Frequency Modulation

This newest means of radio communication began its history about 1938. When the war stopped the expansion of frequency modulation (f-m) equipment, we had a total of 100 individual stations in North America. Since then we can only guess at the improvements in technique.

But what is this thing? What are its advantages? The answer to the first question is so large in scope and so complicated it is impossible to describe here. It is enough to say that the signal is varying in frequency instead of amplitude.

The advantages of the f-m type of transmission are many. F-m gives us static-free reception. This is because the atmosphere causes disturbances to the amplitude variation and does not affect the frequency variation. Since the f-m receiver depends on the frequency variation we eliminate the disturbances to the amplitude variation.

With the mention of high frequency, about 43-megacycles, one realizes that this type of signal will not be reflected by the upper atmosphere and will not go around the curvature of the earth. It is found that the signal will go from the tower to the horizon and past this about 30 per cent of the distance from tower to horizon. The formula, just in case someone is interested, is 2D2 equals 3H. Where D is in miles and H is in feet. But does not this cut down on the usefulness of the system? Definitely not. It is an improvement. We all know that we have a great deal of interference on the radio at night, because a distant station operating on the same frequency as the local station tries to crowd it out. With f-m this will be eliminated. F-m stations can be set up and operated on the same frequency, without interference, if the stations are about 120 miles apart (on flat country). Thus we can have many additional f-m stations.

What about the cost of a frequency modulated transmitter? A 5 kw. f-m station will give the same quality entertainment within its scope of distance as a 50 kw. present type station. And this reception is static-free and of higher fidelity. Higher fidelity simply means that one will be able to hear James' trumpet as a trumpet really sounds and the piano rhythms will be full of the quality-giving harmonics. Thus the cost is less and the reception more nearly that of what is broadcast.

Besides this, a great deal is saved in the construction of an antenna. It is necessary to have the antenna for today's transmitters about 180 to 200 feet high. Quite a structure! In the f-m station the antenna can be short, because of the higher frequency, thus lighter. It can therefore be placed on the roof of a building. It should also be noted that since the f-m type of transmission is static-free the transmitter and antenna may be set up in the heart of the city among the customers, among the noises of the power lines and tram-cars.

Without a doubt f-m will grow rapidly at the close of the war and the community that is without it is going to be far behind the times. At the end of expansion in 1942 f-m had already passed the experimental stage. Tomorrow it will be THE means of communications.

D. H. Green.

JAMES R. GILLIES, one of the lads from the foggy city. Jim is a reader of novels, especially those written by "Christie."

JOHN A. HARRISON, another man from town. He is the youngest of the Power Men but makes up for the years by his size.

C. DONALD MacDOUGALL, from the city, known to all the Seniors as "Beef." One of the more quiet boys of the Class, but occasionally gives forth with bursts of laughter.

CHARLES A. BUNKER hails from Rusagonis Station and will answer to "Bunk." He has been an addition to U. N. B. as a sportster.

EDWIN C. REID hails from Norton and is the able man of the Power Class and is referred to as bone-crusher Reid.

T. EDWARD R. MITTON, known as "Mit," is the sole representative from P. E. I. His main ambition is to devise some way to keep Reid at work in the lab after four o'clock.

D. M. ADAMSON, hails from Dartmouth, N. S., and answers to "Mac." He is one of the main stays of the slash-and-class Senior Interclass Hockey team.

RALPH E. AYERS, came from Aroostook Junction to add humor and zest in turn for smokes from the boys. Answers to Skip. The many hours Skip is up, keeping track of "Beag" are gradually wearing him down.

ROBERT E. EVANS, is a Fredericton man known to us as plain "Bob." During his stay "up the hill" he has taken a keen interest in social functions, and as such we have all benefitted.

ARTHUR J. O'CONNOR, the red-head from Albert County, answers to Art. He belongs in hard work for everybody but can seldom get around to it himself.

AUDREY A. LEWIS, drifted in from Petitcodiac and is the oldest member of the Power Men, answers to "Aub." He looks forward to the frequent visits from "Boog."

A. FOSTER BAIRD, originally from Fredericton, is the wise leader of the Power Men, in whom he takes great interest. His untiring efforts towards the Engineers have brought a streamlined Electrical course.

A. G. Lewis,
A. J. O'Connor.

A RIDE ON THE NORTH SHORE TRAIN

The place: the senior drafting room; the time: around four o'clock; the characters: that horrible conglomeration of misfits known to the world as the "Senior Civils," and to their mothers as "Little Darlings."

Suddenly one pencil is set aside; immediately nine others follow in quick succession (this is always done according to a tacit agreement among the boys in order that no "throat cutting" take place).

Soon one of the pasty faced craftsmen, pushing his greasy hair out of his eyes and putting it his stone teeth, says, "You know, boys, I went home last week-end on the north shore train."

At once ears which up to now had been folded along cheek bones took their rightful places as things of beauty and ornament, bottles were picked up from the floor and a marked atmosphere of good-fellowship and interest was prevalent.

"Well," began that specimen aforementioned, "after being frisked at the entrance for concealed weapons by a husky bozo, I stumbled into the semi-dark car, already reeking from the smell of old socks, tobacco juice and assorted hair tonics (to be used internally as well as externally), only to discover that the car was overcrowded. This condition, however, was soon remedied by the loss of some of the happier passengers by way of the observation platform which is left down for this express purpose.

Seating myself beside a prehistoric bushman clad in a plaid shirt, hip boots and deer skin trousers, I endeavoured to enter into conversation, but all I could get out of him was a series of grunts and groans. This I soon deduced was a kind of code patterned after the fashion of the Morse Code. Two grunts for yes, two grunts and a groan for no. Soon tiring of this method of communication I reached over and stroked a huge dog belonging to a hairy individual, whom I assumed to be one of the fairer sex, smoking a pipe. The dog bit me. The animal sounds emerging from the throats of my neighbours at the sight of blood, my blood in particular, caused me no little alarm. But fortunately for me the conductor appeared at this moment and upon my asking him if there wasn't another car to which I could go, he told me if I was willing to pay another dollar I could travel first class. This I immediately did, and was shown to the first class car.

The difference was very striking, oil lamps were substituted for candles, glass was in the windows, a door on the stove and even banks of a sort on the seats. The people, too, seemed to be of a better class. More shoes and in a few cases even neckties were in evidence.

Seating myself as comfortably as was possible on two boards which continually pinched with every bump, one's posterior, I settled back to enjoy the ride. The ride, an entirely new form of locomotion, consisted of a combination of lurches, sways, and hops, and if I may judge its effect on others by what it did to me, I am convinced it would be an ideal testing ground for the cure of mal de mer. Fortunately my mind did not linger on my ills very long, because the train wheezed to a stop, one of the one-hundred and twenty-five on its one hundred mile run. One of the prettiest girls I have ever seen, you'd swear she was an Al Cap creation, boys, climbed aboard. She daintily sloshed her way through the refuse making straight for me. Well, not really, but—"

At this moment a heavy step was heard in the stairs, the narrator closed up like a clam, feet were pulled off tables, bottles were hastily pushed out of sight and pencils retrieved. So that when the pedagogue in charge appeared, for it was he whom they heard on the stairs, the room could easily be mistaken for a hive of industry.

—W. M. Trimayne, '45.

Hardrock's latest to the Juniors: "Just a short essay of 8 or 10 pages, long enough to cover the subject but brief enough to be interesting, like a woman's skirt!"

* * *

Said the Pitt Cockney preacher from the pulpit in his sermon on "wolfin'": "Some people say 'ugging is harmless, but I say 'ugging is 'armful."

Surveying the Modern Way

As the natural outcrops of our mineral resources and the known supplies of oil are being used up at a rapid rate, we should, and are beginning to, perfect devices for searching out further deposits that are as yet hidden in the Earth's crust. Exploration for oil is an urgent matter, for, at the present rate of consumption, the known supplies are now reckoned to last a comparatively few number of years.

We in Canada are more fortunate than our neighbors across the border, in having many natural outcrops of minerals still untouched and perhaps many more still unrisen covered. Since the United States is thus forced to probe deeper into the earth for more and better mines "she" is far ahead of us in Canada in the field of Geophysics and Seismology.

The most well known and widely used instrument associated with modern prospecting is the seismograph. The electrically operated seismograph of to-day produces data far more accurate than the older Gravity-meter and other instruments depending on gravity for their operation.

The stress placed on oil exploration since the beginning of the war has convinced Oil Companies of the great saving of time and money effected by the seismograph, and the instrument has been used extensively in Canada for the last few years.

The seismograph is an instrument used to transform elastic shock-waves into transverse motion so that a picture of their behavior can be recorded on paper, moved by clockwork.

To understand the use of the seismograph let us consider very briefly how it is applied to oil exploration in the Canadian West. Some oil experts believe that the flat prairie country of Southern Saskatchewan, Central and Northern Alberta, and certain parts of the Northwest Territories and the Yukon could be the greatest oil basin in the world. It is well known that much natural gas is escaping from the earth at many places in these districts, and in some, such as the Turner Valley, Alberta, valuable oil deposits have been discovered and developed.

Oil on the North American continent has never been obtained from formations older than the Ordovician and in Western Canada no oil has as yet been found below the Cretacious sediments. These facts then, give a maximum sub-grade of some 6,000 feet. With this established, the problem now is to obtain favorable local structures such as anticlines and domes, under which the oil collects, under pressure from the salt water which is nearly always associated with oil deposits.

In locating these domes and anticlines the seismograph is supreme. A certain section of country, anywhere from a few square miles to perhaps one hundred square miles, is chosen as being most favorable and operations begin.

Since much of the Prairies is cross-sectioned, the work is simplified. A hole, called a "shot-hole," about four inches in diameter and fifty to sixty feet deep is drilled at each corner of each square mile. This drilling is usually done with a rotary drill mounted on a two or three ton truck. Shortly after the drilling crew has finished drilling a hole, the "shot" truck and the "instrument" truck arrive to "shoot" the hole and obtain a record of the effect that the different strata have on the elastic shock-waves created by the dynamite charge.

This is how that record is obtained: A cable, usually containing twelve separately insulated wires, is laid out for 1,000 feet on one side of the hole. To each of these wires "pick-up" is attached. These "pick-ups" are actually miniature electric generators which are so constructed that when acted on by shock-waves they generate an electric current. This current is conducted to a relay in the "instrument" truck, where it is used to actate a device from which a thin beam of light is focused on photographic paper moved by clockwork. A similar circuit is used for each of the twelve "pick-ups" and the twelve effects are recorded on the same record sheet.

Since the "shot" truck and the "instrument" truck are connected by two-way radio, the exact time of the explosion is known to the operator of the instruments and the clockwork can be started at the correct time. Shock-waves penetrate into the earth from the point of explosion and at each abrupt change in density, a strong reflection is sent back to the surface. It is this reflection that is picked up by the "pick-ups" and recorded. Since only one shock-wave, having a particular angle of incidence and angle of reflection can be picked up by any one "pick-up," and knowing the velocity through the different strata and the depth at which the explosion occurred, the vertical distance that the wave penetrated can be calculated. When the surface elevation at each of the "pick-ups" is known, the dip of the formation at that particular hole can be ascertained. The same procedure is carried on for the other side of the hole.

When this is done for a number of holes in the area, all of which having been definitely located, the information can be correlated and a system of sub-surface contours drawn in much the same fashion that surface contours are drawn.

All that now remains to be done before the "big-rig" can be set up for deep drilling is the selection of structures depicted by the sub-contours which are likely to contain oil. This big drill may be twelve to fourteen inches in diameter and may penetrate 6,000 feet or more into the crust of earth.

The great value of the seismograph in this kind of work is the saving of money that is effected when deep drilling is confined strictly to favorable structures and not just anywhere as was done formerly.

—C. E. Scott, '46.

Engineering Course

(Continued from page one)

office work; Levelling; Method of determining best route for Railway, etc.; Computation of the quantities of land, earthwork, etc., required for the execution of the works; Horse-power of Machinery, etc.; Method of "setting out" Railway curves and side widths; Calculation of gradients and theory of inclined planes; Superelevation of rails; Composition and resolution of forces; calculation of strains and pressures; strength of materials; theory and practice of timber and iron framing; viaducts, bridges, etc."

"Three lectures a week will be given in the College; and instruction in the field will also be given once a week, or as often as may be expedient."

Fredericton, Charles Fisher,
December 1, 1853 Registrar.

This comprehensive and intensive course—extending over a period of two and one-half months—was undertaken by the Engineer brought here from England to conduct the survey for the European and North American Railroad. This railway was intended to connect Halifax with Portland, via Saint John. How successful the course was has not yet been discovered, but the press of the day was enthusiastic, as would appear from the following quotations:

"The gentleman who has been engaged to give instruction is we believe, well qualified for the task; and under his guidance, the young men of the country may be thoroughly trained for those occupations which the progress of railways will open up."

"Mr. Cregan, who was engaged some time since to give a series of lectures on Civil Engineering in King's College, delivered the introductory one on Wednesday last. Of this lecture we have heard a most favourable Report from those who were present at its delivery, who represent it as displaying a large amount of talent and practical information, skilfully conceived and well communicated."

Twenty-six students were enrolled for the first course.

William Brydone-Jack, who was Professor of Mathematics and Natural Philosophy at the time, no doubt co-operated in giving the course.

It is doubtful if any other Canadian University has been in the field of Engineering Education for a period of over ninety years, and students of today, "Up the Hill", especially those in Engineering,—but not those alone,—should feel an additional cause for pride in our University that she can boast of such a tradition. And this is only one such.

February 15th 1945 marked the ninety-first birthday of our Department of Engineering.

SOIL CEMENTS

At Seven Islands Aerodrome, P. Q., soil cement was used for the second time in Canada. The first time it was used was at Camp Borden in the widening and extending of the existing runways.

Five years of intensive research in field and laboratory have developed scientific, though simple, methods of processing soils with Portland cement to produce low cost (under $5,000 per mile), durable and weather-resisting material, designed for light traffic needs.

Soil cement has been laid in many localities and under a great many varietics of climatic conditions and has proven its ability to stand up under divers conditions of temperature and moisture. Seven Islands proved a great testing ground for soil cement as it possesses a wet and cold climate the year around.

The Seven Islands Aerodrome is located approximately half a mile from the shore of the St. Lawrence River and about seven miles due east of the town of Seven Islands. There are four runways, three of which are soil cement and the other of steel mats. The parking area and turning aprons were made of concrete. In most cases where soil cement is used the natural soil in the roadbed is processed in place. Here, however, the soil was of an uncommon type. The topsoil was sandy and very high in organic content and was unsuitable for the mixing of economical soil cement. Hence it was necessary to bring in new material to make up the sub-grade and to provide a proper soil mixture, consisting of clean grey sand and clay.

The subgrade was made up of gravel rolled to a thickness of three inches on which was laid the grey sand and clay thoroughly mixed and graded to a thickness of six inches. A predetermined amount of Portland cement was spread evenly over the surface of the sand and clay. These three ingredients were thoroughly mixed with disc harrows, spring tooth harrows and heavy duty cultivators. The amount of moisture needed was determined by the field control lab and was then added. Heavy sheepsfoot rollers were used to pack the mixture, from the bottom up, to insure maximum and uniform density. A blade grader then shaped the section up to the required grade and crown and the engineers checked at this point to make sure the soil cement was to the proper grade and of good quality. The smooth wheeled tandem roller then rolled the surface to a smooth, even finish. The entire process from the time that water was added to the mixture of sand, clay and cement to the time of completion was not supposed to take more than six hours because after this time the cement began to set and was not workable.

Soil cement has been used extensively in the United States and Great Britain. When the U. S. Marines captured Henderson Field on Guadacanal they found that the Japs had built some soil cement runways there, so soil cement is by no means a new material and has great possibilities as a paving material for secondary roads in Canada.

T. J. Cyr,
M. D. MacLean.

If you are in doubt ask LINDSAY WARD. He can always be seen in the lab playing with a weird machine which looks like a toy railroad.

DOUG McKEE is a firm believer in "better late than never." Last week he hit a coldering iron in a fit of anger.

SOL LASSMAN has visited many parts of the globe. Not seen very often these days, he is busy inventing television so swooners can see "The Voice" as well as hear him.

JOHN HOUGH takes great delight in inventing new noises. Having perfected all known types, he is conducting extensive research for one that will shatter the nerves.

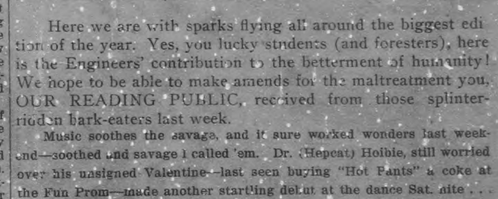
Have you read about the gun the Russians are using? Believe it or not, it was cooked up by FRED DAVIDSON, president of the greatest society on the campus.

ARN GERRISH is a member of the expedition which came from the northland to see how the rest of the world lives.

DAVE PLUMMER is not accustomed to the bright sun as he spent his youth in Saint John.

From the actions of DON (MARCONI) GREEN one is led to believe he is inventing the radio.

Last and foremost is a man of unfailing patience, to whom we run with our sorrows, PROF. DINEEN.



Here we are with sparks flying all around the biggest edition of the year. Yes, you lucky students (and foresters), here is the Engineers' contribution to the betterment of humanity! We hope to be able to make amends for the maltreatment you, OUR READING PUBLIC, received from those splinter-riddon bark-eaters last week.

Music soothes the savage, and it sure worked wonders last week-end—soothed and savage I called 'em. Dr. (Repeat) Hobbie, still worried over his assigned Valentine—last seen buying "Hot Pants" a coke at the Fun Prom—made another starting debut at the dance Sat. nite . . . Nice Looking, kid . . .

"While the cat's away the mice will play." Anna leaves and Harry calls a Doctor. Is that Wright, Harry?

Art O'Connor seemed very pleased with himself and Rose—Grass ain't growing under those smooth steps.

Skippy and Jack, overcome by the effects of the music, retired to the Queen Hotel to await the "bus that never came"—Nice stash, kids.

Apparently Patsy prefers the navy blue to the Red and Black—By the by, "Stud," have you made any progress on the Devon amalagation?

Did you see the left-overs from the Mounties' Ball Sat. morning? Ottis (must be the moustache) Logue, Charlie (God's gift to women) Weyman, Dale (love them and leave them) Wade, Dick (slow but steady) Sainsbury, Uffe (Sure I'm sober!) Anderson and Boog (I never touch it without a seal) Young.

A sight to behold, Helen Gibson in the arms of Dashing Izzy Baab, singing "Who dat up dere" to Stewart in the balcony. I bet Moose would not think you were like ano old woman then, Izzy . . .

Ced McDiarmid is back in the Red again . . .

Nancy, don't you think 4:30 is an awful hour for Ber. to be out? And just what is this neon Gillies doing out till 5:00? . . . but it shows pretty poor judgment on your part, Don, to kid your roommate and then go him one better by several hours—and Sunday night too!

Well, f'mates, here we are at the end. It is with tears in our eyes and prayers for your future on our lips that we say good-by. But wherever there are bottles clinking or hearts missing the odd beat you will find our nose. So beware, you bottle-tipping heart-breakers because I'll be at the Engineers' Dance and Wassail, so your breath had better be sweet and your minds pure!!

Yours truly,
J. C. Antenna Snoop.

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The Rt. Hon. Winston Churchill.

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'SOMETHING FOR THE BOYS'
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WED.-THURS., MARCH 14-15
Frederic MARCH—Claudette COLBERT in
'SIGN OF THE CROSS'
FRI.-SAT., MARCH 16-17
'THE MASTER RACE'

CAPITOL
MON.-TUES.-WED. Mar. 12-13-14
'ARMY WIVES'
Elyse KNOX-Rick VALLIN
Also STAN LAUREL and OLIVER HARDY in
'THE BIG NOISE'
THURS.-FRI.-SAT., 15-16-17
'DANCING MANHATTAN'
Fred BRADY-Ann SAVAGE
Also 'GHOST GUNS'

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