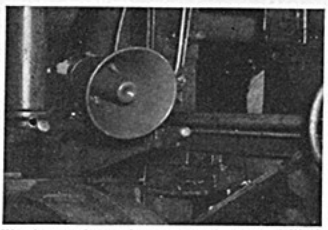
F-M Communications In

Field superintendent Walter Plemnons beside one of the three passenger cars in which two-way f-m units are installed.

Toolpusher Edsie Plemnons and the two-way unit at his bedside through which all emergency reports can be relayed.



Weatherproof speaker mounted near driller's position. Speaker is connected to the receiver in tool house and is on 24 hours a day.

(Left)

Lacy Goosetree of the Dallas G.E. office with f-m transmitter and receiver which are mounted in trunk compartment of passenger cars.

Eleven-Station Two-Way Net, Operating in Northern Texas on 37.14 Mc, Provides Contact to Drilling Rigs, Pickup Trucks, Superintendent's Car, Owner's Car and Toolpusher's Home. Equipment, Operating 24 Hours a Day, Has Proved Invaluable in Speeding Up Deliveries, Reducing Trips and Accelerating Important Operational Decisions.

by TED W. MAYBORN

REMOTENESS OF OIL WELL drilling activity, coupled with the mobile nature of its modern equipment, precludes economical wire communication, and two-way f-m contact represents not a substitute but a sole means of satisfactory contact.

Growing Demand for Service

Radio communications now play a vital part in many oil operations, but in the oil well drilling branch the greatest demand is anticipated.

In oil well drilling, the demand for radio communications is keyed to major economies for the operator rather than better service as would be the case in taxi operation. These economies have, in every instance of installation to date, paid for the initial investment in less than six months, and in one case in six weeks. This is due in part to the costly nature of the drilling operations and the greater opportunity for major savings. Better service to the company-employer who is using an independent drilling contractor is a favorable factor, and is a selling point for the contractor in securing contracts. Through radio communication to this employer from a remote drilling rig, the oil company executive is kept in touch with all important operations and is given opportunity to make decisions without delaying further activity at the rig. As important as this may seem, the real economies are obtained primarily in saving extra and unnecessary trips to the rig by the toolpusher (supt.) or delivery trucks. Breakdown of equipment or other delaying factors are remedied more promptly when f-m communications to the home office, or to the superintendent's home, at night, can describe the trouble and bring proper tools and expert machinists to the location in less time than it would take a man to drive into the nearest town in his car.

Dallas Setup

A typical example of radio's use in drilling operations is found in the F. B. Paine Drilling Company of Dallas, which operates five drilling rigs in the north Texas area. The modern rotary rig designed for drilling to 8,000 to 10,000 feet is an intricate assemblage of costly engines and hoisting equipment totaling more than $100,000 per rig. Wells drilled by these rigs average $50,000 to $60,000 each and require approximately 30

Oil Well Drilling Operations

days per well. Running five rigs, then, becomes a major investment in every phase of operation.

Drilling Rig Link

The Paine Drilling Company is an average sized company in oil well drilling. Some firms operate 25 to 40 such rigs, others only one or two. This firm, one of the first among drilling contractors to install f-m communications, operates a network of eleven f-m transmitters in North Texas on a frequency of 37.14 mc.

Each of its five drilling rigs is equipped with a radiotelephone transmitter and receiver, and the other six sets are installed in pickup trucks, superintendent's car, owner's car in Dallas, and in the toolpusher's home. All of the sets are identical and are operated by six-volt automobile storage batteries that are kept charged by usual auto generators. Installations at the rigs are charged by generators run from V-belts attached to the drilling engine fan pulleys.

Continuous Services

All sets are kept on continuously at the rig, since drilling is a continuous 24-hour job involving three crews. Log of conversations is not kept except in cases of equipment failures, interference or difficulties with radio transmission, and in these latter cases the log must be kept for a year.

The initial investment in radiotelephone equipment for the Paine Drilling Company was $7,000. In the first few weeks the company estimated more than $2,500 savings in operations due to speeded up delivery, unnecessary trip reductions and through issuance of prompt decisions that would have shut down operations had not two-way radio been available. This initial cost was wiped off the books within the first five months through these constant savings, according to the manager, C. J. Paine of Dallas.

Costs

In the meantime, cost per unit for the equipment averages $5 per month for mobile sets and $15 for portable units. FCC's estimate on life of f-m equipment is from seven to nine years; oil well drillers slice this to a maximum five years due to roughness of the industry's usual operations on all equipment. Contractors, however, declare that for $50 per month per rig the entire cost of maintenance and initial installation can be amortized within the five-year period.

Multiple Uses of Channels

Greatest difficulty is expected eventually from this industry because of the scarcity of h-f channels for their part of the petroleum industry's allocation of wavelengths. Stationary plants of the utility nature, including gas and oil marketing, have the lion's share. Already in the north Texas area, where installations soon followed the original one of the Paine Drilling Co., two and three firms have joined in *party line* stacking on the same assignment. Strangely enough this has worked out well in the several installations now taking place. In no case, however, have competitive companies joined in the stacking. One or two producers of oil, and a contractor, have made up one group. A supply house, a producer and a contractor have made up the other. Even so, the number of areas are filling up to a point where north Texas can take no more. West Texas is the next big area, with applications already well underway, and agreements for similar groupings on the same dial number are expected.

Advantages of Service

The field is only scratched, and what will become of the future applications in these filled areas is a headache that the drilling industry and the FCC must work out.

Other economic and administrative improvements due to f-m's advent into oil well drilling are interesting, too. A toolpusher who once drove two hundred miles a day looking after two or three drilling rigs, and finding in most cases that the trip was little more than a routine check which did not result in accompiishment, now finds that such trips are necessary to make only when his assistant calls upon him. This leaves him greater time for other types of work connected with efficient drilling, and in the case of the Paine Drilling Company made it possible to purchase two more drilling rigs to be supervised by the same superintendent. This added employment for thirty more men, five in each shift three times a day on both rigs, and did not increase administrative costs.

The Squelch Circuit

Use of the squelch circuit on receivers installed in cars and in the homes enables these 24-hour supervisors to retire with full confidence that the speaker will awaken them if an emergency arises on any of the rigs. The speakers on each drilling rig are given enough volume to be heard clearly by every employee even above the roar of three big diesel engines.

Field Incidents

Typical of the importance of f-m in hazardous drilling operations are two recent incidents. Near Madisonville, Texas, during completion of a high pressure gas well, the pipe ruptured near the surface of the ground and soon the surrounding area was blanketed by poisonous hydrogen sulphide gas. Crews were unable to approach the well to close safety valves. An f-m call to the Houston home office brought, within the hour, a plane loaded with gas masks and special tools. The saving cannot be reckoned, since total loss would have involved human lives as well as valuable property. Another example, in the northern part of the state, credits f-m with the saving of one life. A man who had been working on a line heater during the February ice age heard his receiver warn him of a freeze in the gas line farther down the string. He left forthwith in his car and had driven but a quarter mile when the pipe burst and the line heater was demolished.

Unique Operation

In north Texas and the Panhandle, rigs were kept in operation during the

FCC Category	District	Major (Integrated) Oil Firms	Independents	Drilling Contractors	Pipe Line Companies	Geophysical Companies	Pipe Line Contractors
Provisional	9	7	4	1	1	4	—
	10	7	3	7	14	1	3
Utility	9	—	—	—	3	—	—
	10	4	1	—	11	—	—
Geophysical	9	3	2	—	—	16	—
	10	12	2	—	—	18	—
Experimental	9	1	2	—	—	—	—
	10	4	1	5	—	3	—
Special Emergency..	9	—	—	—	—	—	—
	10	—	1	—	2	—	—

Oil industry operators of industrial f-m networks in southwest (exeluding marine transport).

freezing weather that otherwise would have had to shut down.

Coverage

Distance assured by f-m installations in the drilling industry is a factor of greatest importance. Many contract drilling companies, and some producing oil companies with their own far flung drilling rigs, cover large areas of an oil producing sector. From fixed stations to mobile units the distances are increased by use of towers. A 200′ 60-watt tower will reach a car fifty miles away. The antenna on a 130′ drilling derrick will reach a car forty-five miles away. Tower to car, with 250 watts, can extend the distance to sixty-five miles. A 300′ tower oi 60 watts will accomplish the same result. But to reach 90 miles from tower to drilling derrick, without use of directional beaming, the tower must be 300′ with 60 watts. With directional beaming a 200′ tower of 60 watts will do the same work. Directional beaming in oil well drilling is not always practicable, because the portable installations on drilling rigs are moved to new locations at the start of each new well. It is used largely by the stationary utility type of petroleum company, or pipe line company.

West Texas Installations

West Texas, where radiotelephone installations already have become popular, the distances covered are greater and drilling costs are higher. Opportunity for savings are thus more pressing, and advantages of f-m become more obvious. The first installation there was confronted with poor reception in low areas, particularly around Odessa and Midland. To answer the issue raised by oil companies, a test was conducted.[1] While most oil field installations are of 50- and 60-watt power, the tests were run with only 30 watts to offset any advantages that test equipment might have over ordinary installations.

Field Tests

The initial tests were conducted from the 120′ City water tower at downtown Midland with runs made north to Andrews and Seminole. Contact with the car was maintained to a point 12 miles north of Andrews, an airline distance of 46 miles from Midland. A temporary antenna was placed on the 130′ derrick 12 miles south of Seminole and connected into the car. Contact was reestablished with Midland at an airline distance of 61 miles. Reception at the rig was good, but that at Midland was poor due to the high noise level prevailing at the downtown location. This confirmed previous experience where it has been found that best results can be obtained by locating a central station at a home or in suburban areas free from X-ray machines, diathermy and other interference downtown. This also aids the operator to use the f-m system in the day at his office and at home at night.

[1]Test conducted by G. E. Dallas office engineers, and Jerry S. Stover of Communications Engineering Co. of Dallas.

Use of Towers

Thus, in order to approximate the conditions of a suburban location, and to test the advantage of a higher antenna, tests were then conducted from a 300′ tower of KCRS, just west of Midland. From this location solid communications were established south out of Midland to Iraan . . . but as the car dropped down into the hilly area, 55 airline miles from Midland, the contact became spotty and was satisfactory only when the car was on a hill. From a hill 83 miles south of Midland the contact was excellent, the greatest distance obtained in car to station tests and proof enough of the value of high towers and good locations. Dropping off of the hill, contact was lost and not reestablished until a temporary antenna was placed on an oil derrick 130′ high, 90 miles from Midland. From both ends the communication was clear.

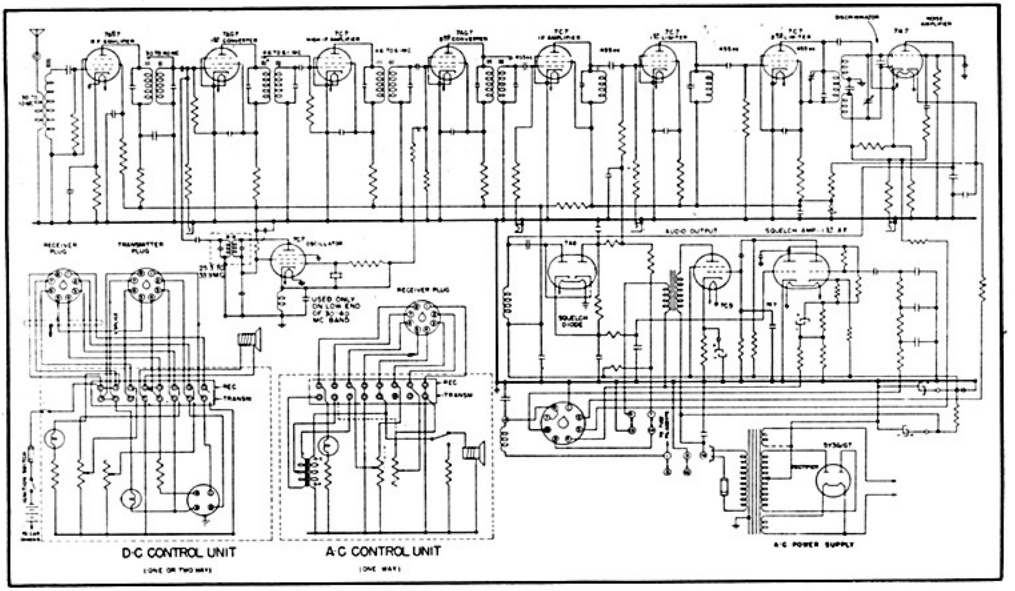
Day-Night Tests

These long haul tests included night and day runs, varying weather conditions and tests for absorption and noise, and in every instance demonstrated that day and night and every sort of weather failed to alter reception.

Future of Service

Thus f-m radiotelephone has entered a big business field where 60- to 80-mile range is demanded for west Texas operations, and where the only solution appears to be 200′ and 250′ towers. This, according to estimates of experts, raises the monthly amortization cost from the north Texas $50 to a west Texas $63 over a five-year period.

But when one considers how many operating hours (at $800 a day normal . . . up to $1,200) can be lost each month and how much driving is done just because there is no communication out to a $100,000 drilling rig, it is easy to see why f-m pays for itself in short order.



The f-m receiver used for 30 to 40 mc reception. (*Courtesy G.E.*)

F-m transmitter used in oil well drilling two-way system. (*Courtesy G.E.*)