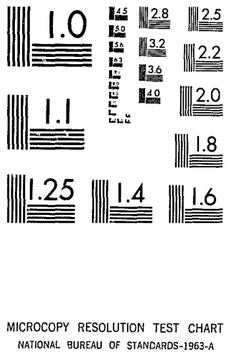
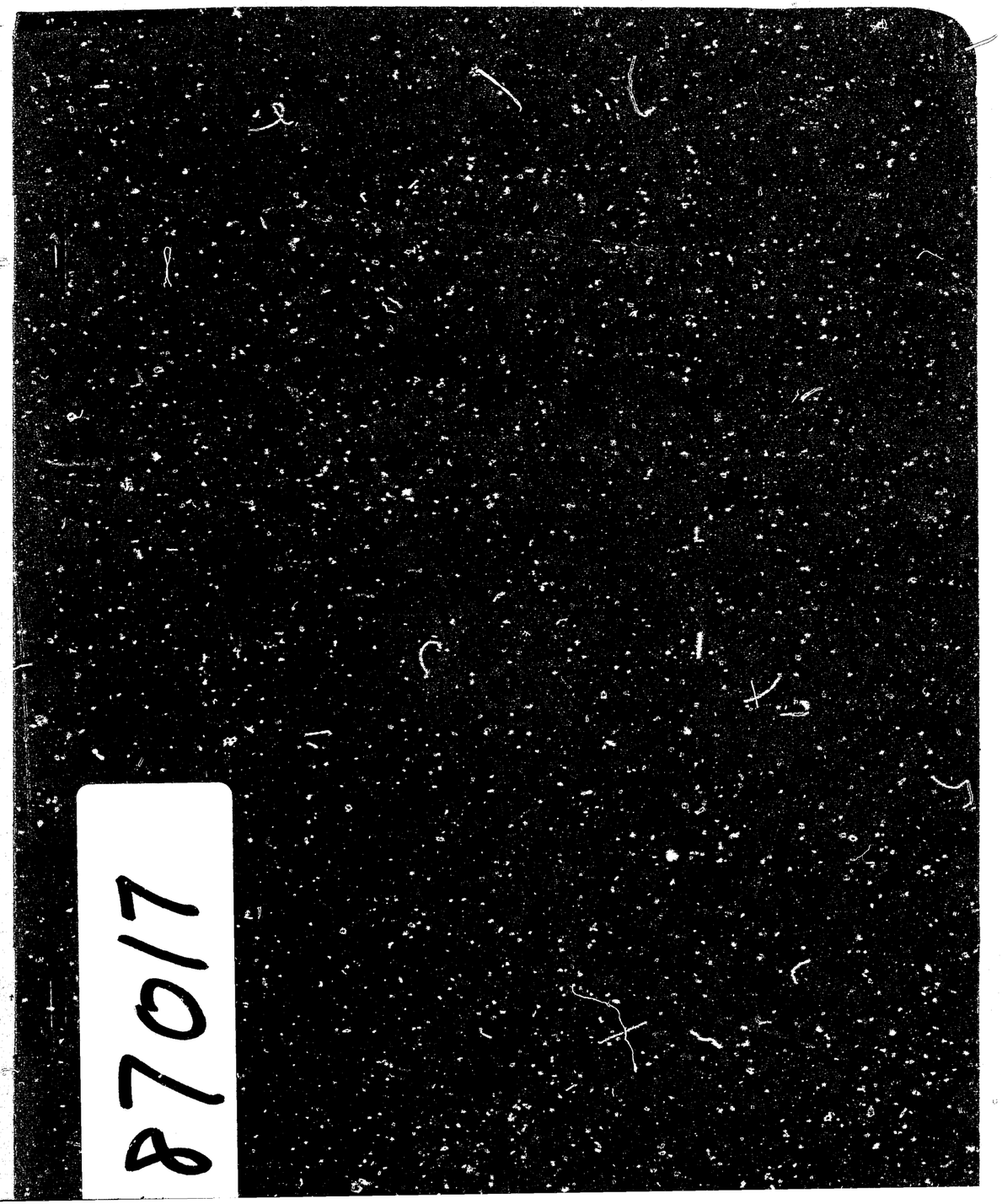




ANALYSIS OF RADIO COMMUNICATIONS SYSTEM
FOR THE
DIVISION OF DRUG CONTROL
DEPARTMENT OF HEALTH
STATE OF RHODE ISLAND

Task #7902201
This report is based upon the study of the communications facility of the Division of Drug Control conducted on May 12,14, 1979. The findings of this report reflect the technical opinions of the advisor and not necessarily of APCO, Inc. or the LEAA which funded this project.

Norman R. Coltri, Advisor
May 31, 1979

The Department of Health for the State of Rhode Island is responsible for the only state drug enforcement program. Through its agents, the Division of Drug Control provides enforcement of the Uniform Controlled Substances Act, the Food Drugs and Cosmetic Act and other laws of the State. In addition to enforcement of drug laws, the Division is also responsible for administration of the Drug Prescription Program through pharmacies. During times of emergencies the agents are diverted from normal duties to relay pharmaceutical products throughout the State.

The proper administration and enforcement programs require a reliable statewide communications system. The system should be able to contact and provide fixed base support to the field agents. Additionally, the system should provide car to car communications for coordinated activities such as stake outs, raids and escorts. A second independent radio system is utilized for undercover covert communications. This covert system is not considered in this report as it is currently providing satisfactory service to the Division. The present tactical radio system however does not provide the statewide coverage required by the Division. Conversation with Mr. Charles Hachadorian, Jr., Administrator of the Division of Drug Control, several of his agents and Mr. Charles W. King, Communications Specialist for the State Department of Health resulted in the defining of numerous communications problems. Most of the problems revolve around the inability of the present communications system to provide coverage which is to be expected with the complexity of today's

modern law enforcement techniques.

The problems noted with the Division's Communications System fall basically into three broad catagories:

1. Inadequate base station facilities
2. Outdated mobile units
3. Various deficient options

The current base station facilities consist of a modern solid state transceiver located atop the Department of Health Building in Providence. This base is controlled from a console at the reception desk of the Division as well as off hours by the 24 hour Division of Environmental Management dispatchers. The antenna height of this site is 75 feet. Transceiver is a 100 watt model with a noiseblanker but no tone squelch, operating on 45.44 MHz. Coverage from this station is good in all areas but the southern portion of the State. A view from the building roof indicated obstructions to the south.

The Division proposes to locate a second base station at a site about 10 miles west of Providence with a directional antenna south to provide coverage backup to the primary base. This new location is situated on high ground which will improve communications to the south.

Current mobile units used by the Division contribute significantly to the lack of statewide coverage. The equipment was obtained as surplus from the Division of State Police several years ago. It consists of General Electric progress line vibrator power 30 watt output mobiles. These units while excellent in their time are now considered obsolete. The combination of tubes and vibrator

power result in poor performance. Vibrator hash and ignition noise makes all but strong signals impossible to receive. The transmitter power output because of aging components and high current draw is usually less than 20 watts. The use of these mobiles during stake-outs require that the car engine be kept running in order to maintain a charged battery.

Several other problem areas include intercity communications, recording system, additional control units and computer access to law enforcement information. The intercity communications network operates on a VHF high band radio channel. The system connects each agency's dispatcher (and mobile units) into a common communication system. This intercity network is in addition to the State Police controlled Nationwide Police Emergency channel. Information exchanged on the intercity system may be less restricted than the guidelines for Nationwide. The Division has on order the necessary base equipment to become operational on the intercity network.

The Division currently has no recording of telephone or radio traffic. The safety of the agent's is the paramount consideration for a recording system. Radio calls in law enforcement are often not afforded the luxury of repeat messages. A call for help must be received properly during the first transmission. A method of radio recording is an essential on the tactical channel. Telephone calls also require the ability to review hurried often incomplete messages. A recording system is required for these contingencies.

During off hours, the radio system for the Division is dispatched by the Division of Environmental Management. At times

when special activities are in operation an agent or supervisory personnel operating from their office or conference room should be able to maintain field communications. Presently only one control console is provided at the reception area of the Division.

It is desirable that additional control positions for the agency's radio system be provided at various locations within the confines of the present building. This would provide for better operational control of the field units.

The State is currently in the process of implementing a data base computer system for law enforcement. This system will access Motor Vehicle, NLETS, NCIC and the State Criminal file. The Division as a law enforcement agency of the State requires the information contained in this system. The present procedure for Motor Vehicle look ups involves a microfiche reader for instate and a teletype terminal for out of state. NCIC and NLETS are accessed by the teletype terminal through the State Police.

This report has highlighted several areas where the Division could improve the present telecommunications system. The priority for such modifications is an essential item. The high costs of hardware combined with the limited capital budget of the Division require a structural implementation approach.

The present communications radio channel can provide the required coverage. The use of VHF low band in itself is not justification for a complete system change. The channel is shared with Health related EMS and CD operations; however, loading is reported at 20 mobile units. Aside from these related co-channel users, the present frequency 45.44 mHz is free from annoyance and interference. The Division currently possesses several late model portable units and a late model base station. An additional base station is currently on order. Basic system improvements can be made which will utilize this existing new equipment. With these improvements, satisfactory operation will result without necessitating a total system revamp.

One important area of system improvement is to specify that:

* all new equipment include tone squelch option.

Tone squelch is a coding system where each transmitter is keyed into the system. Unwanted signals are not allowed to be received by the base station or mobile units. Existing late model equipment can be retrofitted to include this option.

1. Base - In order to provide proper statewide coverage, a properly sited base station network is required. The present base

located at the Department of Health Building cannot be expected to provide this coverage. An ideal system would:

* locate a base station in the northern and southern portions of the State.

Typical locations for these sites would be the Chopmist area (northern) and the Dawley Parkarea (southern). The feasibility of establishing the southern site is limited by the availability, reliability and cost of the control facilities. Telephone line control of this base station would be unreliable and cost prohibitive. A statewide VHF high band system used by the State Police utilizes these locations linked by a microwave control system. A 1974 publication[1] describes a backbone statewide microwave system.

The system is only operational as a State Police control network. This microwave system, if made available to the Division as indicated in the publication, could provide the connection for the north-south base station sites. Without the use of this State microwave system, the feasibility of the southern site is questionable. As an alternate, the Division should investigate the use of:

* 72 MHz or 960 MHz control link systems.

While these Division owned systems require a significant capital outlay, the cost and reliability of telephone lines may make them attractive. Appendix A outlines the basics for these systems.

The Division is currently planning to remote a base station to a State owned tower on Darby Hill Road in Scituate. This site while not interconnected on the microwave system, will provide good

[1]Rhode Island Criminal Justice Information System A description of an LEAA funded interconnection system providing interconnection service to all levels of the State through a backbone microwave system.

coverage of the northern portion of the State. It will not provide reliable coverage to the southwest portion of the State some 40 miles away. Lacking the ability to utilize the microwave system, this may be the only feasible option available to the Division.

A site examination at Darby Hill Road indicates that the tower and building would be suitable for remote operation. The only obvious problem was the lack of emergency power. It is suggested that any remote equipment at this location:

* provide for a battery reverting standby power system.

Such a reverting system could provide for up to 14 hours of operation after a power failure. Although a telephone line could be used to control the station, a 72 MHz or 960 MHz control system should be investigated.

The installation of a transmitter at Scituate or Chopmist will result in the remote station being within 10 miles of the local station in Providence. Transmitting simultaneously on both transmitters will result in phasing areas which will render many areas of the State without communications. For the most part, the remote transmitter because of its advantageous location, will provide better coverage than the local base in all areas of the State. Unless the local base is moved to a higher building in Providence, its use will be limited to backup of the remote site.

2. Mobile - The mobile radio units operated by the Division significantly deteriorate the operation of the communications system. The age, frequent breakdown, and poor performance characteristics preclude the continued use of these mobiles in a primary law

enforcement system.

* The present Division mobile units must be replaced.

There is little doubt in this recommendation. The advantages and reliability of solid state equipment provide for increased range and low battery drain. Although complete replacement is required, a phased implementation of new mobiles could be over a several year period if a total change could not be budgeted. Specifications for the new mobiles should include:

* RF noise blanker
* 60 - 100 watt RF output
* Tone squelch
* Two channel operation
* Channel scan

The RF noise blanker provides for improved receiver operation in the presence of noise encountered in mobile operation. This increases the received range. The 60 to 100 watt RF output is required to provide the range necessary for statewide coverage. Tone squelch option, as discussed previously eliminates the annoyance of receiving unwanted signals from other stations. Two channel operation is required by the Division. The channel loading on the primary operational channel does not indicate the need for additional frequencies. The unique aspects of the Division's operation however, does justify an additional mobile channel. The sharing of a system with EMS and CD as well as other Division activities can present problems during stakeout or surveillance operations.

* A "mobile only" channel should be added to cars and portables for use during stakeouts, raids and surveillances.

This will allow the covert operations of the Division to be divorced from the routine system. The channel scan feature would permit the monitoring of the dispatch channel by mobiles using the "mobile only" car to car channel. Without scan, mobiles using the car to car channel would be lost from the system. A "mobile only" car to car channel should be licensed to the Division and installed in each new mobile radio and in all portables. The area frequency coordinator should be helpful in finding a statewide mobile channel within dual channel capability of the present 45.44 MHz.

3. Intercity System - The Division currently has on order a base station for this network.

* Intercity should be placed into operation upon receipt of the ordered equipment.

4. Recording System - While a recording system is required by the Division, the use of a conventional dispatch 24 hour recorder may not be justified. The continuous run systems are expensive and are generally used for a busy system which require documentation. During off hours or on weekends, depending on activities, the Division system may have limited activity. A logging system based upon voice operation may be the most cost effective in this situation. The 3 M Company has developed such a system based upon the use of inexpensive cassettes. It is suggested that the Division:

* Investigate the purchase of a voice operated recording system based upon low cost cassettes for recroding of radio and telephone traffic.

Such a system will provide the basics to protect safety of the agents in the field as well as provide a record which may be used

to substantiate the Division's actions during criminal proceedings.

A discussion of the possible configruation of such a recorder appears in Appendix B.

5. Control Units - The point has been made that from time to time it may be required to operate the radio system from other offices or a situation room in the Health Building. It does not seem feasible to place a control unit in each of these areas for the chance that they may be required. An alternate approach to the multiple control requirement is to:

* Wire remote control jacks in each location where a remote is desired. Purchase one or two remotes which can be jacked in as required.

With this approach the expense of numerous control consoles would be eliminated.

6. Computer Information - The need of law enforcement personnel for Motor Vehicle, NCIC, and NLETS data is clearly defined. The use by agents of the Divsion for investigative work is as great as any police agency. The current system of MV, NCIC and NLETS used by the Divison lacks in speedand completeness. Should the State proceed in the direction of on-line data terminals:

* The Division should be included in any system of on-line data involving MV, NCIC and NLETS.

7. System Licensing - Upon licensing the local and remote transceivers and the mobile units, provision should be made to:

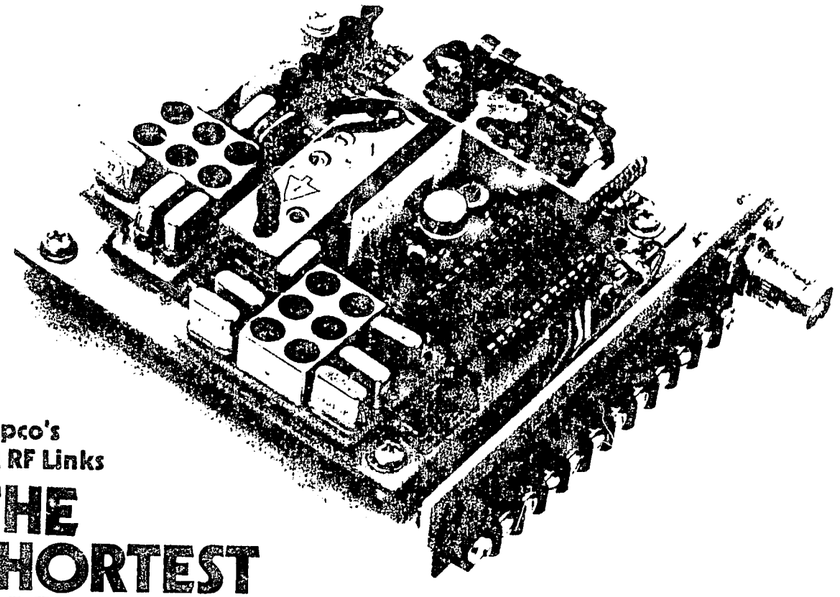
* Apply to the FCC for a system license such that all base stations and mobiles can be included under one call sign and license.

Appendix C provides information on System Licensing.

APPENDIX A

Control of remote base transceivers requires the use of specialized systems. The common method is to use leased telephone lines with DC or tone control signsls. Telephone lines are expensive and often unreliable. A backbone microwave system provides a secure and economical alternative to telephone lines. If the existing state microwave system should be unavailable, the possibility exists for the Division to establish its own control system.

Multi channel low density microwave is available at 960 MHz or 2 GHz. These systems are somewhat expensive. An alternative method would utilize a 72 MHz control link. This system provides a low cost alternative to telephone line control. Information is enclosed on 72 MHz control equipment.



Repco's
FM RF Links

THE SHORTEST DISTANCE BETWEEN TWO POINTS

Today, design engineers everywhere are specifying Repco's RF communications links for their telemetry requirements. And when you consider the advantage of Repco's RF links over wire, it's easy to see why.

RF links are small, lightweight. Our transmitters and receivers start as small as 3.32" square, and weigh as little as 3.5 oz. So no matter how tight your packaging requirement, we've got your link. **Unique modular design.** Repco's RF links offer optimum reliability thanks to plug-in block modules. Each module is a self-contained circuit that can be instantly changed — thus resulting in low-cost maintenance and design flexibility. **More performance options.** Repco transmitters and receivers are designed to carry tone, voice or low-speed digital data . . . Operate at frequencies of 25-50 MHz, 72-76 MHz, 132-174 MHz and 450-470 MHz. . . . And are available at 0.4W to 25W Tx output.

And, most important, **low cost.** Nothing untangles the high cost of hard wire installations like Repco's RF communications links. Want to know more? Send today for complete performance specs and we'll send you — free — our new RF links applications book. Got a telemetry problem? Get the straight line from Repco.

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Repco

As advertised in Electronic Design Magazine

VHF (mid band, 66-88 MHz)

TRANSMITTERS	810-042, 0.5 Watt	810-043, 1.0 Watt	810-038, 2.2 Watts	810-040, 4.0 Watts
Frequency Range	66-76 MHz	66-76 MHz	66-76 76-88 MHz	66-76 76-88 MHz
Frequency Stability	±.0005% (−30°C to +60°C)	±.0005% (−30°C to +60°C)	±.0005% (−30°C to +60°C)	±.0005% (−30°C to +60°C)
RF Power Output	0.5 Watt @ 15 VDC	1.0 Watt @ 15 VDC	2.2 Watts @ 15 VDC	4.0 Watts @ 15 VDC
Emission Type	15F2, 16F3	15F2, 16F3	15F2, 16F3	15F2, 16F3
Power Supply	+15 VDC ±15%	+15 VDC ±15%	+15 VDC ±15%	+15 VDC ±15%
Power Supply Current	180 mA (+15 VDC)	225 mA (+15 VDC)	400 mA (+15 VDC)	650 mA (+15 VDC)
Audio Input Impedance	5,000 ohms @ 1 kHz	5,000 ohms @ 1 kHz	5,000 ohms @ 1kHz	5,000 ohms @ 1kHz
Audio Input Level @ 1 kHz for ±3.0 kHz Deviation	5-10 mV rms	5-10 mV rms	5-10 mV rms	5-10 mV rms
Audio Response (300 − 3000 Hz)	+1, −3dB of std. EIA 6dB/octave pre-emphasis characteristic	+1, −3dB of std. EIA 6dB/octave pre-emphasis characteristic	+1, −3dB of std. EIA 6dB/octave pre-emphasis characteristic	+1, −3dB of std. EIA 6dB/octave pre-emphasis characteristic
Audio Distortion (Max)	6% @ 60% rated system deviation with 1 kHz modulation	6% @ 60% rated system deviation with 1 kHz modulation	6% @ 60% rated system deviation with 1 kHz modulation	6% @ 60% rated system deviation with 1 kHz modulation
FM Hum & Noise	50dB below 60% rated system deviation	50dB below 60% rated system deviation	50dB below 60% rated system deviation	50dB below 60% rated system deviation
Spurious & Harmonics	43dB below carrier	43dB below carrier	47dB below carrier	49dB below carrier
Weight	6 oz	6 oz.	6 oz.	6 oz.
Size	3.32" x 3.32" x 1"	3.32" x 3.32" x 1"	3.32" x 3.32" x 1"	3.32" x 3.32" x 1"
Mounting Centers	2.9" x 2.9"	2.9" x 2.9"	2.9" x 2.9"	2.9" x 2.9"
Duty Cycle (w/o degradation)	Continuous	10% (max transmission 1 minute)	10% (max transmission 1 minute)	10% (max transmission 1 minute)

RECEIVERS	810-037-04	810-055-05	810-055-04
Frequency Range	66-76 MHz	76-88 MHz	66-76 MHz
Frequency Stability	±.001% (−30°C to +60°C)	±.001% (−30°C to +60°C)	±.001% (−30°C to +60°C)
Sensitivity	0.35 μV. 12dB SINAD 0.5 μV. 20dB Quieting	0.35 μV. 12dB SINAD 0.5 μV. 20dB Quieting	0.35 μV. 12dB SINAD 0.5 μV. 20dB Quieting
Spurious & Image Rej.	70dB below carrier	70dB below carrier	70dB below carrier
Noise Squelch Sensitivity	0.25 μV	0.25 μV	0.25 μV
Adj. Channel Rejection	70dB (20dB Quieting)	70dB (20dB Quieting)	70dB (20dB Quieting)
Modulation Acceptance	±7 kHz	±7 kHz	±7 kHz
Audio Output Power	750 mW @ <10% distortion	500 mW @ <10% distortion	500 mW @ <10% distortion
Audio Output Impedance	25 ohms resistive	25 ohms resistive	25 ohms resistive
Audio Response (300 to 3000 Hz)	+2 to −8 dB of std. EIA 6dB/octave de-emphasis curve	+2 to −8dB of std EIA 6dB/octave de-emphasis curve	+2 to −8 dB of std EIA 6dB/octave de-emphasis curve
RF Input Impedance	50 ohms nominal	50 ohms nominal	50 ohms nominal
Power Supply Current	4.6 mA @ 15 VDC (standby) 87 mA @ 15 VDC (receive)	8 mA @ 12 VDC (standby) 87mA @ 12 VDC (receive)	8 mA @ 12 VDC (standby) 87mA @ 12 VDC (receive)
Power Supply	15 VDC ±15%	12 VDC ±15%	12 VDC ±15%
Weight	6 oz	6 oz.	6 oz.
Size	3.32" x 3.32" x 1"	3.32" x 3.32" x 1"	3.32" x 3.32" x 1"
Mounting Centers	2.9" x 2.9"	2.9" x 2.9"	2.9" x 2.9"
Duty Cycle	Continuous	Continuous	Continuous

tions between 152 and 450 MHz, where there is an adequate showing that such operations cannot be conducted on frequencies allocated for assignment to operational fixed stations. Such operation will not be authorized initially or renewed for periods in excess of one year. Any such authorization shall be subject to immediate termination if harmful interference is caused to stations in the mobile service, or if the particular frequency is required for mobile service operations in the area concerned.

(b) Control stations operating on frequencies in the band 450-470 MHz shall comply with the following requirements if they are located within 120 km. (75 mi.) of the center of urbanized areas of 200,000 or more population as defined in the U.S. Census of Population, 1960, Vol. 1, Table 23, Page 50. The centers of urbanized areas are determined from the Appendix, page 226 of the U.S. Commerce Publication "Airline Distance Between Cities in the United States".

(1) If the station is used to control one mobile relay station or two or more mobile relay stations located within 45 degrees of azimuth, a directional antenna having a front-to-back ratio of at least 15 dB shall be used at the control station. For other situations, a directional or omnidirectional antenna may be employed. In each case, the antenna used must, to the exent practical, produce a radiation pattern that provides only the coverage necessary to permit satisfactory control of each mobile relay station and limit radiation in other directions.

(2) The strength of the signal of a control station, controlling a single mobile relay station, may not exceed by more than 6 dB, the signal strength produced by a unit of the associated mobile station at the antenna terminal of the mobile relay receiver. When the station controls more than one mobile relay station, the 6 dB control-to-mobile signal difference need be verfied at only one of the mobile relay station sites. The measurement of the signal strength of the mobile unit must be made when such unit is transmitting from the control station location or, if that is not practical, from a location within one-fourth mile (0.4 km) of the control station site.

(c) A base station which is used intermittently as a control station for one or more associated mobile relay stations of the same licensee shall operate only on the mobile service frequency assigned to the associated mobile relay station when operating as a base station and on the mobile service frequency assigned to the associated mobile station when operating as a control station Authority for such dual classification and use must be shown on the station authorization. When operating as a control station, the licensee must meet all control station requirements. In the Railroad Radio Service base stations used intermittently as control stations shall operate only on a mobile service frequency which is available for assignment to base stations.

Subpart K—Standards for Special Frequencies or Frequency Bands.

§ 90.251 Scope.

This subpart sets forth special requirements applicable to the use of certain frequencies (4383.8 kHz) or frequency bands. (27.235-27.275, 72-76, 216-220, 450-470, and 1427-1435 MHz).

§ 90.253 Use of frequency 4383.8 kHz.

The frequency 4383.8 kHz may be used by any station authorized under this part, to communicate with any other station in the State of Alaska for emergency communications. The maximum power permitted is 150 watts peak envelope power (PEP). Airborne operations will not be permitted. All stations operating on this frequency must be located in or within 50 nautical miles (92.6 km) of the state of Alaska.

§ 90.255 Assignment and use of the frequencies 27.235, 27.245, 27.255, 27.265, and 27.275 MHz.

(a) Effective September 10, 1976, station authorizations for the use of 27.235, 27.245, 27.255, 27.265, and 27.275 MHz will be issued only to applicants in the Personal Radio Services. Licenses in the Radio Services under this part authorizing the use of these frequencies shall remain valid until December 31, 1979, or, if such licenses expire prior to December 31, 1979, they may be renewed and will be given expiration dates of December 31, 1979. Licenses issued under this subpart for frequencies between 26.96 and 27.41 MHz should be modified prior to December 31, 1979, to permit operation on other authorized frequencies.

(b) Prior use of these frequencies is subject to the following limitations:

(1) The bandwidth of emission shall not exceed 8 kHz.

(2) The output power shall be limited to no more than 20 watts.

(3) All operation is subject to interference from the operation of industrial, scientific, and medical devices on the frequency 27.12 MHz.

§ 90.257 Assignment and use of frequencies in the band 72-76 MHz.

(a) The following criteria shall govern the authorization and use of frequencies within the band 72-76 MHz by fixed stations. (For call box operations see § 90.241).

(1) The following frequencies in the band 72-76 MHz may be used for fixed operations:

Megahertz

72.02 72.04 72.06 72.08 72.10 72.12 72.14 72.16
72.18 72.20 72.22 72.24 72.26 72.28 72.30 72.32
72.34 72.36 72.38 72.40 72.42 72.46 72.50 72.54
72.58 72.62 72.64 72.66 72.68 72.70 72.72 72.74
72.76 72.78 72.80 72.82 72.84 72.86 72.88 72.90
72.92 72.94 72.96 72.98 75.42 75.46 75.50 75.54
75.78 75.62 75.64 75.66 75.68 75.70 75.72 75.75
75.76 75.78 75.80 75.82 75.84 75.86 75.88 75.90
75.92 75.94 75.96 75.98

(2) All authorizations are subject to the condition that no harmful interference will be caused to television reception on channels 4 and 5.

(3) The applicant must agree to eliminate any harmful interference caused by his operation to TV reception on either channel 4 or 5 that might develop by whatever means are necessary. Such action must be taken within 90 days of notification by the Commission. If such interference is not eliminated within the 90-day period, operation of the fixed station will be discontinued.

(4) Vertical polarization must be used.

(5) Whenever it is proposed to locate a 72-76 MHz fixed station less than 128 km (80 mi.) but more than 16 km (10 mi.) from the site of a TV transmitter operating on either channel 4 or 5, or from the post office of a community in which such channels are assigned but not in operation, the fixed station shall be authorized only if there are fewer than 100 family dwelling units (as defined by the U.S. Bureau of the Census), excluding units 112 or more km (70 mi.) distant from the TV antenna site, located within a circle centered at the location of the proposed fixed station. The radius shall be determined by use of the following chart entitled, "Chart for Determining Radius From Fixed Station in 72-76 MHz Band to Interference Contour Along Which 10 Percent of Service From Adjacent Channel Television Station Would Be Destroyed." Two charts are available, one for channel 4, and one for channel 5. The Commission may, however, in a particular case, authorize the location of a fixed station within a circle containing 100 or more family dwelling units upon a showing that:

(i) The proposed site is the only suitable location.

(ii) It is not feasible, technically or otherwise, to use other available frequencies.

(iii) The applicant has a plan to control any interference that might develop to TV reception from his operations.

(iv) The applicant is financially able and agrees to make such adjustments in the TV receivers affected as may be necessary to eliminate any interference caused by his operations.

(v) All applications seeking authority to operate with a separation of less than 16 km (10 mi.) will be returned without action.

(b) The following criteria shall govern the authorization and use of frequencies within the band 72-76 MHz by mobile stations in the Special Industrial, Manufacturers, and Railroad Radio Services.

(1) Mobile operation on frequencies in the 72 to 76 MHz band is subject to condition that no interference is caused to the reception of television stations operating on channels 4 or 5. Interference will be considered to occur whenever reception of a regularly used television signal is impaired by signals radiated by stations operating under these rules in the 72 to 76 MHz band regardless of the quality of such reception or the strength of the signal used. In order to minimize the hazard of such interference, it shall be the duty of the licensee to determine whether interference is being caused to television reception, wherever television receivers other than those under the control of the licensee, are located within 31 m. (100 ft.) of any point where the stations licensed under these rules may be operated. In any case, it shall be the responsibility of the licensee to correct, at its own expense, any such interference and if the interference cannot be eliminated by the application of suitable techniques, the operation of the offending transmitter shall be suspended. If the complainant refuses to permit the licensee to apply remedial techniques which demonstrably will eliminate the interference without impairment of the original reception, the licensee is absolved of further responsibility.

(2) The maximum transmitter output power that will be authorized is 1 watt; and each station authorized will be classified and licensed as a mobile station. Any units of such a station, however, may be used to provide the operational functions of a base or fixed station. The antennas of transmitters operating on these frequencies must be directly mounted or installed upon the transmitting unit: Except that when permanently installed aboard a vehicle, antenna and transmitter may be separated as required for convenience in mounting. Horizontal polarization will not be allowed; and the gain of antennas employed shall not exceed that of half-wave dipole. The maximum bandwidth that will be authorized is 20 kHz. Tone control transmissions are permitted.

Ch 4
New York City WNBC
73 59 10 404454

Ch 5 79 MHz
New York City WNEW
73 59 10 404454

Washington DC WRC
77 04 53 38 56 23

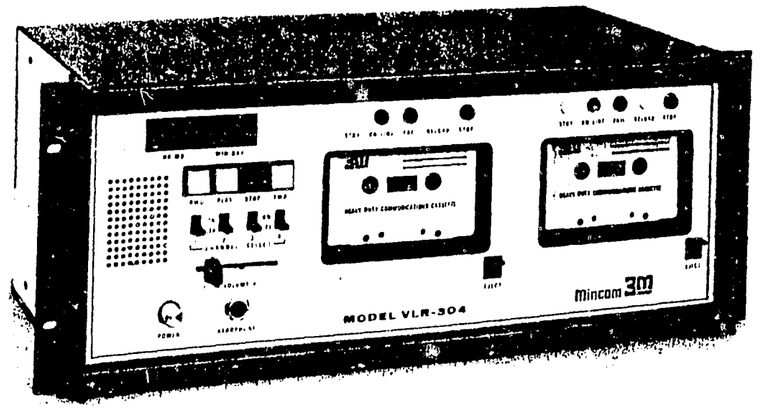
Washington DC WTTG
77 04 57 38 57 21

APPENDIX B

Recording System

A multi channel recording system based upon a 24 hour continuous run tape is very expensive. Approximate costs approach $12-$15000. The use of recorders can usually only be justified by large communications centers that have high volumes of traffic. The volume user also requires the security provided by on line recording. To meet this need, manufacturers have developed lower cost voice operated recording systems. These systems are based upon cassette tape which also reduces storage costs. The number of channels of recording are reduced, but should be sufficient for smaller communications users. A typical system by 3 M is shown for comparison with the larger continuous run records.

3M MODEL 304
COMMUNICATIONS VOICE LOGGING RECORDER



The Mincom Model VLR-304 provides phone, voice or contact closure activated recording of two-way voice communications.

The Model VLR-304 Recording System is ideally suited for applications requiring archival recording such as:

Public Safety Facilities
Emergency Medical Service
Customer Complaints
Telephone Surveys
Management Control
Banking Systems

VLR-304 FEATURES

- Simultaneous recording of four voice communications channels:
  - Four individual telephone lines, or
  - Four individual two-way radios, or
  - Any combination of telephones and two-way radios, up to a maximum of four channels.
- Recording format is four tracks on standard heavy duty communications cassette. Recommended tape is 3M Heavy Duty Communications Cassette.
- Three record actuating modes are provided:
  - Telephone interface actuated
  - Voice actuated switch (VOX)
  - Contact closure actuated

  Any of the four channels can be actuated independently by either of these three methods.
- Two cassette drives with one drive always ON-LINE ready to RECORD and the second cassette drive in STANDBY. Automatic transfer of recording from ON-LINE to STANDBY drive prior to end-of-tape or in case of failure.
- Continuous recording time is eight hours minimum with C-120 cassette and six hours minimum with C-90 cassette. Actual total recording time is determined by the communications activity.
- Time code is automatically and simultaneously recorded with any voice communications, and records month, day, hour and minute. During Standby or Recording, the time code display indicates real time, and, when a cassette is reproduced, indicates real tape time.
- Automatic gain control is provided on all channels to insure optimum recording levels.
- Automatic cassette initialization to beginning-of-tape when cassette is loaded in the drive.
- Audible alarm and warning light in case of failure.
- Controls and Indicators:
  - FRONT PANEL

Controls	Indicators
Power On/Off	Standby
Rewind	On-Line
Forward	Failure
Play	Reload
Stop	Stop

  - REAR PANEL

    Vox threshold adjustment per channel

    Time code set switches: (1) Month and Day (2) Hour and Minute
- Monitors
  - Speaker with volume control
  - Four switches to select desired channel(s) for PLAYBACK and review of recorded communications.
  - Headphone output for external headset — mutes speaker when in use.
  - Time code display of month, day, hour and minute.
- Size:
  - 19" (48.3 cm) wide by 7" (17.8 cm) high by 9" (22.9 cm) deep.

For additional product or ordering information write or wire Mincom Division, 3M Center, St. Paul, MN 55101, Telex #306 or call direct on 612-733-0712.

Mincom Division 3M COMPANY

RM-VLR304P(97.05)R1 3M CENTER · ST. PAUL, MINNESOTA 55101 Litho in U.S.A.

APPENDIX C

System Licensing

Attached is a Federal Communication Commission guideline for system licensing.

17253

Before the
Federal Communications Commission
Washington, D.C. 20554

FCC 79-259
5740

In the Matter of

Amendment of Parts 2, and 90 of the Commission's Rules to provide for system licensing in the Public Safety, Industrial, and Land Transportation Radio Services and to provide for the assignment of call signs on a system, rather than a single station, basis in these services.	)	
Amendment of Part 89 (Section 89.153) to allow stations in different Public Safety Radio Services to use the same call sign when controlled from a single dispatch center.	)	RM-2406 RM-2543
Amendment of Parts 2 and 91 of the Commission's Rules and Regulations to revise the station identification requirements for mobile stations in the Industrial Radio Services.	)	RM-3108
Amendment of Parts 91.56(a) and 91.57(a) to simplify the application procedure as it pertains to a Base/Mobile/Relay System.	)	RM-3111
Amendment of Parts 89, 91, and 93 to eliminate the requirement of separate licensing of control stations that use antennas under 20 feet in height.	)	RM-3136

MEMORANDUM OPINION AND ORDER

Adopted: May 2, 1979; Released: May 11, 1979

By the Commission:

1. The Commission has before it the petitions for rule making listed above filed, respectively, by Norman R. Coltri and James R. Barsuglia, RM-2406/2543 (the same petition was filed on two separate occasions); the Sears, Roebuck and Company (Sears), RM-3108; the National Association of Business and Educational Radio, Inc.(NABER), RM-3111; and by the California

Mobile Radio Association (CMRA), RM-3136. These petitions have been considered together because they all relate to the subject matter of this decision.

2. Coltri and Barsuglia request that the Commission amend its rules to enable the assignment of a single call sign to a dispatch center which handles the communications of a single licensee having one or more stations in any of the Public Safety Radio Services. It is argued that in many instances, licensees have so many individually authorized stations operated by a single dispatcher, that no identification at all is transmitted because of the difficulty in remembering which station is in use at any particular time.

3. Sears has petitioned the Commission to either amend its rules to allow the issuance of a system call sign to each clearly segregated land mobile radio system, or else to eliminate the requirement for the transmission of station call sign by mobile radio units where the mobile units and the associated base station(s) operate on different frequencies. Sears believes that such mobile units should be permitted to use the "unit identifier" means of identification. Confusion in the land mobile radio community over proper mobile station identification procedure (particularly where a mobile relay system is involved), the need for streamlining operational procedures in order to obtain the most efficient channel utilization, and the apparent lack of need for mobile unit identification are reasons given by Sears in support of its petition.

4. NABER requests that applications for a single mobile relay system (i.e., a system involving the use of not more than one control or one mobile relay station) be made possible through the use of a single application form in order to eliminate a number of redundant data elements common to the three application forms which must presently be filed. NABER, too, stresses the desirability of the Commission's issuing a single system call sign.

5. The California Mobile Radio Association (CMRA) has requested rules under which the Commission would not need to license separately control stations utilizing antennas not more than 20 feet above ground, or more than 20 feet above the tree, natural formation or existing man-made structure (other than an antenna structure) on which the antennas may be mounted; and instead, license these stations in a manner similar to mobile units. CMRA cites the Commission's practice of allowing certain low-powered mobile stations to serve the functions of base and fixed stations, where the antenna height does not exceed 20 feet, and the need to improve our application filing and processing procedures as the primary arguments for the requested change.

6. Comments were submitted in RM-3108, RM-3111, and in RM-3136. All who submitted comments supported the requested rule amendments.

7. The Commission has had an on-going program looking toward improvements in our licensing and regulatory procedures. The changes requested by these petitions are in line with that program. However, we believe that the objectives of the petitioners would be achieved and our overall licensing and

regulatory program for the private land mobile services would be improved by going somewhat further than requested and adopting procedures for system licensing and assigning a single system call sign in all of the private land mobile radio services regulated by Part 90 of the Commission's Rules.

8. Many requirements for radio communications call for multiple transmitting facilities involving various classes of stations. In the Public Safety Radio Services, for example, approximately 80% of all applications received relate to stations which could properly be termed as part of an overall communications system. In the Industrial Radio Services, the percentage is closer to 60 (in the Business Radio Service alone, it is 70). Similar systems, particularly in the Railroad Radio Service, are authorized in the Land Transportation Radio Services. A typical example of a "system," which is widely authorized, is the mobile relay system, which consists of a mobile relay and mobile stations, and usually at least one control station. Many systems involve the use of one or more control, mobile relay, base or operational fixed stations to provide radio communications over a specific area. This results in the filing of a large number of individual station applications. Yet it would be possible to encompass most, if not all of these facilities, in a fewer number of applications under a system licensing approach. Such an integrated, singly licensed, system would consist of an intercommunicating group of land mobile or operational fixed stations, or a combination of both, and the associated mobile station. Characteristically, such a system would provide radio communications over a specific area of operation.

9. System licensing, while not changing the fundamental evaluation which takes place in the examination phase of applications processing, would reduce the number of authorizations issued and the subsequent accountability (license filing and data base entry) which must take place. Eventually, the number of renewal requests would decline in proportion to the numbers of systems authorized involving multiple transmitting facilities. The demand for additional call signs would be moderated and data base design and capture procedures could be less complex. Also, we are aware of the difficulties encountered by many licensees in understanding the present station identification rules, particularly where mobile relay stations are concerned. It is evident that some relief in the way of a rule simplification is needed, and the use of system call signs appears to be the key to such relief.

10. We have, accordingly, decided to amend Parts 2, and 90 to provide for land mobile system licensing. We are defining a "land mobile system" as a "regularly interacting group of land mobile stations intended to provide radio communications over a single area of operation." Usually, this involves a group of stations of different classes. The simplest system consists, at a minimum, of a base station and mobile station. More typically, it consists of one or more "control" stations, a "mobile relay" station, and

a "mobile" station. (Most systems authorized above 450 MHz fit this description). Other systems consist of either multiple base stations and a mobile station, or a combination of base and operational fixed stations, and a mobile station. Multiple base station systems are often utilized where the necessary area of operation is much larger than normal. In sum, a system, which would be authorized in a single license and which would be assigned a single call sign, may consist of the number of base stations, any fixed stations used to control those base stations, and the associated mobiles, all of which are used to provide coverage over the licensee's defined area of operation.

11. On the other hand, a licensee who plans to utilize two or more widely separated base stations to cover two or more independent or non-contiguous areas of operation may not combine those stations to form a single system unless the mobile units routinely operate mobile-to-mobile in the area between the two base stations, or frequently operate in the area served by each base station. Normally, the service areas of the various base stations must overlap or at least be contiguous. Also, we are not limiting system licensing to operations on a single frequency or channel, or pair of frequencies. Where an applicant has been able to justify the assignment of multiple channels to provide coverage over his area of operation, the necessary stations may be included in the sirgle system authorization.

12. Unfortunately, the Commission's Master Frequency File cannot, at the present, handle the data for the systems we are proposing when two or more land stations at different locations are involved, except in the case of the 470-512 MHz band. Were such modifications to be made for all other types of stations, it would be necessary to require the licensee to resubmit an application for the entire system. This is because the Commission's principal land mobile data base (called the "Frequency Master File") is constructed around a "record-by-record" or "license-by-license" insertion and deletion system. While this would not be a problem in the case of small systems requiring the use of a single application form, a substantial burden would be placed on licensees of more complex systems. The burden on Commission personnel, too, would be significant in terms of the effort required to delete and replace a system record. These disadvantages can be avoided either by the development of a land mobile data base or a front-end system to handle the more complex systems' data for input to the Master Frequency File, but it will take some time to accomplish the necessary changes. We have, therefore, decided to adopt a phased approach to system licensing. We will authorize a system call sign now for an eligible system of any complexity in the 470-512 MHz band, and for a simple system (i.e., one consisting of not more than two land stations at different locations) in all of the other frequency bands. Later, on a date to be announced, when the necessary front-end system or land mobile data has been developed, we will expand the system licensing and system call sign concept to include the more complex systems outside the 470-512 MHz band. This approach should allow 50% of all land mobile applicants to take immediate advantage of system licensing, and the rest to do so when the computer procedures are developed.

13. In conjunction with these changes, it is likely that the application forms (both Form 400 and Form 425) will be replaced by a new form more suitable for system licensing. In the interim, applicants should follow the procedures set forth in Appendix B concerning the use of FCC Form 400 and 425 in applying for a system license.

14. The use of single system call sign will greatly alleviate the station identification problem, and we anticipate that many licensees may want to file for a system authorization as soon as possible. Unfortunately, we do not have the resources to cope with such an increase of applications, so we will not accept applications submitted solely for the purpose of obtaining a system call sign. We will accept applications involving the authorization of new stations or systems, or modification or renewal of a license of a station which is a component of what we have defined as a system. Where modification or renewal is involved, even if only of one station in a system, applications for inclusion of the other stations may also be submitted.

15. In order to provide relief for those licensees who will not be able to immediately consolidate their individual stations into a system, we are amending the station identification rules to generally permit two-frequency systems (such as two-frequency simplex, duplex and mobile relay systems) to be identified by the transmission of the call sign of the base station only. In instances, where communications occur between mobile units, one of the mobile units involved should transmit the call sign of the associated base station. In a mobile relay system, the mobile relay station is considered to be the "associated base station" of the control and mobile stations. Whenever a base station (including a control station) transmits the call sign of the system base or mobile relay station during the operating period, the mobile units need not identify by call sign. In the case of a system utilizing multiple base stations, the call sign of the particular base station being utilized may be transmitted by a mobile unit at the prescribed interval, or the mobile station call sign may be used.

16. This relaxation in station identification procedure is based on the fact that in systems operating on frequencies above 450 MHz, the base stations and the mobile units operate with a prescribed amount of frequency separation. Thus, knowing the assigned frequency of the base station (which can be found through referencing its call sign), it is possible to determine the authorized frequency of the associated mobile units (and in a mobile relay system, the frequency of the control station). Also, in the Industrial and Land Transportation Radio Services, the call signs of stations communicating with a base or mobile relay station are indicated on the station license, thereby providing us with a clear picture of the system configuration. This is not the case in the Public Safety Radio Services, however, so we are not able to relax the station identification requirements for public safety stations which operate on frequencies below 450 MHz. Licensees in the lower frequency bands will have to defer any change in their station identification procedure until modification or renewal of one of the stations in their system allows them to file for a system authorization and call sign.

17. While the action we are taking grants, in greater part, the referenced petitions, it is necessary to comment further on the proposals of Barsuglia and Coltri (RM-2406 and RM-2543) and the California Mobile Radio Association (RM-3136).

18. The Barsuglia-Coltri proposal, if adopted as proposed, would require even more extensive changes in the Commission's Frequency Master File. We believe, too, that administrative difficulties could arise in attempting to identify systems in different radio services, where they are "labeled", as it were, by only a single call sign identifier. The problem would be particularly acute in the case where an operating frequency was available for assignment in more than one radio service. Because of these difficulties, and because we feel the other changes we are implementing in this action go a long way to ease the station identification problems in the private land mobile radio services, we must deny the request for interservice assignment of a single call sign.

19. A difficulty with respect to the petition of the California Mobile Radio Association (RM-3136) is that if it were granted in its entirety, the Commission would not be provided with even a minimum amount of information as to the location of a control station meeting the proposed "20 foot rule." While we do not see any great need for knowing the presise technical location (latitude and longitude) of a control station transmitter because of the reduced interference potential characteristic of such a station, we do need an administrative location or street address in order to have an inspection address for the station and be able to enforce our transmitter control regulations. Thus, while we are granting the CMRA petition in substance, applicants will be required to provide the street address locations of all control station control points. Control stations may be moved without license modification, in the same way as are control points, provided that the Commission is notified of any such change within thrity (30) days. Also, we cannot relax the present requirements for control stations in the 470-512 MHz band because of the need to know the coordinates in order to check the antenna height above average terrain (AAT) and the distance to the associated mobile relay transmitter.

20. While the single call sign, system licensing approach being permitted by this action offers many advantages to licensees and to the Commission, there is one potential drawback which we wish to point out. Our field personnel, in performing our enforcement functions, may not be able to determine the location or the particular identity of a station which may be monitored in violation of one of our technical rules, or which may be causing interference. As an example, under the present system (where individual station call signs are assigned), if a control station in a multiple control station mobile relay system was observed to be off-frequency, the station call sign would be indicated on the ensuing Notice of Violation, and the licensee would know which station is off-frequency. This convenience would be given up where a system call sign is used. Practically, however, this should not be much of a problem, since we expect most licensees to use some form of internal station identification (such as the "unit number" method) for their own administrative purposes. Nevertheless, should such an identifier not be obtained by our field personnel during the course of station observation, the burden of identifying the particular station or transmitter will fall upon the licensee. This requirement, however, seems very small in comparison to the convenience afforded by system licensing and the resultant simplification of station identification.

21. Lastly, licensees of individually authorized stations may, when combining their stations in a system application, request that the call sign of one of the previously authorized base stations be assigned as the system call sign..

22. The rule changes we are adopting are essentially procedural in nature and would benefit both applicants and the Commission, with no adverse effect on any party. It does not appear that adverse comments would be received were these changes to be released for prior public comments (no comments at all were received on RM-2406 and RM-2543, and all of the comments received on RM-3108, RM-3111, and RM-3136 strongly supported these proposals), and it is in the public interest to initiate the new procedures relating to system licensing as soon as possible. Therefore, the prior notice and comment provisions of the Administrative Procedures Act (5 USC 533) do not apply. The reporting requirement included herein is adopted subject to GAO clearance, and unless we are advised to the contrary, will be effective August 1, 1979.

23. The new procedures become effective August 1, 1979. General Information on this matter may be obtained by contacting Mr. Eugene C. Bowler, of the Commission's Private Radio Bureau's Rules Division, at (202) 632-6497. More specific questions concerning completion of Form 400 and Form 425 should be directed to the Bureau's Licensing Division at (202) 632-6475.

24. Accordingly, IT IS ORDERED, pursuant to the authority contained in Sections 4(i) and 303(r) of the Communications Act of 1934, as amended, that petitions RM-2406 and RM-2543 ARE DENIED; petitions RM-3108 and RM-3111 ARE GRANTED, as extended; and that petition RM-3136 IS GRANTED IN PART: and that effective August 1, 1979, Parts 2 and 90 of the Commission's Rules are amended as set forth in Appendix A. IT IS FURTHER ORDERED that this proceeding IS TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION

William J. Tricarico
Secretary

Attachments: Appendices

NOTE: Rules changes herein will be covered by T.S.II(76)-5 and T.S.V(79)-1.

A P P E N D I X A

I. Part 2 of the Commission's Rules and Regulations is amended as follows:

§2.302 is amended to read as follows:

§2.302 Call signs.

The table which follows indicates the composition and blocks of international call signs available for assignment when such call signs are required by the rules pertaining to particular classes of stations. When stations operating in two or more classes are authorized to the same licensee for the same location, the Commission may elect to assign a separate call sign to each station in a different class. (In addition to the U.S. call sign allocations listed below, call sign blocks AAA through AEZ and ALA through ALZ have been assigned to the Department of the Army; call sign block AFA through AKZ has been assigned to the Department of the Air Force; and call sign block NAA through NZZ has been assigned jointly to the Department of the Navy and the U.S. Coast Guard.

* * * * *

II. Part 90 of the Commission's Rules and Regulations is amended as follows:

1. §90.7 is amended to include a definition of "Land Mobile Radio System", and to clarify the definition of "Land Station."

§90.7 Definitions.

* * * * *

Land Mobile Radio Service. A mobile service between base stations and land mobile stations, or between land mobile stations.

Land Mobile Radio System. A regularly interacting group of base, mobile and associated control and fixed relay stations intended to provide land mobile radio communications service over a single area of operation.

Land Station. A station in the mobile service not intended to be used while in motion. (As used in this Part, the term may be used to describe a base, control, fixed, operational fixed or fixed relay station, or any such station authorized to operate in the "temporary" mode.)

* * * * *

2. The heading and text of §90.117 are amended to read as follows:

§90.117 Applications for radio station or radio system authorizations.

Persons desiring a radio station or radio system authorization must first submit the appropriate application(s). Prescribed application forms are listed in §90.119. They may be obtained from the Washington, D.C. office of the Commission, or from any of its engineering field offices. (See § 90.145 for information regarding special temporary authorizations.) **Beginning August 1, 1979, the Commission will accept applications for land** mobile radio systems as defined in §90.7 of this Part. Until further

notice, the following limitation shall apply to systems for which authorization is being sought: systems, except those utilizing frequencies exclusively in the 470-512 MHz Band, shall consist of not more than two land stations at different locations, unless the land stations are control stations meeting the requirements of §90.119(a)(2)(ii), and a mobile station. No restrictions will be placed on the complexity of a system to operate exclusively in the 470-512 MHz Band. Effective January 1, 1980, applicants for new stations which comprise a system, or applicants modifying or renewing a station which is part of a system, shall file an application for a system authorization. (In the latter case, the applicant may select one of the land station call signs as the call sign of the system.) The obligation to file for system authorization falls only upon those applicants with a system falling within the purview of the limitation set forth above.

3. In §90.119, paragraphs (a) and (b) are amended to read as follows:

§90.119 Application forms.

The following application forms shall be used-

(a) Except as provided for in paragraph (c) of this section, Form 400 shall be used to apply:

(1) For new base, fixed, or mobile station authorizations governed by this part.

(2) For system authorizations, where the system meets the requirements of §90.117.

(i) Except as provided in subparagraph (ii) below, application for a system consisting of not more than two land stations at different locations (most commonly this will be a control station and a mobile relay station), and a mobile station, shall be submitted on a single Form 400.

(ii) If the control station(s) will operate on the same frequency as the mobile station, and if the height of the control station(s) antenna(s) will not exceed 6.1 meters (20 feet) above the ground, or an existing man-made structure (other than an antenna structure), there is no limit on the number of such stations which may be authorized. Item 1 of Form 400 shall be completed showing the frequency, the number of control stations, the emission, and the output power of the highest powered control station. Additionally, the Commission shall be provided with the address of each control station, and where different, the address of every control station control point.

(3) For modification or for modification and renewal of an existing authorization. (See §90.135)

(4) For the Commission's consent to the assignment of an authorization to another person or entity. In addition, the application shall be accompanied by a letter from the assignor setting forth his desire to assign all right, title, and interest in and to such authorization, stating the call sign and location of the station, and that the assignor will submit his current station authorization for cancellation upon completion of the assignment. Form 1046 may be

used in lieu of this letter.

(b) Except as provided for in paragraph (c) of this section, Form 405-A shall be used to apply for a renewal without modification of a station or system license.

* * * * *

4. In Section 90.135 add new language to subparagraph (b)(3) to read as follows.

§90.135 Modification of license.

(a) ***

* * * * *

(b) ***

(3) Change in the number and location of station control points, or of control stations meeting the requirements of Section 90.119(a)(2)(ii).

* * * * *

5. In §90.425, paragraph (a) is amended to read as follows:

§90.425 Station identification.

* * * * *

(a) Identification procedure. Except as provided in paragraph (d) of this section, each station or system shall be identified by the transmission of the assigned call sign during each transmission or exchange of transmissions, or once each 15 minutes (30 minutes in the Public Safety and Special Emergency Radio Services) during periods of continuous operation. The call sign shall be transmitted by voice in the English language, or by International Morse Code in accordance with paragraph (b) of this section. Permissible alternative identification procedures are as follows:

(1) A mobile relay station call sign may be used to identify the associated control and mobile stations, except in the Public Safety and Special Emergency Radio Services where the stations operate on frequencies below 450 MHz. Alternatively, a base station (including a mobile relay station) which is controlled by radio may be identified by the transmission of the call sign of the station at which communications originate.

* * * * *

A P P E N D I X B

GUIDELINES FOR FILING APPLICATIONS FOR A SYSTEM AUTHORIZATION

Form 425: Refer to the definition of a system and the examples given below, then refer to the instructions and example application starting on Page 8 of this Appendix.

Form 400: The guidelines set forth below should be followed where system authorization is sought on Form 400. These guidelines are a supplement to the instructions in booklet FCC Form 400-10.

1. Definition of a Land Mobile Radio System:

A Land Mobile Radio System is a regularly interacting group of base, mobile and associated control and fixed relay stations intended to provide land mobile communications service over a single area of operation. (See §90.7)

Base, mobile and fixed stations may be combined to comprise a system. Each system will be assigned a single call sign to serve as the identification of each station in the system. Applicants for a system which is to consist, at least in part, of several previously authorized base stations, may select one of the base station call signs to be assigned as the call sign of the system.

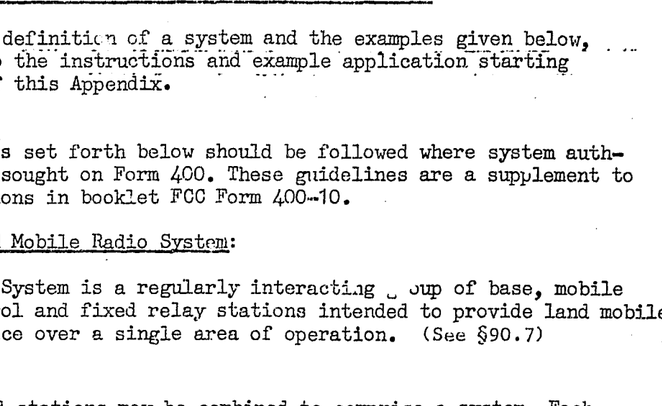
The size of a system shall be limited to the number of stations required to provide radio communications over a specified area of operation. The area of operation is the area over which mobile units will normally be expected to operate, or the area covered by the base station(s), whichever is larger. (Normally, these areas would be approximately equal.) When the areas of operation either overlap or are contiguous, the necessary stations are eligible for inclusion within the system. Several examples follow:

EXAMPLE 1:

All stations are eligible.

("AOP" means "area of operation")

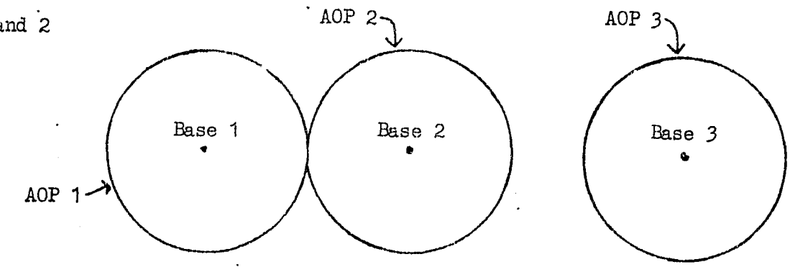
NOTE: For the present, this example applies only to systems in the 470-512 MHz Band.



This is an idealized example intended only to show how the rules apply. In actuality the base station service contours would rarely be perfectly circular.

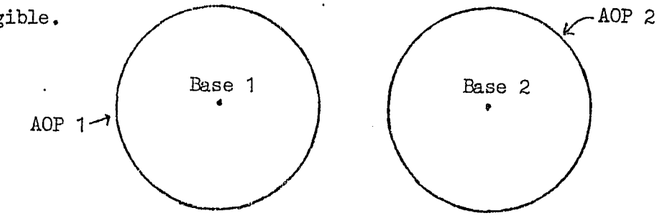
EXAMPLE 2:

Only stations 1 and 2 are eligible.

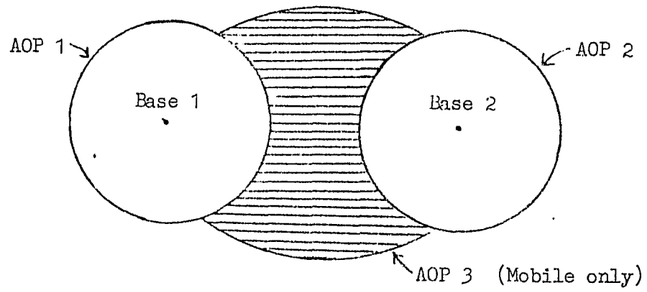


EXAMPLE 3:

Neither station is eligible.



EXAMPLE 4:



This configuration would be regarded as a system provided that the information contained in the application clearly demonstrated mobile station operation in the connecting area not covered by the base stations, or, that mobile units routinely travel between the base stations and operate within the respective base station areas of operation. Arrangements involving non-contiguous or non-overlapping base station areas of operation will be examined very closely to insure that their operational characteristics enable them to be validly regarded as systems.

While not shown in the examples, any number of fixed stations used to control the base stations may be included in the system application.

Also, while an applicant may be able to justify a very large system, such a system may be broken down into several smaller systems if this would facilitate management.

NOTE: A complete system diagram must be submitted with each system application.

I M P O R T A N T   N O T I C E

The preceding examples of eligible systems are provided largely for informational purposes. Pending further notice by the Commission, only those systems to be operated exclusively on frequencies in the 470-512 MHz Band (using application Form 425) may be of unlimited complexity. All other systems (using Form 400) are limited to not more than 2 land stations (a land station can be a base, mobile relay, fixed, operational fixed, or fixed relay station) at different locations, unless the land stations are control stations whose antenna height does not exceed 6.1 meters (20 feet) above the ground or man-made supporting structure (other than an antenna structure), and a mobile station. This restriction also applies to systems in the Chicago Region which do not operate exclusively on frequencies in the 470-512 MHz Band.

IMPORTANT DATES:

August 1, 1979 — System licensing becomes optional, in accordance with the restrictions mentioned above.

February 1, 1980 — System licensing becomes mandatory, in accordance with the restrictions mentioned above. Applicants for new stations which comprise a system shall file for a system authorization. Licensees who seek modification or renewal of the license of a station which is part of a system shall file for a complete system authorization, if the system complies with the limitations set forth above.

To be announced — Is the date on which applications will be accepted for more complex systems than those specified above. Persons who will be operating complex systems will be permitted to break them down into smaller systems for licensing purposes, if this would be administratively desirable.

Examples of how to complete FCC Form 400 for typical permissible systems are given on the following pages.

EXAMPLE 1: Typical mobile relay system with a control station having an antenna meeting the "20 foot rule" (see §90.117 and §90.119).

Form 400
RIL 1978

United States of America
Federal Communications Commission

APPROVED BY GAO
B-180227 (R0380)

Frequencies MHz	1(b). No. of transmitters Base-Land-Fixed	Mobile	Other	1(c). Emission	1(d) Output Power Watts
5.900			1	20F3	25
0.900	1			20F3	100
5.900		10		20F3	50

Show No. of mobile units in each of following
Land vehicle 8 aircraft
carried 2 marine paging receivers

tion of transmitter(s) at a fixed location
ber and street (or other indication of location)
00 Industrial Boulevard
ckville | County Montgomery | State Maryland
39° 25' 55" N | Longitude 77° 30' 15" W

tion of control point(s)
235 Main Street
aithersburg, Maryland 20760

mobile units, or other class of station at temporary locations, are included in this authorization, show area of operation Montgomery County

Overall height above ground of
p of antenna 250 ft | (2) antenna supporting structure 230 ft
Elevation of ground above mean sea level at antenna site 450 ft

DO NOT WRITE IN THIS BLOCK

Call Sign ______ File No ______

Antenna painting and lighting specifications

Special Conditions:

This authorization effective ______

and will expire 3 00 AM EST ______

and is subject to further conditions as set forth on reverse side. If the station authorized herein is not placed in operation within eight months this authorization becomes invalid and must be returned to the Commission for cancellation unless an extension of completion date has been authorized.

Federal Communications Commission

Chief, Safety & Special Radio Services Bureau

6(a) Name of Radio Service Business
(b) Class of station
Base [X] Mobile [X] Other [X] (Control)

7(a) Name (see instructions)
C. & J. Enterprises

(b) Mailing address (number, street, city, state & zip code)
6235 Main Street
Gaithersburg, Maryland 20760

EXPLANATION: Item 1 contains the frequency, number, emission and output power of each class of station. The output power indicated should be that of the highest powered transmitter in each class. The control station is indicated in the "Other" column. If there is more than one control station, and all meet the "20 foot rule", enter the number in the "Other" column, and on an attachment provide the street address of each such control station, and, if necessary, the address of each control station control point which is at a different address than the associated control station. Item 2 contains the information pertaining to the location of the mobile relay transmitter. Item 3 (in this example where there is only one control station) gives the location of the control station (which, in this example, is also the location of the control station's control point). If the control station/control point is at the mailing address, Item 3 may be completed by indicating "Same as 7(b)". If there is to be a wireline control point on the mobile relay station, it should be indicated in Item 3, and the control station/control point address should be provided on an attachment. Whenever extra control points will be used, they should be indicated on an attachment along with the class of station with which they will be associated. Item 4 indicates the mobile unit area of operation. Item 5 is used to provide the information about the

mobile relay station's antenna.

The remaining items on the Form are completed in the usual manner, except for Item 11(a)(1). If the applicant will own his control and mobile equipment, but not the mobile relay, neither the "Yes" nor the "No" blocks should be checked. Type in "See reverse" and provide the information in the space provided. Items 17 and 18 refer to the mobile relay station.

EXAMPLE 2: A mobile relay system having a control station with an antenna in excess of the "20 foot rule".

FCC Form 400
APRIL 1978

United States of America
Federal Communications Commission

APPROVED BY GAO
B-180227 (R0389)

DO NOT WRITE IN THIS BLOCK

Call Sign _____ File No. _____

1(a). Frequencies MHz	1(b). No. of transmitters: Base-Land-Fixed	Mobile	Other	1(c). Emission	1(d). Output Power Watts
465.900			1 (A)	20F3	15
460.900	1 (B)			20F3	100
465.900		10		20F3	50

1(e) Show No. of mobile units in each of following
categories Land vehicle 8 aircraft _____ paging receivers _____
hand carried 2 marine _____

Location of transmitter(s) at a fixed location
Number and street (or other indication of location) (A) 6235 Main Street
(B) 5000 Industrial Boulevard
City (A) Gaithersburg (B) Rockville County Montgomery State Maryland
Latitude (A) 39° 30' 33" N (B) 39° 25' 55" N Longitude (A) 77° 31' 00" W (B) 77° 30' 15" W
Location of control point(s)
6235 Main Street
Gaithersburg, Maryland 20760

If mobile units, or other class of station at temporary locations, are included in this authorization, show area of operation. Montgomery County

9(a). Overall height above ground of (1) tip of antenna (A) 60 (B) 250 ft. (2) antenna supporting structure (A) 55' (B) 230' ft.
(b). Elevation of ground above mean sea level at antenna site (A) 500' (B) 450' ft.

Antenna painting and lighting specifications
Special Conditions:

This authorization effective _____
and will expire 3 00 AM EST. _____
and is subject to further conditions as set forth on reverse side. If the station authorized herein is not placed in operation within eight months this authorization becomes invalid and must be returned to the Commission for cancellation unless an extension of completion date has been authorized.

Federal Communications Commission

Chief, Safety & Special Radio Services Bureau

6(a) Name of Radio Service
(b) Class of station.
Base [X] Mobile [X] Other [X] (Control)

7(a) Name *(see instructions)*
C. & J. Enterprises

(b) Mailing address *(number, street, city, state & zip code)*
6235 Main Street
Gaithersburg, Maryland 20760

EXPLANATION: The application is completed almost the same way as in Example 1, except that Items 2 and 5 must be completed for the control station. The control station is distinguished from the mobile relay station by using the (A) and (B) labels. Items 17 and 18 must be similarly completed for both the control and the mobile relay station. It is evident that the application can be greatly simplified if the control station antenna height conforms to the "20 foot rule". Unless technically impractical, applicants should try to minimize control station antenna height.

EXAMPLE 3: A mobile relay system having a control station with an antenna in excess of the "20 foot rule" and 3 other control stations meeting the "20 foot rule".

The Form 400 would be filled out exactly as in Example 2, with the exception of Item 1, which would be completed as follows:

FCC Form 400
APRIL 1978

United States of America
Federal Communications Commission

APPROVED BY GAO
B-180227 (R0389)

1(a). Frequencies MHz	1(b). No. of transmitters: Base-Land-Fixed	Mobile	Other	1(c). Emission	1(d). Output Power Watts
465.900			3	20F3	25
465.900			1 (A)	20F3	15
460.900	1 (B)			20F3	100
465.900		10		20F3	50

1(e) Show No. of mobile units in each of following
categories Land vehicle 8 aircraft _____ paging receivers _____
hand carried 2 marine _____

In addition, it would be necessary to provide the addresses of the 3 extra control stations on an attachment.

REMEMBER: A system with more than 2 control stations having antennas in excess of the "20 foot rule" would not be eligible for a system license at the present time because eligible systems "shall not consist of more than two land stations at different locations". (§90.117) This restriction would allow only one control station, in addition to the mobile relay station. The only exception to the rule is when the additional control stations meet the "20 foot rule" (§90.119).

(Examples continued on following page.)

EXAMPLE 4: A system consisting of a base station with a control station, a fixed relay/base station, and a mobile station.

FCC Form 400
APRIL 1976

United States of America
Federal Communications Commission

APPROVED BY GAO
B-180227 (R0389)

DO NOT WRITE IN THIS BLOCK

Call Sign _____ File No. _____

1(a) Frequencies MHz	1(b) No. of transmitters: Base Land-Fixed	Mobile	Other	1(c) Emission	1(d) Output Power Watts
72.020			1(A)	20F3	30
75.980			1(B)	20F3	30
154.515	1 (B)	25		20F3	100

1(e) Show No. of mobile units in each of following categories: Land vehicle 25; aircraft _____; hand carried _____; marine _____; paging receivers _____

2 Location of transmitter(s) at a fixed location

Number and street for other indication of location: (A) 6235 Main Street (B) 2 mi. N. of Rt. 40 on Ridge Road

City: (A) Gaithersburg (B) Frederick | County: (A) Montgomery (B) Frederick | State: Maryland

Latitude: (A) 39° 30' 33" N (B) 40° 05' 10" N | Longitude: (A) 77° 31' 00" W (B) 77° 45' 50" W

3 Location of control point(s):

6235 Main Street
Gaithersburg, Maryland 20760

4 If mobile units or other class of station at temporary locations are included in this authorization show area of operation: Mont. & Fred. Counties

5(a) Overall height above ground of (1) tip of antenna: (A) 30' (B) 100 ft | (2) antenna supporting structure: (A) 25' (B) 80' ft

(b) Elevation of ground above mean sea level at antenna site: (A) 500' (B) 1700' ft

Antenna painting and lighting specifications:

Special Conditions:

This authorization effective _____

and will expire 3:00 AM EST. _____

and is subject to further conditions as set forth on reverse side. If the station authorized herein is not placed in operation within eight months this authorization becomes invalid and must be returned to the Commission for cancellation unless an extension of completion date has been authorized.

Federal Communications Commission

Chief, Safety & Special Radio Services Bureau

6(a) Name of Radio Service (b) Class of station: Business

Base [X] Mobile [X] Other [X] Control & Fixed Relay

7(a) Name (*see instructions*)

C. & J. Enterprises

(b) Mailing address (*number, street, city, state & zip code*)

6235 Main Street
Gaithersburg, Maryland 20760

EXPLANATION: The application for this system, even though it is not a mobile relay system, is virtually identical to that of Example 2 in format. The output power of the highest powered mobile unit, being equal to the power of the base station, enables both base and mobile station information to be contained in one line in Item 1. Item 3 indicates the control point of the control station, (The control station is considered the control point of the base station. Again, Items 17 and 18 must be completed for both the control station and the fixed relay/base station.

CONCLUSION

The preceding examples should fairly well illustrate the procedure for filing for eligible system authorizations using FCC Form 400. However, additional questions may be directed to the Licensing Division, Private Radio Bureau, FCC, Washington, D.C. 20554, at (202) 632-6475.

Guidelines for Filing an Application
for a Land Mobile Radio System on FCC Form 425

The guidelines set forth below should be followed where an application for a land mobile radio system (see the definition on Page 1 of this Appendix and the related examples of permissible systems) is filed on FCC Form 425. These guidelines are intended as a supplement to the Booklet, "Instructions for Completion of Form 425." They apply only to stations in the Public Safety (Part 89), Industrial (Part 91), Land Transportation (Part 93), and General Mobile (Part 95) Radio Services.

SYSTEM APPLICATIONS - Applications for radio systems having two or more stations at fixed locations need complete only one Section I of Form 425. Except as provided below for control stations, at least one Section II and one Section III is required for each station (fixed location) as specified in Instruction Booklet Form 425-A. In Item 7, Section II, the information requested should pertain only to the mobile operating area when the application includes a base station and mobiles.

CONTROL STATIONS - Applications for base stations, except those in the 470-512 MHz band, remotely activated by radio via "control stations" which use antennas no more than 20 feet above ground or existing man-made structure (excluding antenna supporting structures) do not require separate Sections II and III for such control stations, provided that the control station transmits on the associated mobile frequency. In such cases, Form 425 shall be completed as follows:

In Item 6, Section II, indicate both base station and control station by entering the appropriate letters in the last block.

The street addresses of such control stations (and telephone numbers) shall be included in Item 8, Section III (Control Points) for the appropriate base stations. All control station addresses shall include an indication of control by radio and the effective radiated power. See the attached example.

All other items on the form shall apply to the associated station(s).

Applicants for all other control stations shall continue to file completed Sections II and III for each control station as specified in Instruction Booklet Form 425-A.

Attached is a sample FCC Form 425 completed pursuant to this guideline.

FCC Form 425
May 1977

United States of America
FEDERAL COMMUNICATIONS COMMISSION
Washington, D. C. 20554

Form Approved
GAO No. B-180227(R0392)

APPLICATION FOR RADIO STATION AUTHORIZATION

(INDUSTRIAL, PUBLIC SAFETY, LAND TRANSPORTATION, BROADCAST REMOTE PICKUP AND CITIZENS CLASS A)

NOTICE TO INDIVIDUALS REQUIRED BY PRIVACY ACT OF 1974

Sections 301, 303, and 308 of the Communications Act of 1934, as amended, *(licensing powers)* authorize the FCC to request the information on this application. The purpose of the information is to determine your eligibility for a license. The information will be used by FCC staff to evaluate the application, to determine station location, to provide information for enforcement and rulemaking proceedings and to maintain a current inventory of licensees. No license can be granted unless all information requested is provided.

SECTION I - LEGAL AND ADMINISTRATIVE DATA — USE TYPEWRITER ONLY

1 LEGAL NAME OF APPLICANT:

Doe Supply Company

DO NOT WRITE IN THESE BOXES

2 LICENSEE IDENTIFICATION NUMBER:

3 MAILING NAME AND ADDRESS:

Doe Supply Company
1029 S King St
Addison Il 60101

4 NAME OF RADIO SERVICE:

Business

5 STATE WHETHER APPLICANT IS: (CHECK ONE)

- INDIVIDUAL — A ☐
- PARTNERSHIP (ATTACH LIST OF NAMES OF ALL PARTNERS) — B ☐
- ASSOCIATION — C ☐
- CORPORATION — D ☒
- GOVERNMENTAL ENTITY — E ☐

6 STATE THE TYPE OF BUSINESS IN WHICH APPLICANT IS ENGAGED, AND GIVE DESCRIPTION OF THE INTENDED USE OF THE PROPOSED STATION IN CONNECTION WITH THE STATED BUSINESS.

Primarily engaged in the repair of office machines. Station will be used to dispatch vehicles.

STANDARD INDUSTRIAL CLASSIFICATION CODE (IF KNOWN)

7 Is communication service to be received from YES ☐ NO ☒ or rendered to another person? (See instructions) If "YES", list persons involved on separate attachment and provide copy of cooperative use agreement, if required by FCC Rules.

8 Are any other persons licensed to operate any YES ☒ NO ☐ of the radio facilities covered by this application? If "YES", give call signs and names of all licensees sharing the facilities on a separate attachment.

9 Has applicant previously filed for and been YES ☐ NO ☒ granted a radio license by the FCC? If "YES", in what service? (List one only)

10 Would a Commission grant of this application be a major action as defined by Section 1.1305 of the Commission's rules?

If yes, submit the required statement (See Section 1.1311 of the Commission's rules). YES ☐ NO ☒

CERTIFICATION

THE APPLICANT waives any claim to the use of any particular frequency or of the ether as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests an authorization in accordance with this application. All statements made in the attached exhibits are a material part hereof and are incorporated herein as if set out in full in this application. I, the undersigned, individually and for the applicant hereby certify that the statements made in this application, including any attachments, are true, complete and correct to the best of my knowledge and belief, and are made in good faith. Applicant is not a foreign government or a representative thereof.

WILLFUL FALSE STATEMENTS MADE ON THIS APPLICATION ARE PUNISHABLE BY FINE AND IMPRISONMENT. (U. S. CODE, TITLE 18, SECTION 1001)

SIGNATURE: _____ DATE: _____

(Designate appropriate classification below)

☐ INDIVIDUAL APPLICANT ☐ MEMBER OF APPLICANT PARTNERSHIP ☒ OFFICER OF APPLICANT CORPORATION ☐ OFFICER WHO IS ALSO A MEMBER OF APPLICANT ASSOCIATION ☐ OFFICIAL OF GOVERNMENTAL AGENCY

FCC Form 425
May 1977

UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON, D.C. 20554

APPLICATION FOR RADIO STATION AUTHORIZATION

SECTION II
PRELIMINARY ENGINEERING DATA

ENTER TOTAL NUMBER OF SECTION II PAGES: 1

ENTER PAGE NUMBER OF THIS SECTION II SHEET: 1

PURPOSE OF APPLICATION.
A FREQUENCY AUTHORIZATION
F NEW LICENSE
C LICENSE RENEWAL ONLY
D LICENSE MODIFICATION (COMPLETE ITEM 3)
E ADD STATION TO SYSTEM
F REINSTATEMENT
G DEVELOPMENTAL
H ASSIGNMENT OF LICENSE
I OTHER (SPECIFY BELOW)

(ENTER CORRECT LETTER) B

NATURE OF PROPOSED CHANGES MODIFICATIONS:
A CHANGE NAME ADDRESS
B CHANGE NUMBER OF MOBILES
C CHANGE POWER
D ADD CHANGE CONTROL POINTS
E OTHER (SPECIFY BELOW)
F RELOCATE STATION
G CHANGE AREA OF OPERATION
H CHANGE ANTENNA
I CHANGE EQUIPMENT
J CHANGE OR FREQUENCY
K CHANGE TONE FREQUENCY

(ENTER CORRECT LETTERS)

DOES APPLICATION REFER TO AN EXISTING AUTHORIZATION OR PREVIOUS APPLICATION? IF "YES" COMPLETE THIS ITEM: (YES OR NO) No

CALL SIGN / LICENSE NUMBER

DETAILS OF STATION AT A FIXED LOCATION

ANTENNA HEIGHT (SEE INSTRUCTIONS) 1199
GROUND ELEV ABOVE MSL (FEET) 600
ANTENNA LATITUDE 41-52-44
ANTENNA LONGITUDE 87-38-10

LOCATION OF TRANSMITTER: Adams and Franklin St

CITY Chicago
COUNTY Cook
STATE Ill

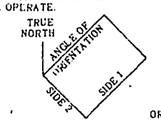
IS ANTENNA STRUCTURE WILL BE USED BY OTHER LICENSES. GIVE CALL SIGN OF BROADCAST LICENSEE, IF APPROPRIATE. OTHERWISE, GIVE CALL SIGN OF ONE OTHER LICENSEE

TYPE OF STATION PROPOSED

FIXED LOCATION	TRANSPORTABLE MOBILE	NO. OF UNITS
A BASE	J LAND VEHICLE	10
B CONTROL		
C MOBILE RELAY	K AIRCRAFT	
D FIXED		
E OPERATIONAL FIXED	L WATERCRAFT	
F FIXED RELAY		
G REPEATER	M HAND-HELD PORTABLE	1
H AUXILIARY TEST		
I OTHER (SPECIFY)	N OTHER (SPECIFY)	

(ENTER CORRECT LETTERS) BC

AREA OF OPERATION - DESCRIBE THE APPROXIMATE COVERAGE AREA REQUIRED FOR MOBILE LICENSE APPLICATION. GIVE AREA IN WHICH MOBILES WILL OPERATE.



COORDINATES OF CENTER
LATITUDE 41-52-36
LONGITUDE 87-52-30

DIMENSIONS OF AREA
SIDE 1 (MILES) 30
SIDE 2 (MILES) 60
ORIENTATION (DEGREES) 90

WRITTEN DESCRIPTION OF MOBILE OPERATING AREA:
Within 30 miles of Adams and Franklin Sts., Chicago, Illinois

NAME OF APPLICANT

DO NOT WRITE IN THIS BOX

LICENSE NO.
SECTION NO.
LICENSEE ID

AMOUNT OF FEE
FEE REQUIRED
ELIGIBILITY
STAT.
SERV.
COORD. CK.

9 NUMBER ASSIGNED TO THIS STATION BY APPLICANT: (ENTER THE NUMBER (SIX DIGITS OR LESS) ASSIGNED TO THIS STATION IN ACCORDANCE WITH THE INSTRUCTIONS FOR THIS ITEM.)

10 POINTS OF COMMUNICATION. MOBILE ...

FOR SYSTEMS CONTAINING MORE THAN TWO STATIONS AT FIXED LOCATIONS, ENTER CALL SIGN OR NUMBER ASSIGNED TO APPLICANT'S STATIONS AT FIXED LOCATIONS WITH WHICH THIS STATION IS TO COMMUNICATE

11 LOCATION OF RECEIVING SITES NOT COLLOCATED WITH TRANSMITTING SITES

ENTER LATITUDE, LONGITUDE AND ANTENNA HEIGHT ABOVE GROUND FOR ALL RECEIVING ANTENNAS NOT COLLOCATED WITH THIS TRANSMITTING SITE AND WHERE COMMUNICATIONS TO THIS STATION ARE RECEIVED. SEE INSTRUCTIONS FOR STATIONS HAVING MORE THAN TWO NON COLLOCATED RECEIVING SITES.

SITE NO.
LATITUDE
LONGITUDE
ANT. HGT. (FEET)
SITE NO.
LATITUDE
LONGITUDE
ANT. HGT. (FEET)

12 GIVE EITHER RADIO FREQUENCY REQUESTED ... OR RADIO BAND REQUESTED ... FROM ... (ENTER FREQUENCIES IN MEGAHERTZ.) TO ...

13 PARTICULARS OF RADIO OPERATIONS

A. SINGLE FREQUENCY SIMPLEX
B. TWO FREQUENCY SIMPLEX
C. TWO FREQUENCY DUPLEX
D. ONE WAY VOICE & TONE PAGING
E. ONE WAY PAGING TONE ONLY
F. REMOTE CONTROL OF EQUIPMENT
G. VOICE DISPATCHING
H. VOICE CONVERSATIONAL INSTRUCTIONAL
I. VOICE COMMAND & CONTROL
J. BROADCAST REMOTE PICKUP
K. TELEPRINTER
L. FACSIMILE
M. TELEMETRY
N. SELECTIVE SIGNALLING
P. CALL BOX
Q. ALARM DEVICE
R. TONE SQUELCH
S. OTHER (SPECIFY BELOW)

(ENTER CORRECT LETTERS) BGHR

14 GIVE TIMES WHEN TRANSMITTER(S) DESCRIBED WILL NORMALLY BE USED FROM ... TO ...

GIVE TIMES OF PEAK USAGE

15 IS YOUR USE OF THESE RADIO FACILITIES SEASONAL? (YES OR NO)

IF "YES", GIVE PERIOD OF USE

16 SYSTEM DIAGRAM
ALL APPLICANTS WITH PROPOSED SYSTEMS CONTAINING MORE THAN TWO BASE STATIONS OR MORE THAN TWO STATIONS AT FIXED LOCATIONS MUST ATTACH A FUNCTIONAL SYSTEM DIAGRAM SHOWING DETAILS OF THE PROPOSED SYSTEM.

CHECK IF DIAGRAM ATTACHED ☐

CERTIFICATION OF PERSON RESPONSIBLE FOR PREPARING ENGINEERING INFORMATION SUBMITTED IN THIS APPLICATION

I, THE UNDERSIGNED, HEREBY CERTIFY THAT I HAVE SUPPLIED TO THE APPLICANT, FOR THE PURPOSE OF HIS COMPLETING THIS APPLICATION, THE TECHNICAL AND ENGINEERING DATA REQUIRED, AND TO THE BEST OF MY KNOWLEDGE BELIEVE THAT IT IS ACCURATE, CORRECT AND COMPLETE. I FURTHER CERTIFY THAT I AM FAMILIAR WITH THE COMMISSION'S RULES AND REGULATIONS PERTAINING TO THIS APPLICATION.

SIGNATURE _____ TYPED NAME. _____ DATE. _____

ADDRESS _____

BUSINESS RELATIONSHIP TO APPLICANT _____

TELEPHONE NUMBER _____

FCC Form 425
May 1977

UNITED STATES OF AMERICA
FEDERAL COMMUNICATIONS COMMISSION
WASHINGTON D C 20554

APPLICATION FOR RADIO STATION AUTHORIZATION

SECTION III
FINAL ENGINEERING DATA

1 NAME OF APPLICANT:

2 LICENSE NUMBER:

3 ENTER TOTAL NUMBER OF SECTION III PAGES 1
ENTER PAGE NUMBER OF THIS SECTION III SHEET 1
ENTER PAGE NUMBER OF PERTINENT SECTION II SHEET 1

ENTER THE FOLLOWING INFORMATION FOR ALL NON MOBILE EQUIPMENTS. USE ADDITIONAL PAGES OF SECTION III AS NECESSARY.

4	TRANSMITTER INPUT POWER (WATTS)	220	6 EFFECTIVE RADIATED POWER (WATTS)		75
5	TRANSMITTER OUTPUT POWER (WATTS)	100	7 IS TRANSMITTER TYPE ACCEPTED? (YES OR NO)		Yes
8	LOCATION OF CONTROL POINTS				CONTROL POINT TELEPHONE NO. (INCLUDING AREA CODE)
	POINT NO. 1	1029 S. King St., Addison, Ill. (Radio-ERP 50)			3129991234
	POINT NO. 2				
	POINT NO. 3				

9	TYPE OF UNIT (E.G. TRANSMITTER OR RECEIVER)	TX	RX	
10	UNIT NUMBER			
11	ASSIGNED FREQUENCY (MEGAHERTZ)	464.5750	469.5750	
12	EMISSION DESIGNATOR	16F3		
	(UP TO TWO ENTRIES PER RADIO UNIT)			
13	EQUIPMENT MANUFACTURER'S NAME	C.E.		
14	FCC TYPE ACCEPTANCE MODEL NUMBER	KT-114-C	ER-65-C	
15	ANCILLARY EQUIPMENT — MANUFACTURER'S NAME	Decibel Prod.		
	GIVE REQUIRED INFORMATION FOR EQUIPMENTS ELECTRICALLY CONNECTED BETWEEN THE TRANSMITTER OR RECEIVER AND ITS ANTENNA. (UP TO TWO ENTRIES PER RADIO UNIT. USE ADDITIONAL PAGES OF SECTION III AS NECESSARY.) — MODEL NUMBER	SP3461-3		
	TYPE OF DEVICE	Cavity		
	MANUFACTURER'S NAME			
	MODEL NUMBER			
	TYPE OF DEVICE			
16	TONE SQUELCH FREQUENCY (IF USED) (HERTZ)	179.9	179.9	
17	ANTENNA MANUFACTURER'S NAME	Decibel Prod.	Decibel Prod.	
18	ANTENNA MANUFACTURER'S MODEL NUMBER	SP1026-450	SP1026-450	
19	ANTENNA GAIN OVER HALF WAVE DIPOLE (DB)	3	3	
20	ANTENNA POLARIZATION	V	V	
21	AZIMUTH OF MAIN LOBE (DEGREES EAST OF TRUE NORTH)	Omni	Omni	
22	IF MOUNTED ON GROUND, DOES OR WILL THE ANTENNA STRUCTURE EXTEND MORE THAN 20' ABOVE GROUND?			
23	IF MOUNTED ON A BUILDING, DOES OR WILL ANTENNA STRUCTURE EXTEND MORE THAN 20' ABOVE BUILDING?	No	No	
24	GIVE NAME AND LOCATION OF NEAREST AIRCRAFT LANDING AREA IF WITHIN FIVE MILES OF ANTENNA. ANSWER ITEMS 25 AND 26 BELOW. — NAME			
	LOCATION			
25	DISTANCE IN FEET, FROM ANTENNA TO NEAREST POINT OF NEAREST RUNWAY			
26	BEARING IN DEGREES EAST OF TRUE NORTH FROM ANTENNA SITE TO NEAREST POINT OF NEAREST RUNWAY			
27	HEIGHT IN FEET ABOVE GROUND OF SUPPORTING STRUCTURE AT ANTENNA SITE.	1199	1199	
28	TYPE OF ANTENNA SUPPORTING STRUCTURE (WATER TOWER, BUILDING, CHIMNEY, POLE, ETC.)	Bldg	Bldg	
29	OVERALL HEIGHT OF ANTENNA IN FEET ABOVE GROUND	1202	1202	
30	HAS NOTICE OF CONSTRUCTION BEEN FILED WITH THE FAA? (ON FAA FORM 7460-1)	No	No	
31	IF ANSWER TO ITEM 30 IS "YES" COMPLETE THIS ITEM — DATE FILED			
	NAME UNDER WHICH FILED			
	FAA OFFICE WHERE FILED			
32	IF USING AN EXISTING ANTENNA STRUCTURE, GIVE ITS CURRENT PAINTING AND LIGHTING SPECIFICATIONS			

ENTER THE FOLLOWING INFORMATION FOR MOBILE UNITS.

33	NUMBER OF UNITS	10	1	
34	EMISSION DESIGNATOR	16F3	16F3	
35	OUTPUT POWER (WATTS)	35	4	
36	ASSIGNED FREQUENCY (MEGAHERTZ)	469.5750	469.5750	
	TONE SQUELCH FREQUENCY (IF USED) (HERTZ)	179.9	179.9	
37	EQUIPMENT MANUFACTURER'S NAME	RCA	Motorola	
38	FCC TYPE ACCEPTANCE MODEL NUMBER	CT3004	CC4224C	

R E S U M E

Norman R. Coltri
Deer Trail, RD #1
Tabernacle, N.J. 08088
609-859-9709

SUMMARY

- Ten years of experience in the design, development, procurement, and operation of public safety telecommunications systems.
- Five years experience in coordinating and licensing public safety radio systems.

EDUCATION

New Jersey Institute of Technology
Newark College of Engineering
Newark, New Jersey
BS degree in Electrical Engineering
(Major in Communications Systems)

PROFESSIONAL EXPERIENCE

Division of State Police
West Trenton, New Jersey

Frequency Coordinator Analyst — 1976 - Present

- Recommend assignment of public safety radio frequencies for police, EMS, and other agencies of local government throughout the State.
- Reconcile radio interference problems encountered by existing radio systems.
- Conduct radio propagation studies.
- Evaluate existing public safety telecommunications systems.
- Work with local agencies to improve telecommunications systems. Develop concept plans and conduct feasibility studies.
- Provide staff support to the Statewide Police Emergency Network.
- Analize and respond to FCC proposals. Maintain close liason with FCC staff.

Electronic Research Engineer 1970-1976

- Design and implement electronic technique and devices in support of the New Jersey Wiretapping and Electronic Surveillance Control Act.

- Develop specifications for and oversee the procurement of radio equipment for land mobile and avionics usage.

- Analyze and test performance of new equipment to insure compliance with specifications.

- Design of land mobile communications network for area wide dispatching.

Borough of Buena Police Department
Minotola, New Jersey

Radio Dispatcher 1969-1970

- Received and processed citizens request for public safety service.

Dispatched police, fire and ambulance service.

ADVISORY AND CONSULTATIONS

- Member of the Central Dispatch Committee for the Borough of Buena, N.J. 1974 - 1976
Developed management structure, dispatch, scheduling, dispatcher training and operating procedures manual.
Designed, procured and supervised installation of the radio and telephone system for the Center.

- Provide telecommunication assistance to several diverse agencies through participation in APCO Project 17, Technical Advisor Program. This program, funded through LEAA, provides for on-site visit and preparation of a factfinding report.

PROFESSIONAL AFFILIATION

- Associated Public Safety Communications Officers, Inc. APCO is a nationwide professional society of telecommunications personnel.
Member 1974 to present

Appointed to APCO National Regulatory and Dockets Committee. One of 10 persons in the nation chosen to review and comment of FCC Dockets and Proposals.

Appointed to APCO Select Committee of Frequency Coordination. One of 12 persons in the nation involved in a review of procedures and standards for Frequency Cooridnation. A new National Procedures Manual will result from this study.

Appointed to APCO National Operational Procedures Committee. Co-chairman of a 7 member committee which revised the "Standard Operating Procedure Manual."

- Institute of Electrical and Electronic Engineers, Inc.
Member 1972 to present

A multi-national professional society of engineering personnel.

- Radio Club of America, Inc.
Member 1978 to present

Elected to membership of this prestigious worldwide organization composed of the pioneers of radio communications.

FCC LICENSES

- First Class Commercial Radiotelephone Operators License. This is the highest class license issued by the FCC for radio and television operation.

Amateur Technician Operators License.

END