another indication of relative size of the railway communications and its "big brother" in the commercial side is shown by the number of messages handled—1,000,000 monthly for the commercial office, of which 50,000 are for the railway service. However, "C" railway office alone handles 280,000 messages monthly. Thus, as far as messages are concerned, railway service is about one-third the size of the commercial service.

The fourth and fifth floors of the new building are the nerve centers of the communications inside plant: operating rooms of "C" and "TN" offices; TV and radio operating rooms; testing and regulating department (distributing frames, carrier terminals and test switchboards); offices of CNT; and the power room for supplying d.c. for carrier telegraph and other equipment.



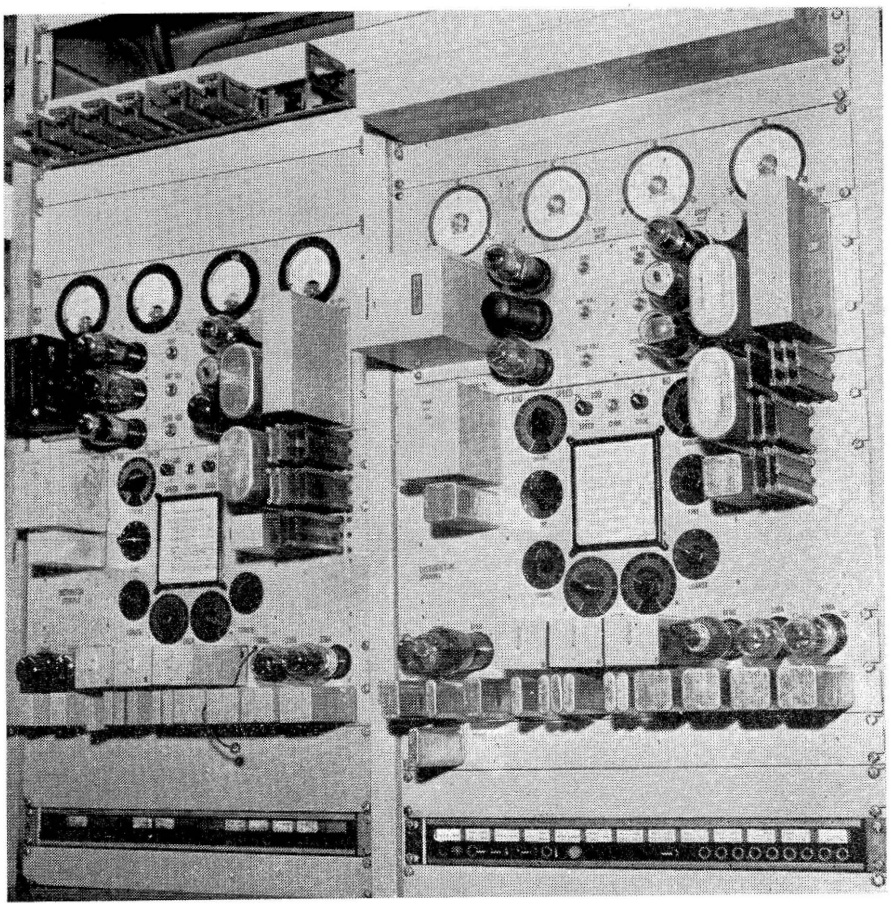
Typical line board position, of which there are several

"C" Office Has 21 Printer Circuits

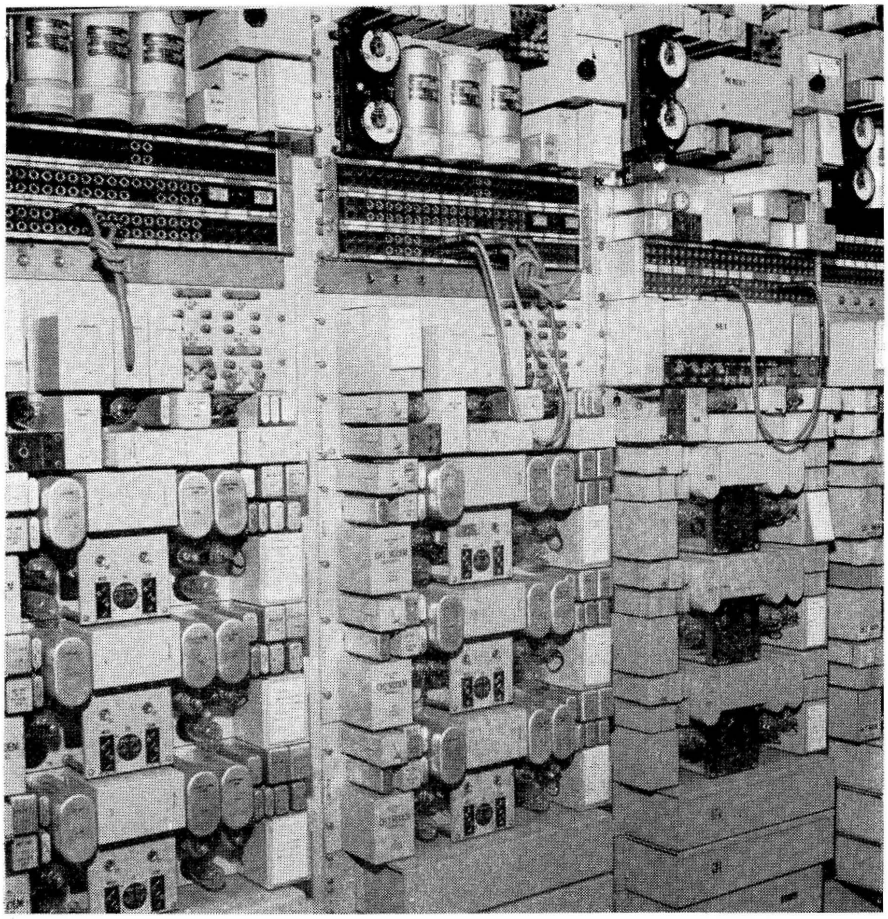
Railway printing telegraph circuits terminate on No. 19 ASR Teletype machines, the only exception being four Toronto terminal circuits and a Toronto-Durand-Battle Creek circuit. Generally speaking, "C" office receives messages and train consists (called "journals") in the form of page copies. If a train journal is to be received, a typing reperforator is plugged into the circuit so that a tape is made for relaying. At present, relaying of messages and "journals" is done manually, but semi-automatic methods are being studied and will undoubtedly be installed in the near future.

The terminal circuits connect "C" office to the various freight yards in the Toronto area. One of these circuits terminates in a No. 19 ASR and the others in No. 15 typing reperforators, the reason being that these yards are sending train journals which must be relayed at "C" office.

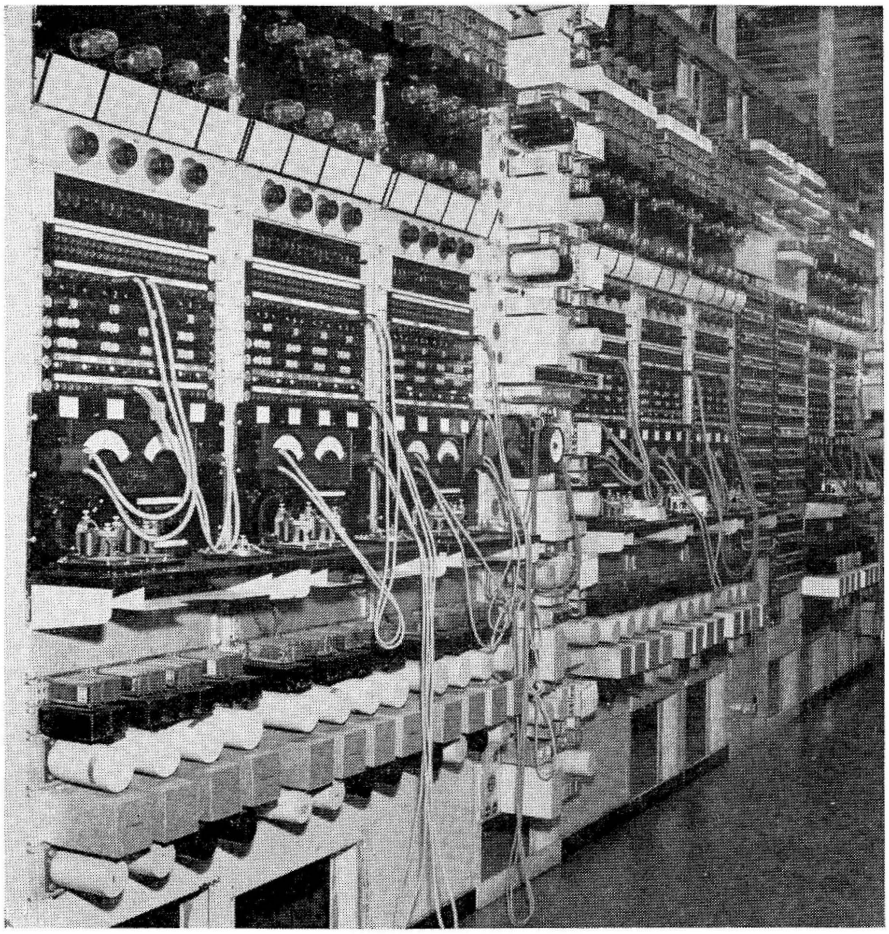
Incoming Morse wires terminate at a three-position table, where operators transcribe the messages. These are delivered to the proper outgoing circuit for relaying, or to a sorting bin and put on one of the conveyor belts for proper cross-



Two of the type 118-C telegraph transmission measuring sets



Above: type C carrier telephone terminals. Below: type 40-B carrier telegraph terminals. Original 12 channel system built out to 15 by adding 40-C equipment



office designation. Conveyor belts are also used for handling railway messages between "C" office and the "TN" commercial office.

T&R Has Elbow Room

One of the first things that one notices upon entering the testing and regulating room is the arrangement of distributing frames, carrier bays and test switchboards which allows considerable room for easy access to both front and rear of equipment. At the switchboards, circuits are grouped according to customers (commercial), and the railway circuits are in one section. In addition to conventional test equipment, each position has a No. 14 tape Teletype with keyboard, telegraph key and sounder, and meters which read per cent of bias and per cent distortion. The telegraph transmission test equipment (bias and distortion) is mounted in the carrier bays near its associated carrier terminals. Soon to be installed are Stelma, Inc., automatic telegraph distortion monitors. A monitor will be installed on each of a number of important circuits to provide continuous analysis of the circuit. It will give an audible and visible alarm when a predetermined number of bias or distortion peaks occurs in a given period of time. This will allow a man to adjust the circuit before it fails. The design of the switchboard circuits and the grouping of actual circuit assignments is such as to afford maximum convenience and efficiency of testboard work at all hours.

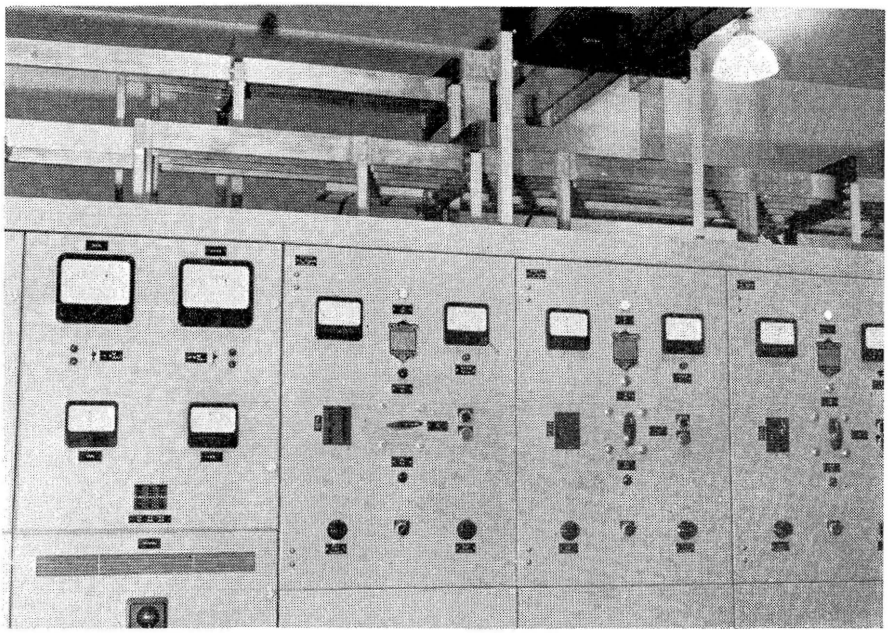
For printer circuits, voice frequency telegraph carrier is used, the majority of equipment being Western Electric types 40 and 43A, Western Union type 30 and British Telephone Mfg. Co. Voice carrier equipment is largely Lenkurt types 32, 33 and 45A, and Western Electric type C.

No Voltage Drop With Copper Bus Bars

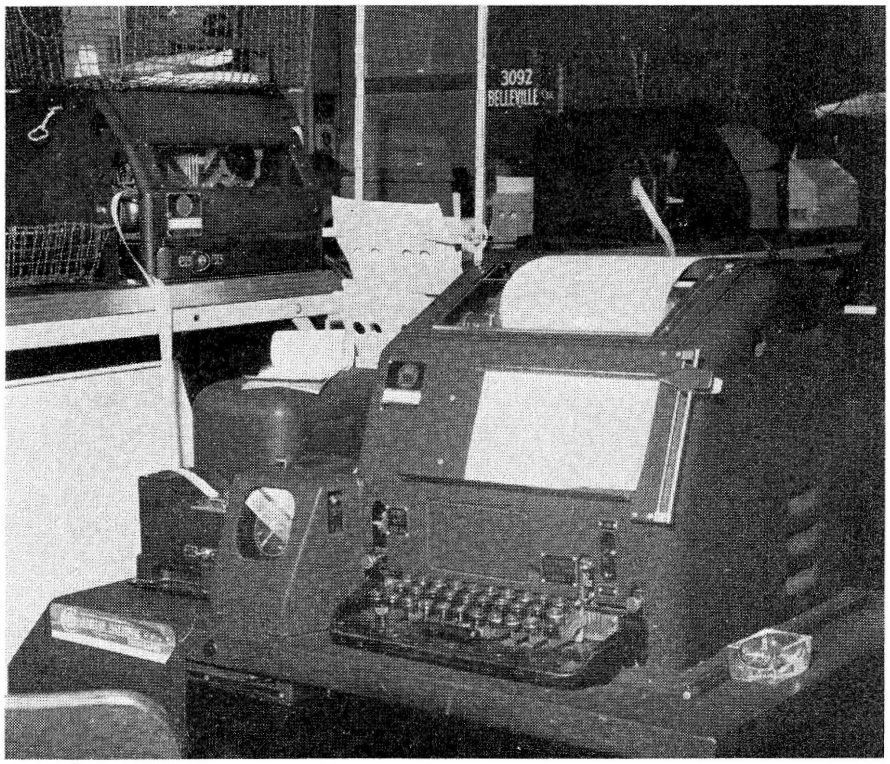
One floor above the testing and regulating room is the power room. Here incoming a.c. at 208 volts, 60-cycle, 3-phase is rectified to supply 130 volts plus, 130 volts minus, and 24 volts for filaments. Two rectifiers are on normal service for each voltage, and each has one standby unit. These selenium rectifiers are in parallel with lead-acid storage battery, the rectifiers taking the majority of the load and the battery acting as a filtering and stabilizing element. The rectifiers are manu-

factured by the Canadian Line Material Co., Ltd. Sixty cells of Exide 1120 a.h. battery are on each 130-volt line, and 12 cells of 9075 a.h. battery are on the 24-volt line. By using copper bus bars (3/8 in. by 3 in.) for d.c. transmission, no significant voltage drop is incurred between the power room and the carrier and printer terminals. Bus bar joints are silver plated and the bars are covered with polyvinyl sleeving to prevent corrosion. At the old office on Bay street, a 2-4 volt drop was experienced between the power room in the basement and the carrier equipment on the 12th floor. Six cables of 1,000,000 circular mils each (about 1½ in. in diameter) were used for d.c. power transmission.

Actual operating voltage at the carrier terminals is 129 volts, plus and minus, and 23.65 volts for filaments. To obtain this voltage, during commercial power failures, counter EMF cells are employed. These buck the storage battery when the commercial power is "on," thus maintaining the 129 and 23.65 voltages. When the commercial power fails, a 2-volt drop occurs—and to prevent this, a relay cuts out the CEMF cells, so that the storage battery without rectifier support will maintain the proper voltages. The batteries, with commercial power off, will hold the voltages for about 3 hr. During this time a 650 kva, 800 brake hp diesel engine generator will be started to supply a.c. at 208 volts, 60-cycle, 3-phase for the rectifiers.



Rectifiers for 130-volts d.c. and copper bus bars for its delivery downstairs



Typical operating position in the "C" railway telegraph office

Special Bath Saves 3 Man-Days for Teletype Cleaning

A fully-equipped Teletype repair shop is on the fourth floor of the new building, and a feature of this shop is the cleaning facilities which save considerable time when a machine is to be completely overhauled and cleaned. A machine brought into the shop for cleaning is partially dismantled (remove typewriter ribbon, take machine out of its case, etc.). Then it is put in a cleaning vat, the machine being locked into position on a shelf which is continuously being raised and lowered during the bath. This action agitates a solution consisting of 12 gal. Varsol, 30 gal. kerosene, and 4 gal. office machine cleaner. The Teletype machine is "washed" for 20 min. Next it is placed in a tank where for 15 min. it receives a shower bath of hot water sprayed on under air pressure at 90 psi. The machine is then dried with air at 90 psi, and then sprayed with a fine oil mist, which prevents rust from forming on the metal parts. Finally, the machine is placed in an oven for drying (20 min. at 180-220 deg. F.). Thus a machine is completely cleaned in about 1 hr. Another advantage of this new cleaning method is that the machine requires less adjustment after cleaning than when it was completely dismantled for cleaning under the old method. Considerable time was required before for adjusting the machine after re-assembly. Now a machine can be cleaned and adjusted ready for use in one day, a saving of three man-days over the old method of cleaning.

Considerable planning, engineering know-how, and design work have gone into CNT's new Toronto office building. Briefly, credit is due J. R. White, general manager; R. B. Steele, general superintendent; J. S. Ford, chief engineer; and A. C. Cline, inside plant superintendent of Canadian National Telegraphs.