

UTAH TELECOMMUNICATIONS
PLANNING STUDY

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and Emergency Preparedness

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FOREWORD

Society little realizes what is actually happening in the world today. The present population explosion will bring problems which we have never had to face before in communication. Today, the population is 3 billion and will double by the year 2000. Barring major changes, 100 years from now it will be 24 billion.

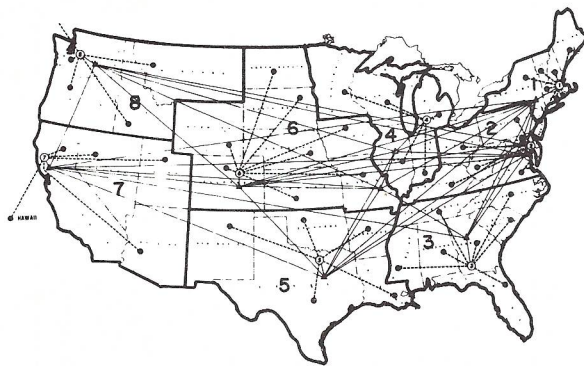
Communication must become more efficient in order to answer the needs of aircraft and all types of vehicles moving at high rates of speed, which need immediate information on weather conditions, clearances of traffic in or out of major areas.

Several aspects must be taken into consideration when planning a communication system of any size regardless of whether it is a state system, small business, or sectional type communication system.

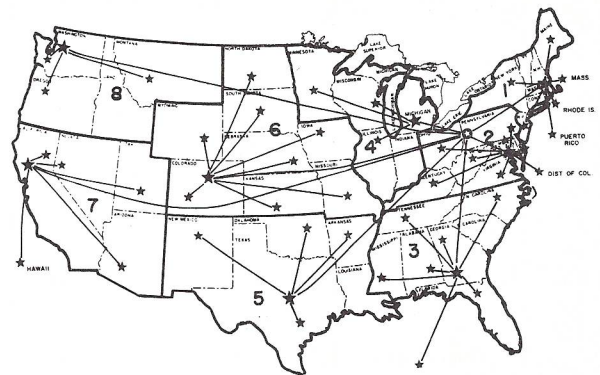
The need for communication between the federal, state and county levels is becoming more urgent all the time. Communication between different levels of government has been a matter of convenience in the past. However, today the development of nuclear weapons and the speed with which attacks can be delivered anywhere in the world, in a matter of minutes, necessitates immediate communication between all levels of government. To accomplish this type of system, extensive proper planning is imperative on all government levels to insure normal

day-to-day operation and yet meet the needs in emergency situations to integrate a central command. This is one of the primary purposes of this Survey.

The federal government is developing consolidation trends for their communication facilities under a Regional Planning Concept. Each region will have a regional center which will develop economic and control advantages. These systems include:



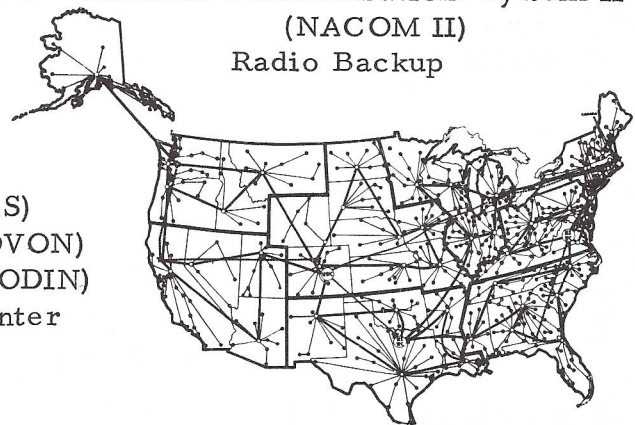
National Communications System I
(NACOM I)
Common Carrier



National Communications System II
(NACOM II)
Radio Backup

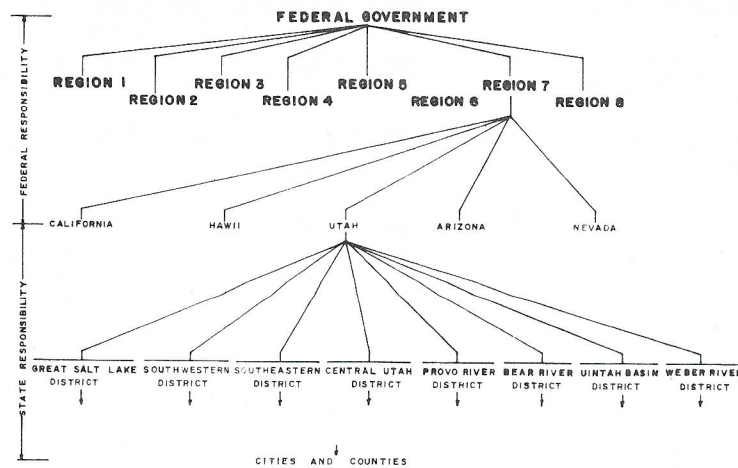
as well as

National Warning System (NAWAS)
Automatic Voice Network (AUTOVON)
Automatic Digital Network (AUTODIN)
National Crime Identification Center
(NCIC)



National Warning System

It is the responsibility of the federal government to plan, budget and operate the facilities between the Federal and State governments. It is the responsibility of the state, working with the counties and cities to plan, budget and operate the facilities between the state government and the local entities. See the following figure.



Example of Governmental Communication Flow Diagram

Utah's communications, because of inadequate funding and the lack of coordinated planning, make immediate improvement necessary. Changes in FCC rulings on high-band radio control of base stations, plus the need for additional frequencies to cover increased loads, require a major change in the complete radio communications system.

The writing of this Study is based on centralization of the State's Communications System under one plan, fulfilling the requirements for the Office of Civil Defense and Emergency Preparedness, Crime Omnibus, and the Highway Safety Program. Planning covers areas which would make it applicable for receiving federal grants and other financial assistance.

In determining the communications requirements for the State, including those required in an emergency it has been difficult to define the communications responsibilities of the different state departments and agencies and correlate these with the presently existing systems of the various private and federal, state, and local governmental agencies. An attempt has been made here to design one communications system which will meet all requirements.

Utah had no complete communications plan to include all agencies assigned emergency operations functions in Civil Defense and emergency preparedness operations which could be used by the federal government to evaluate it's readiness in an emergency or disaster.

The preparation of this Study is for day-to-day operations and the necessary tie-in for emergencies, as can be discerned by reading the definition of Civil Defense as taken from the Federal Guide, Part E, Chapter 9, Page 1.

"Civil Defense" and local government are one and the same thing. "Civil Defense Operations" occur when a local government responds to any massive emergency - a tornado, flood, or other natural disaster; a major fire, explosion, or industrial accident; a civil disorder or disturbance, or a nuclear attack.

News stories about a disaster may report that the police force cordoned off the disaster area and helped remove the injured, the fire department fought the blaze, the public works department cleared away the debris, and doctors treated casualties. Some people ask, "Yes, but where was Civil Defense?" The answer is that "Civil Defense" was there. It was the police, fire, public works, and other forces of government dealing with the emergency, whether or not they regarded themselves as engaging in civil defense operations, or even thought of the two words, civil defense. It was the doctors and nurses and hospital staffs doing their jobs.

"Civil Defense" is the concerted response to an unusual emergency condition - a response that calls for maximum use of community resources, and with a greater need for coordination between emergency forces than usually exists.

Civil Defense is not a special unit or group of people, standing by to save the day in case of a major disaster. Local police, fire and other forces may sometimes need some trained auxiliaries to assist the regular force in disaster operations. Some additional trained people may be needed to monitor radioactive fallout with special instruments or to serve

public fallout shelter managers. But the forces responsible for civil defense operations are the normal forces of government - plus nongovernment personnel with needed skills, such as doctors.

The official in charge or in command during a civil defense emergency is the official who is always in charge - the major or other staff executive. He often has a key staff advisor or specialist called a civil defense director or coordinator, and there may be a staff office called the civil defense agency. It should be clearly understood, however, that the civil defense director is not solely responsible for civil defense preparations. Rather, he is a staff specialist for the chief executive.

One of the civil defense director's major responsibilities is to take the lead in assisting the operating departments of government - the police, fire, engineering, and other departments - to make plans and preparations for major emergencies of all types. But the civil defense agency as such does not normally have operational forces of its own to deploy. These forces belong to the operating departments.

A related function, to allow local forces and resources to be used most effectively in a major emergency, is to provide the means and procedures for the chief executive and his cabinet - the chief of police, fire chief, city engineer, and other key executives -- to make rapid and coordinated decisions. The civil defense director should lead in this government-wide effort to provide for "direction and control" in emergencies.

This usually involves plans for operations at a control center, at which the key officials of government will get information on the emergency situation, and can make decisions rapidly, but after coordinating with each other as conditions may require. This control center (or Emergency Operating Center, or EOC) should have the communications needed to transmit orders to local government forces.

In an actual emergency, the chief executive is in overall command and is responsible for policy-level decisions. The chief of police or sheriff, fire chief, and other heads of operating departments are in command of their forces. The civil defense director normally serves as a chief of staff for the major or other chief executive.

The Telecommunications Planning Study should follow the Civil Defense philosophy of operations, as well as supply the guidelines in communications to answer the commitment to Emergency Planning of local, state and federal government.

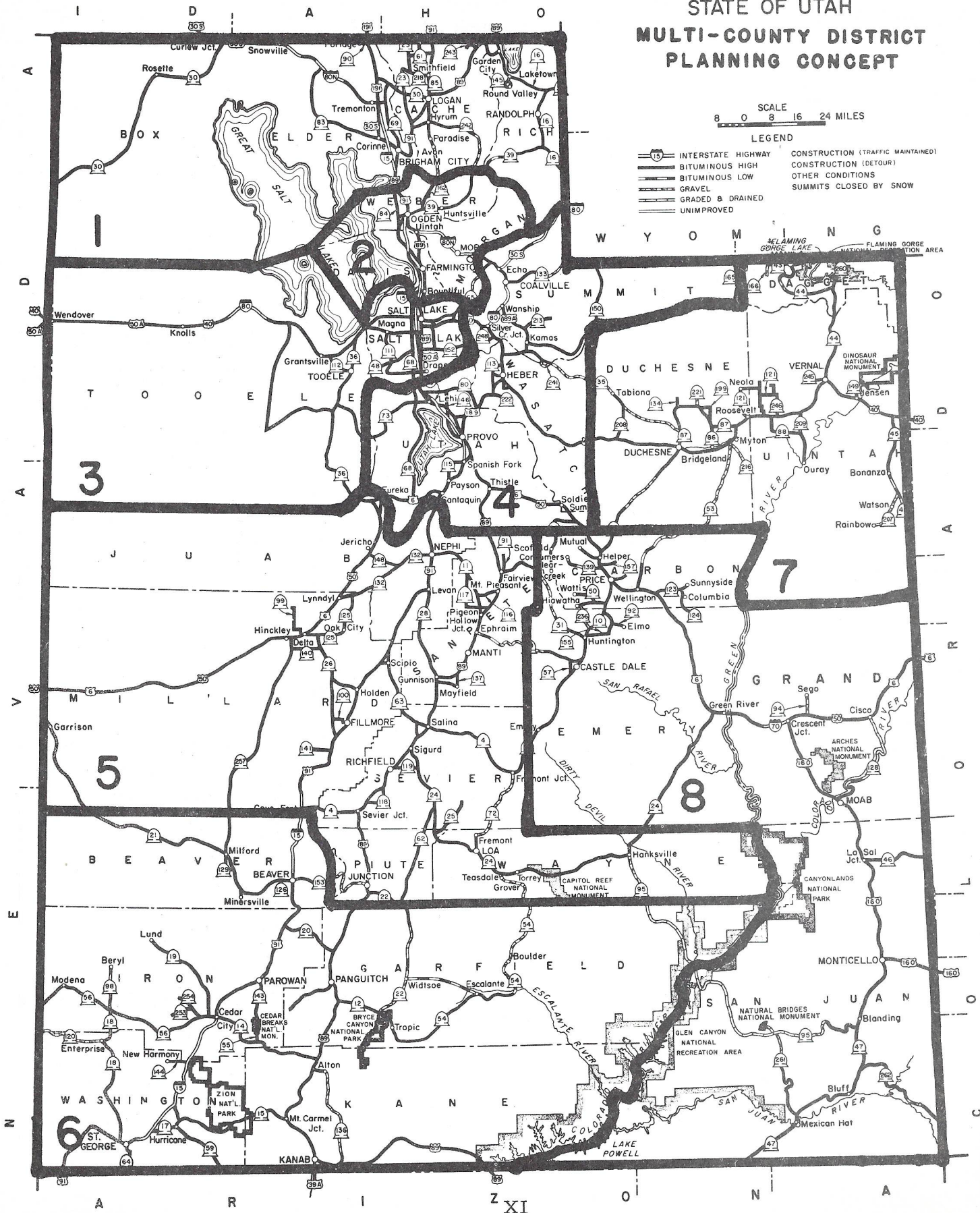
The Utah Council of Defense has several functions, with the main two being the Utah Office of Civil Defense and the Utah Office of Emergency Preparedness. Brigadier General C. C. Thorstensen is the director for both of these functions.

STATE OF UTAH MULTI-COUNTY DISTRICT PLANNING CONCEPT

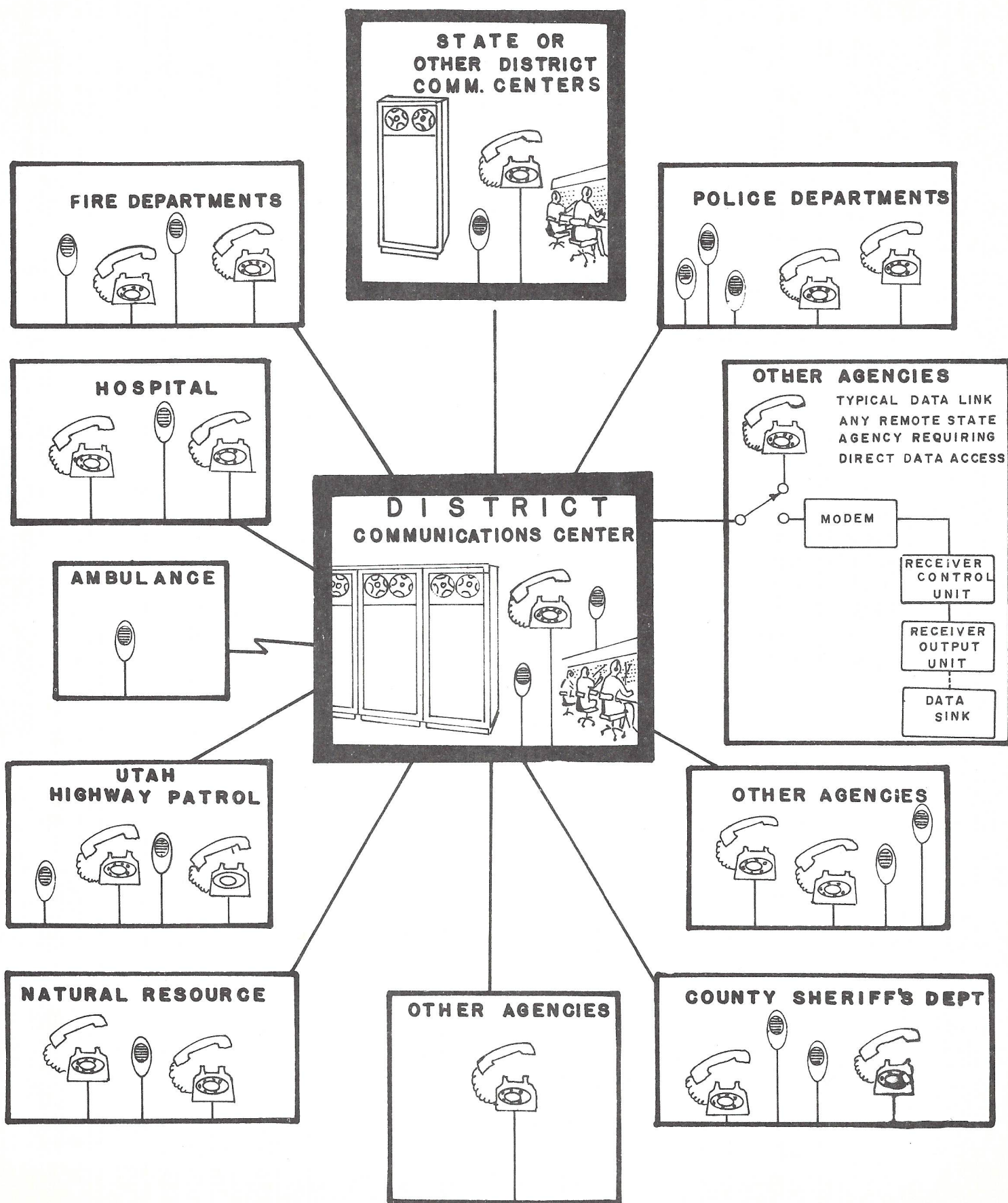
8 0 8 16 24 MILES

LEGEND

- | | | |
|--|--------------------|-----------------------------------|
| | INTERSTATE HIGHWAY | CONSTRUCTION (TRAFFIC MAINTAINED) |
| | BITUMINOUS HIGH | CONSTRUCTION (DETOUR) |
| | BITUMINOUS LOW | OTHER CONDITIONS |
| | GRAVEL | SUMMITS CLOSED BY SNOW |
| | GRADED & DRAINED | |
| | UNIMPROVED | |



STATE OF UTAH - TELECOMMUNICATION SYSTEM



On February 13, 1970, Calvin L. Rampton, Governor of the state of Utah issued the following executive order:

EXECUTIVE ORDER

State Telecommunications System

WHEREAS, an efficient and reliable telecommunications system is vital to the security and welfare of the state in times of emergency, as well as in the conduct of the regular business of the state; and

WHEREAS, substantial economies can be effected by joint use of a consolidated telecommunications system by departments, agencies, commissions, boards and other units of state government as well as by local government.

NOW, THEREFORE, I, Calvin L. Rampton, Governor of the State of Utah, by virtue of the authority vested in me by the Constitution and laws of the State of Utah, do hereby declare that it is the policy of the State of Utah to provide for the development of an efficient and reliable comprehensive telecommunications system for joint use by state departments, agencies, commissions and boards and by local government. It is further declared to be the policy of the State of Utah to accomplish maximum practical consolidation and joint use of existing telecommunication facilities and services owned or used by the state and generally to coordinate all telecommunication functions and activities of state government.

1. There is hereby created, within the Department of Finance a Telecommunications Division to be headed by a Director of Telecommunications who shall be appointed by the Director of Finance.
11. Under the supervision of the Director of Finance, the Director of Telecommunications shall have the following duties power and responsibilities:
 1. To standardize policies and procedures for and coordinate the purchase, lease and use of telecommunication equipment, services and facilities for all agencies of state government.
 2. To coordinate and consolidate maintenance and repair procedures and facilities as far as is practical.

3. To advise departments and agencies of the state and the political subdivisions thereof as to systems or methods to be used to meet telecommunication requirements efficiently and effectively.
 4. To work toward consolidation of telecommunication systems and services of state agencies, so far as is practicable, and to provide for their joint use by agencies wherever possible.
 5. Cooperate with other states and the federal government with respect to organizing telecommunication systems in expediting and carrying out regional or wide-area communication networks.
 6. To apply for, receive and hold, or if appropriate, assist agencies in applying for, receiving or holding such authorization, licenses and allocations of channels and frequencies as are necessary to carry out the purposes of this order.
111. There is hereby established a state telecommunications advisory committee which shall consist of the following agency heads or their representatives:
1. The adjutant General of the Utah National Guard.
 2. The Director of the State Highway Department.
 3. The Commissioner of Public Safety.
 4. The Executive Director of the Department of Natural Resources.
 5. The Director of the Division of Aeronautics.
 6. The Executive Director of the Department of Social Services.
 7. The Superintendent of Public Instruction.
 8. The Commissioner of Higher Education.
 9. The Executive Secretary of the Utah Joint Educational Television Committee.
 10. The State Director of Civil Defense.
 11. The State Planning Coordinator
 12. Such private citizens or other involved parties as the Governor may choose to appoint.
- 1V. The advisory committee shall meet at least monthly or upon the call of the Director of Finance, and shall provide advice and counsel to the Director of Finance and the Director of Telecommunications in the development, management, administration, planning and operation of a consolidated state-wide telecommunications system aimed at meeting the requirements of all departments and agencies in state government and the political subdivisions of the state. Specifically,

the committee shall provide general advice to the Director of Finance and the Director of Telecommunications in fulfilling the above enumerated responsibilities. Members of the telecommunications advisory committee shall receive no compensation for duties performed as members of the committee.

- V. Personnel of all departments, offices and agencies of state government are directed to cooperate and assist, to the maximum extent possible, in carrying out the purpose of this order.
- 1 V. The Director of Telecommunications, under the supervision of the Director of Finance, shall develop a system of equitable billings and charges for services provided in administering and operating any consolidated or joint use system of telecommunications and in providing for the overhead, supervisory and planning functions of the Division of Telecommunications. Such system of charges shall reflect, as nearly as may be practical, the actual share of costs incurred on behalf of, or for services to each department, agency or political subdivision provided services from the State Telecommunications Division. Using agencies shall pay for such services out of appropriated or available funds.

IN WITNESS WHEREOF, I have

set my hand and caused to be affixed

the Great Seal of the State of Utah.

Done at the State Capitol in Salt

Lake City, Utah this 13th Day of

February, 1970.

(Signed) Calvin L. Rampton
Governor

ATTEST:

Secretary of State

ACKNOWLEDGEMENTS

Because of the wide scope of this Study many agencies and individuals' advice was required. We especially wish to express our gratitude for the efforts of:

The Office of the Governor of the State of Utah
All the Utah State Agencies involved in communications.

also

Mountain Bell Telephone Company
Utah Power and Light Company
Federation of Rocky Mountain States, Inc.
International Association of Public Communication
Officers, Inc. (APCO)
Department of the Army Stratcom
International Association of Chiefs of Police
Forestry Conservation and Communications Association
Commander of the Division of Communications,
Washington State Patrol
Communications Engineer, State of New Mexico

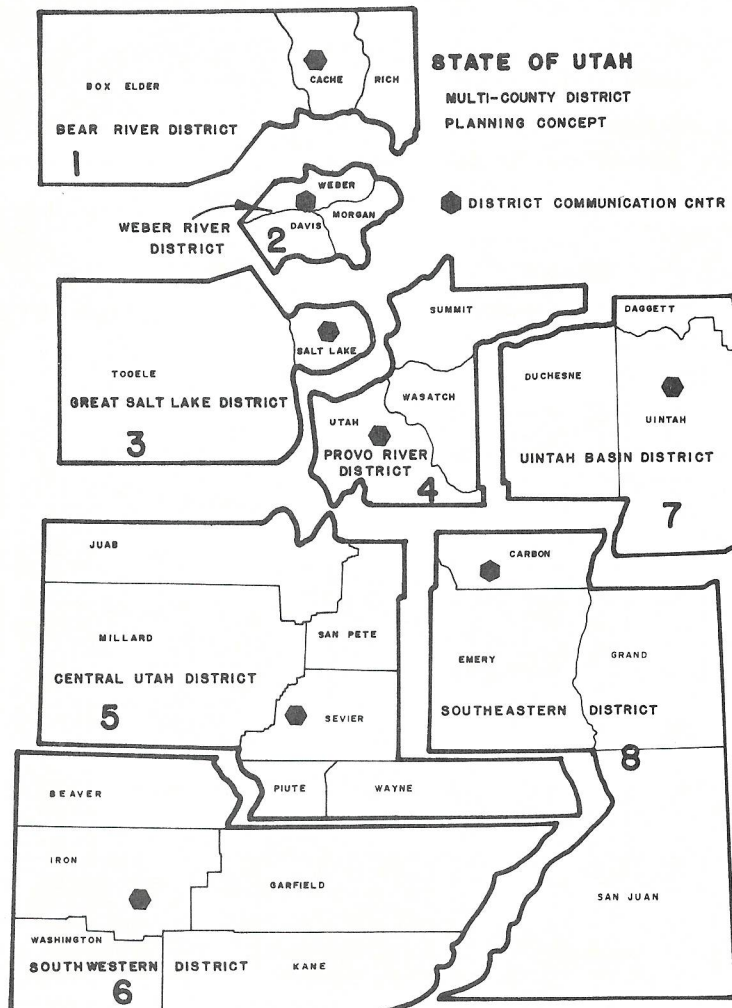
Illustrations By

Russell R. Bateman

Chapter 1

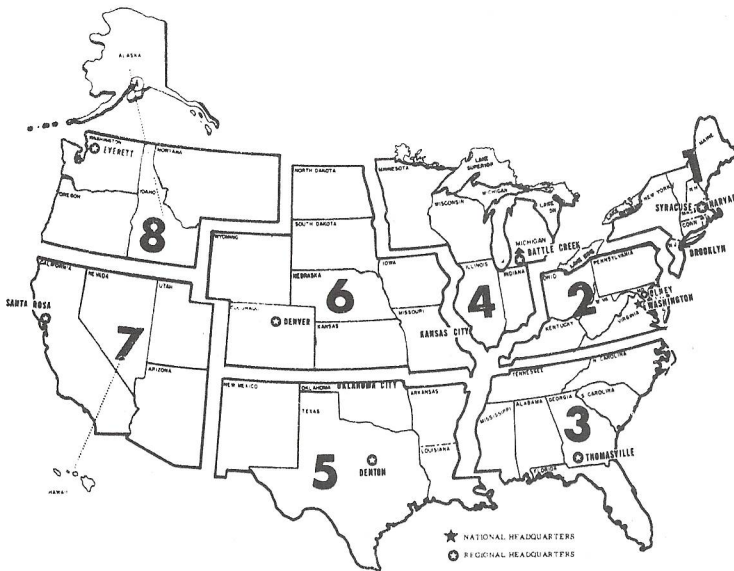
THE DISTRICT COMMUNICATIONS PLANNING UNDER THE MULTI-COUNTY CONCEPT

The Multi-County Planning Concept is a natural for the District Communications Planning and follows the State Planning Office's recommendation which divides the State of Utah into eight separate planning areas. The District Communications Plan lends itself very well to the



sharing of facilities in communications system planning. It assures efficient day-to-day operation while still providing appropriate connection for any level of emergency communications.

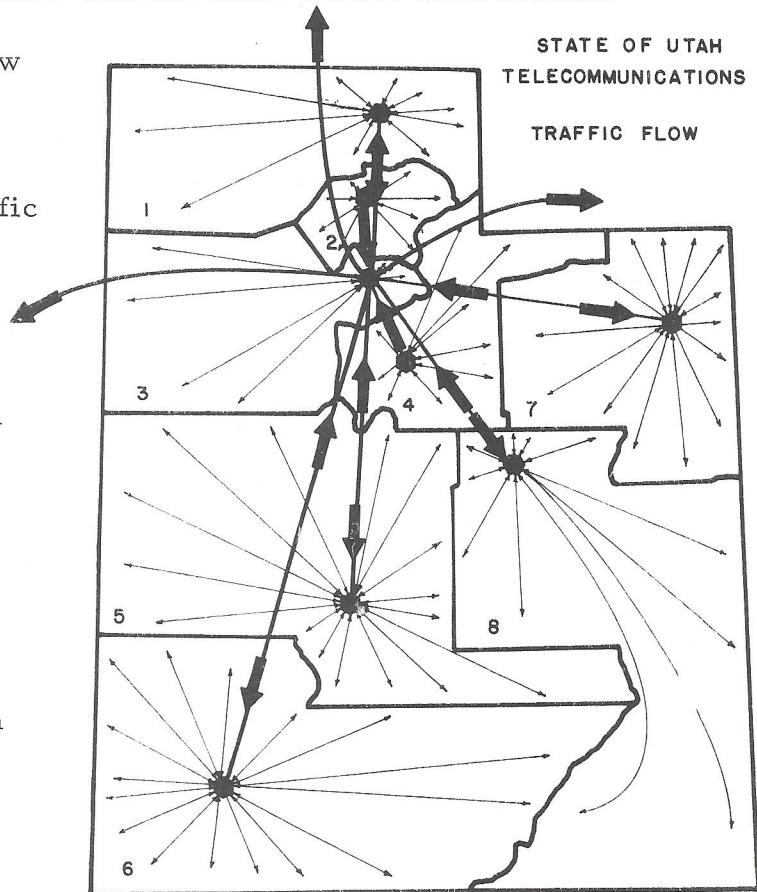
When compared with the Federal Regional Planning Concept, on the following page, the District Planning Concept is closely aligned.



Federal Regional Planning Concept

When the Federal Regional Planning Concept and the District Multi-Planning Concept are considered on a statewide basis for Utah the District Communications Center and the State Center then become central points for traffic flow within the State.

As noted on the Traffic Flow Pattern, information from out of state and from within the State would follow a natural communications flow. This pattern in Utah follows the natural terrain and routing of highways with the population centers and facilities for education and industry normally following



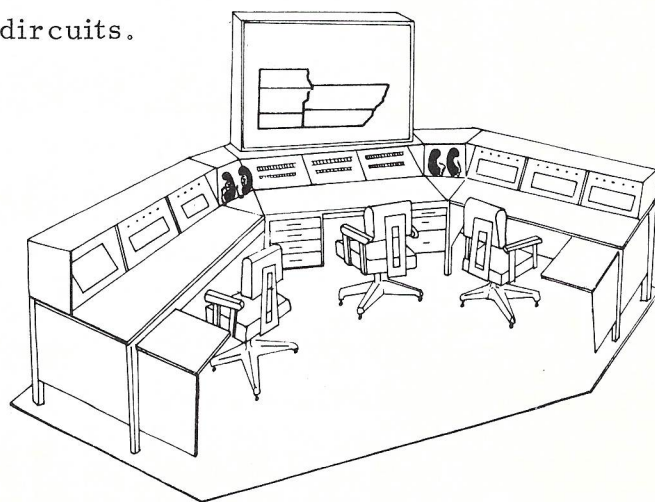
Telecommunications Traffic Flow

the location of the District Communications Center. The flow of traffic would normally be routed to the District Center, with an exchange of information to the State Center and would be capable of handling all types of communications, including telephone, two-way radio, data and information for government and educational type traffic.

DISTRICT COMMUNICATIONS CENTER

The District Communication Center now becomes a point where all normal local traffic located within the District, as set down by the Multi-County Planning Concept, would handle all communications within that District with the ability to contact any other District or to route traffic directly to the State Communications Center, or a Federal Communications point whenever the need arises. This planning lends itself to all kinds of information such as, inventory information, payroll, stolen automobile information, etc. The traffic could go through a manual or automatic switched facility within the District Center via high speed message switching or data circuits.

The System allows coordination of dispatching between all agencies. It affords one agency, normally not communicating with another to be able through the Dispatch Center to contact



District Dispatch Center

another local agency.

The District Communications Center will require a minimum of two dispatchers during a twenty-four hour period. The dispatchers should be assigned as follows:

Utah Highway Patrol Dispatcher:

District Police Channel - This channel would be his first priority and require most of his attention.

Statewide Police Channel - This channel is used only when there are special requirement or for communications that are required with a mobile from other areas.

Medical Channel - Operation on this channel will normally be in support of something on the District Police Channel. Studies show that police are involved in 90% of the ambulance activity.

Make NCIC inquiries on data terminal.

Operate NAWAS

Furnish back up on other channels.

Highway Department or State Government Dispatcher:

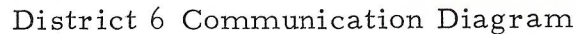
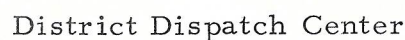
Highway Department Channels - Much of this traffic could utilize telephone patch for getting information directly to or from the responsible party.

State Government Channel - Much of this traffic could utilize telephone patch facilities.

Operate Data Facilities - Data can be fed from agencies in the district that are not on the message switching network.

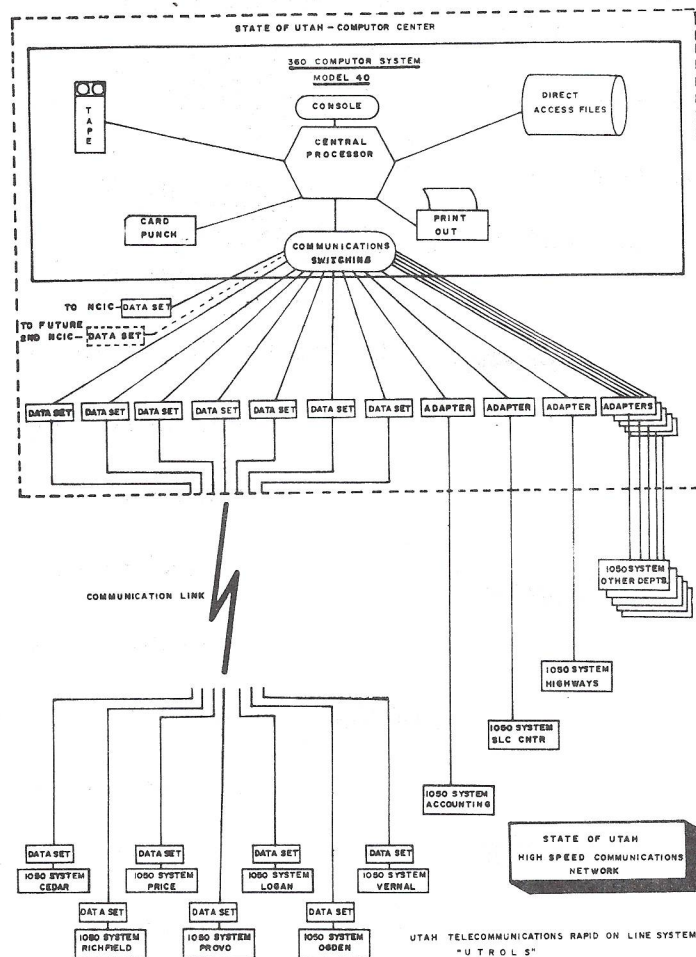
Furnish back up to the Highway Patrol Dispatcher as required for emergencies and circuit overloads.

Each Communication Center will require custom design. Consultants advise it is far more economical to



purchase modules and build the consoles. However, consoles can be built by many suppliers to specifications by the State. Every District should have a computer terminal designated by the Systems Planning and Data Handling Division. Telephone and other equipment will require further studies to insure economically current "State of the Art" facilities

Data Processing would become an integrated function of the Communications Centers to be compatible with the Multi-County Planning Concept, and would automatically provide electronic message switching facilities which are capable of fast and efficient handling due to computer controlled facilities. Data Processing would be provided to all agencies within the District Communications Center, once again taking advantage of the economics of a centralized plan.

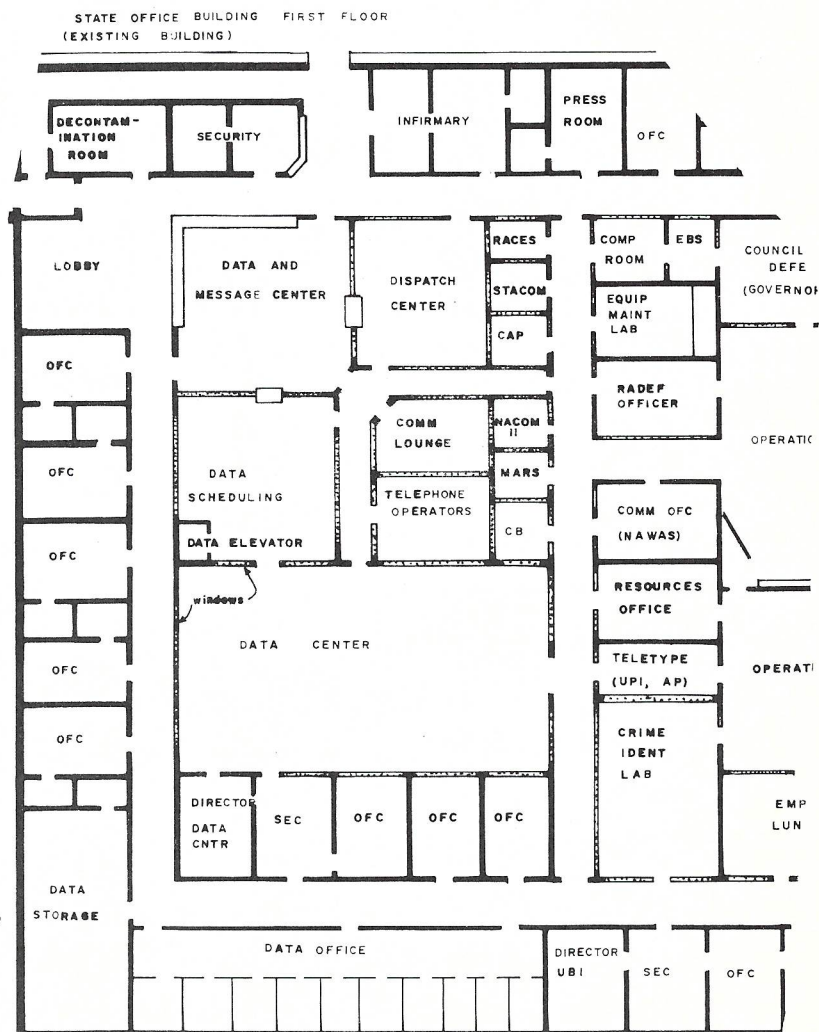


STATE COMMUNICATIONS CENTER

The State Communications Center is planned to be part of the State Operations Center, as indicated by the illustrated floor plan. The State Operations Center would handle day-to-day coordinated activities as well as activities in case of emergency. Communication would flow from the local entities, cities and counties to the federal agencies; or from one local entity to another local entity. In the case of an emergency the Center, operating as one, could provide communications to all state agencies, the federal government, city and county governments. This would provide savings to all communications operations.

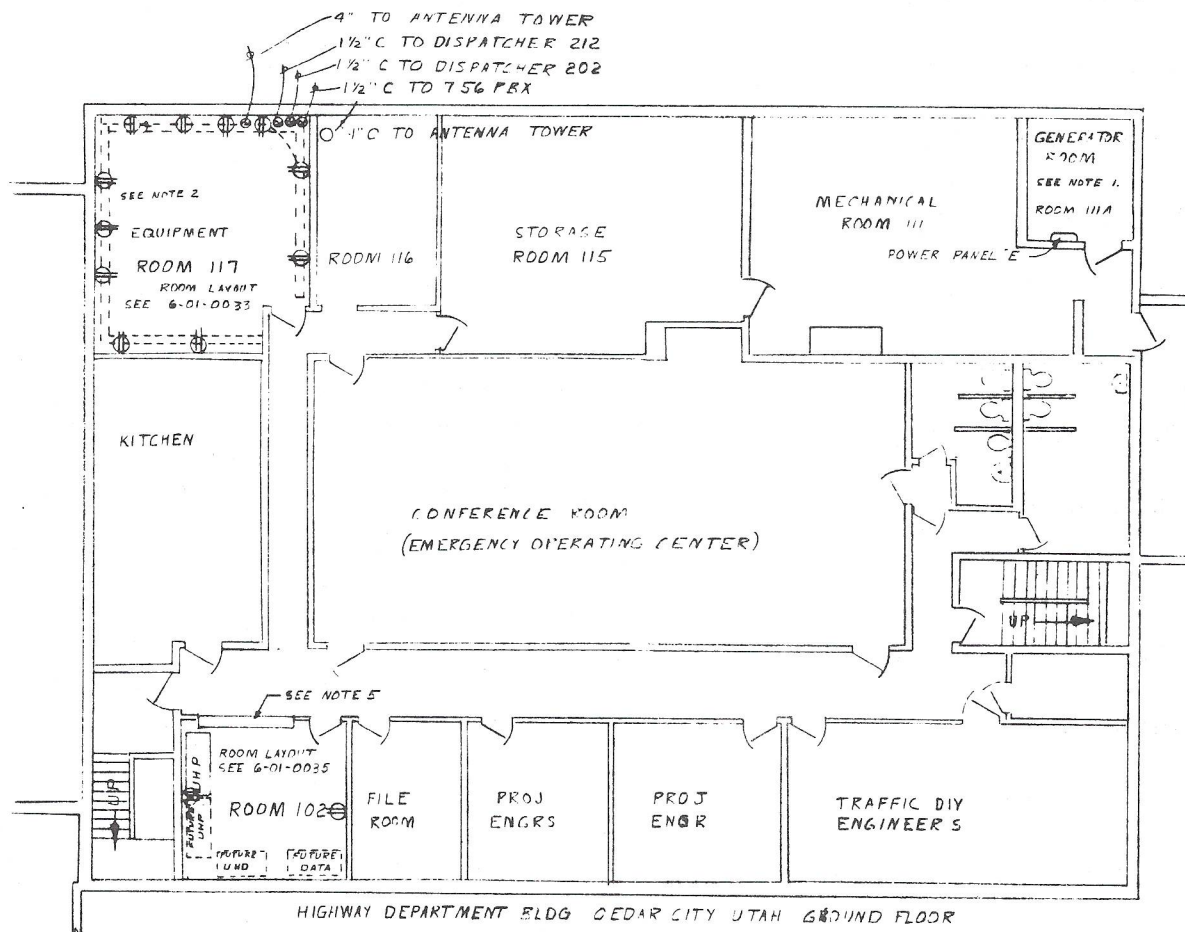
The State Operations Center is presently being planned by the State Building Board to be located in the State Office Building addition.

Close liason between the Building Board and communications planning should be established to insure that each new or remodeled State building would have the proper communications considerations, thus reducing heavy costs after



completion.

The following floor plan is an example of communications planning to insure that proper power, conduits and location of equipment considerations are provided during the construction or modification of a building.



NOTE 1. ONAN 35 KB SERIES
ELECTRIC PLANT GAS ENGINE
35 KW - 43.75 KVA AT 0.8 PF
120/208 V 3 PHASE 4 WIRE 60 Hz

NOTE 2. WIRE TRAY HUSKY #5789-M4
MOUNTED 12" BELOW CEILING.

NOTE 3. PROVIDE 2 - 15 AMP CTS
IN ROOM 102 FROM PWR PANEL 'E'

NOTE 4. PROVIDE 1 - 24 PR 17 GA
CABLE BETWEEN ROOM 102 AND
ROOM 117.

NOTE 5. PROVIDE WINDOW-DESK
THRU WALL

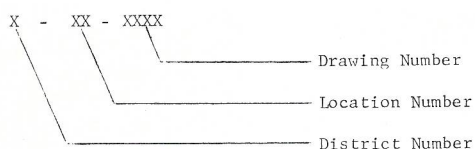
STATE OF UTAH TELECOMMUNICATIONS			
PHASE ONE 1969 COMMUNICATIONS PROJECT CEDAR CITY REGION E.O.C. INSTALLATION			
DWR	PWF	ENGR	APP
DWG NO 6-01-0031			

Documentation

Drawing numbers for design, floor plans and schematics will become a necessary function in order to assure proper filing and location of all drawings. A consolidated system with many users requires a clear understanding during the design phase so that the system is understood by all participants. The drawing system should be established on reproducible vellum which could be modified as the system changes and is updated. A sample drawing system is used to illustrate a system which is recommended for State Telecommunications Documentation. It is broken down into the various State Districts with a means of assigning numbers for drawings which are common in all

Districts.

STATE OF UTAH - TELECOMMUNICATIONS



0 - XX - XXXX	Drawing Common to all Districts
1 - XX - XXXX	District 1
2 - XX - XXXX	District 2
3 - XX - XXXX	District 3
4 - XX - XXXX	District 4
5 - XX - XXXX	District 5
6 - XX - XXXX	District 6
7 - XX - XXXX	District 7
8 - XX - XXXX	District 8

X - XX - XXX1	Overall Lists
X - XX - XX10	Block Diagram
X - XX - XX20	Equipment and Owner Lists
X - XX - XX30	Building and Structure Layouts
X - XX - XX50	Equipment Layouts
X - XX - XX70	Frequency and Channel Assignments
X - XX - XX80	Power Source Layout
X - XX - X100	Detail Sketches

X - XX - 1XXX	Equipment Inventory Number
---------------	----------------------------

The first number would be zero, meaning a common drawing to all Districts. The number one being for District 1, etc. The first two digits would be assigned as the location number which would be defined between the various locations within the District. The next four digits would be the drawing number itself.

The same type of drawing number can be used for equipment inventory control.

At the right is a
sample of the drawing
breakdown in District 6.

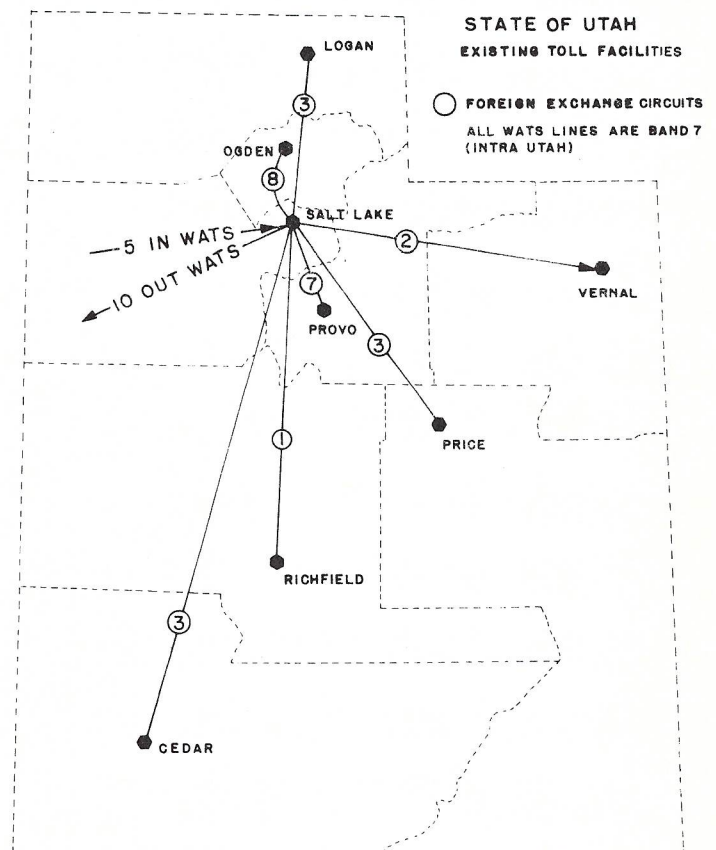
SAMPLE DRAWING SYSTEM - DISTRICT SIX

- 6-01-0001 - District 6 Telecommunications
 - 6-00-0010 - Communications Block Diagram, Region 6
 - 6-01-0001 - District 6 Communications Center
 - 6-01-0010 - District 6 Block Diagram
 - 6-01-0011 - Microwave Block Diagram
 - 6-01-0012 - FM Systems Block Diagram
 - 6-01-0013 - HF Systems Block Diagram
 - 6-01-0020 - Equipment and Ownership List
 - 6-01-0030 - Site Layout and Antenna Structures
 - 6-01-0031 - Equipment Room and Conduit Sketch
 - 6-01-0051 - Equipment Layout - Equipment Room
 - 6-01-0032 - Console Room and Conduit Sketch
 - 6-01-0052 - Equipment Layout - Console
 - 6-01-0033 - Telephone Conduit Layout Sketch
 - 6-01-0016 - Telephone System Block Diagram
 - 6-01-0080 - Power Layout
 - 6-01-0014 - Block Diagram - A. C. Wiring
 - 6-01-0015 - Block Diagram - EM Generator
- 6-02-0001 - Frisco Peak Installation List
 - 6-02-0010 - Block Diagram
 - 6-02-0030 - Site Layout
 - 6-02-0050 - Equipment Layout
 - 6-02-0080 - A.C. Power and EM Generator Equipment and Block Diagram
- 6-03-0001 - Beaver Dam Installation List
 - 6-03-0010 - Block Diagram
 - 6-03-0030 - Site Layout
 - 6-03-0050 - Equipment Layout

Chapter 2

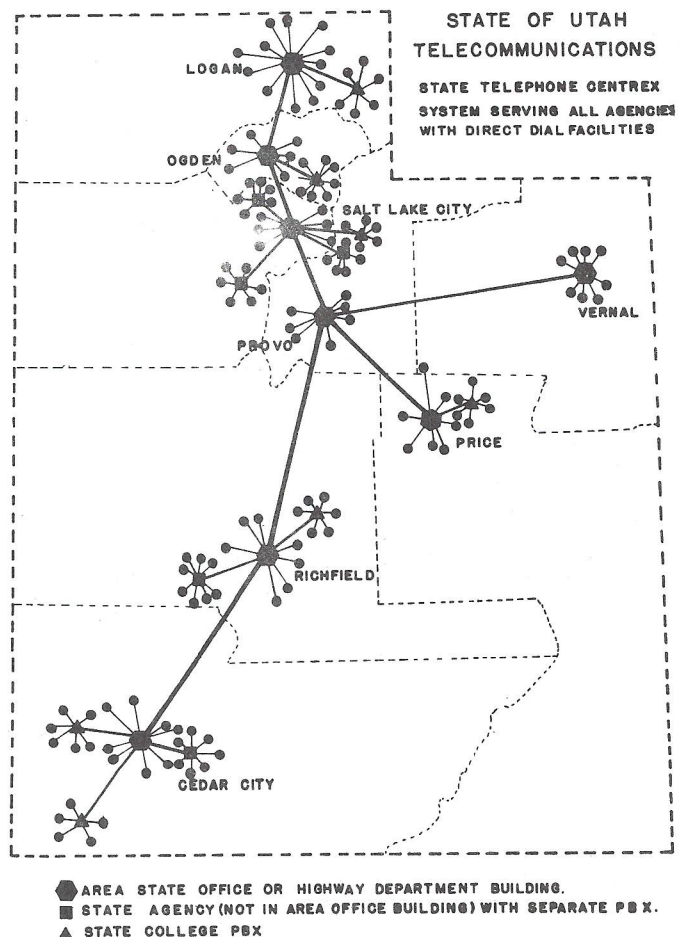
CONCEPT OF SHARED INTRASTATE FACILITIES

Shared intrastate facilities presently exist in the Utah State Government as part of our telephone service. The development of telephone facilities in Utah has kept up with the state-of-the-art. Presently there are 27 interexchange lines, as shown in the figure. There are full period lines between the PBX at Salt Lake City and major cities in the State. The number of lines is established by studies conducted by the Mountain Bell Telephone Company. The full period dedicated circuits are supplemented by the five Band-7 IN WATS and the ten Band-7 OUT WATS, which provide incoming and outgoing telephone calls to any telephone in the State of Utah. Band 1 (adjacent states to Utah) should be added when the number of calls can justify the cost. This would be of special aid to law enforcement.



The Communication Center planning would also make possible President Nixon's recommendation of a universal emergency number as supported by both Congress and the FCC. This easily remembered three digit 911 would be used by the police, fire and medical as well as any other emergency requirements. The implementation of this number must be planned into the State, county and city communication networks. The city of Bountiful is the first area in Utah to use the 911 number arrangement. All areas should participate in a master plan, working with Mountain Bell personnel to develop the best possible and most economical configuration.

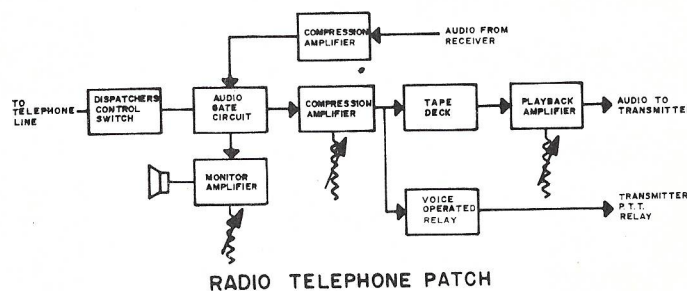
An effective state telephone system, including facilities of intra-exchange lines and intrastate WATS lines, can be developed with proper planning at an overall cost less than it is today. Major PBX systems should be planned for the District Centers with satellite PBX equipment on college campuses and other locations where the cost and operational requirements justify it. With all agencies participating, statewide direct dialing would



provide faster, convenient facilities to state and local governmental agencies. For example, Weber State College could call direct to Dixie College by dialing six digits.

A new tariff provides a broader base for interconnection and integration of common carrier facilities and state owned facilities into an overall communications network. One new aspect of the new tariffs is the availability of a telephone patch. The telephone patch will save many hours on the part of a dispatcher by allowing radio channels (other than police) to be patched directly into the telephone line.

The interconnection of a two-way radio base station to a telephone line will provide communications with any tele-

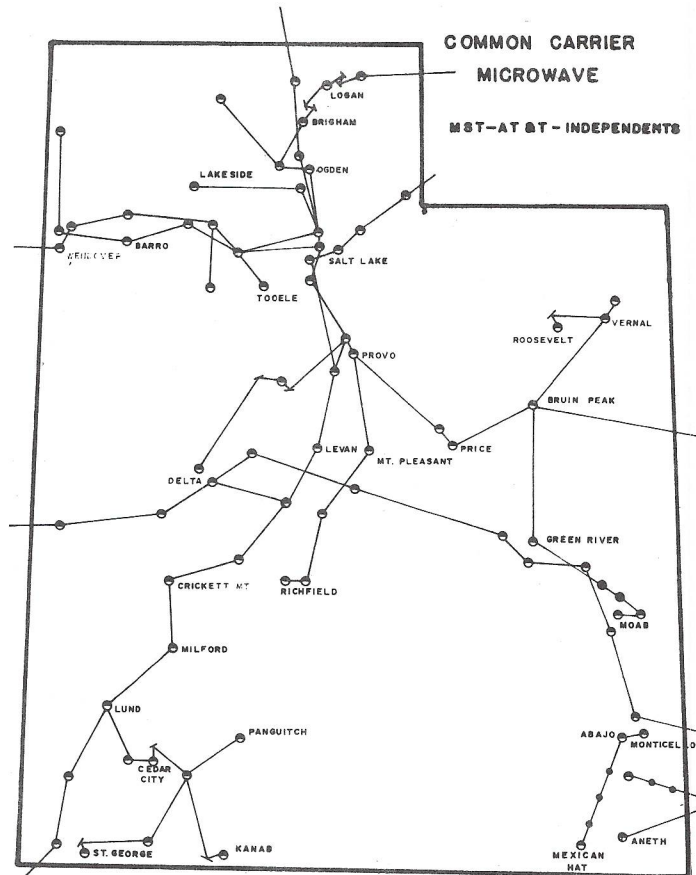


phone. The base station is automatically keyed by voice from the telephone, provided that the mobile is not transmitting. One approach is shown in the block diagram. A continuous tape loop is employed to provide a delay in the transmitted audio which eliminates the usual problem of losing the first word or syllable spoken into the telephone. This operation is controlled by the dispatcher, who first establishes the contact with the mobile unit and the telephone party. The dispatcher is then free to do other work until the conversation is completed.

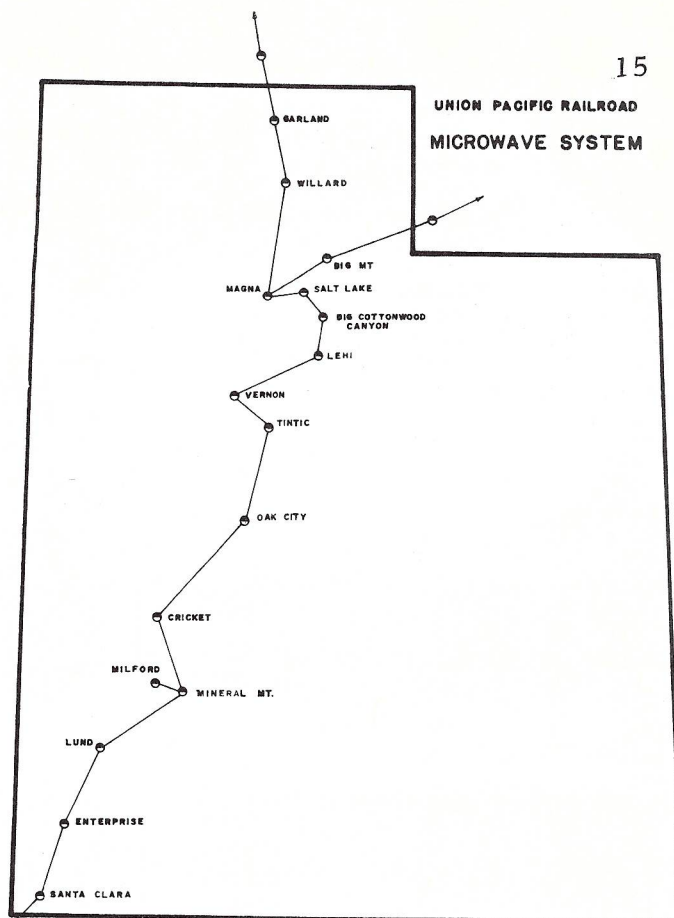
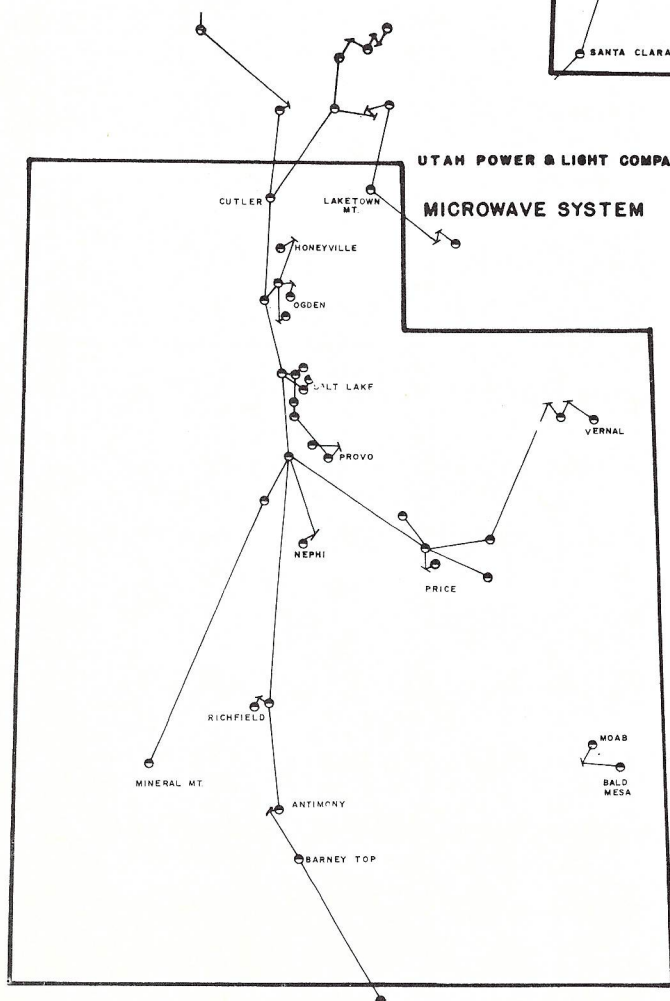
There are many other aspects of sharing facilities which are available from common carriers. An extensive system of common carrier microwave covers Utah, and for many requirements it is far

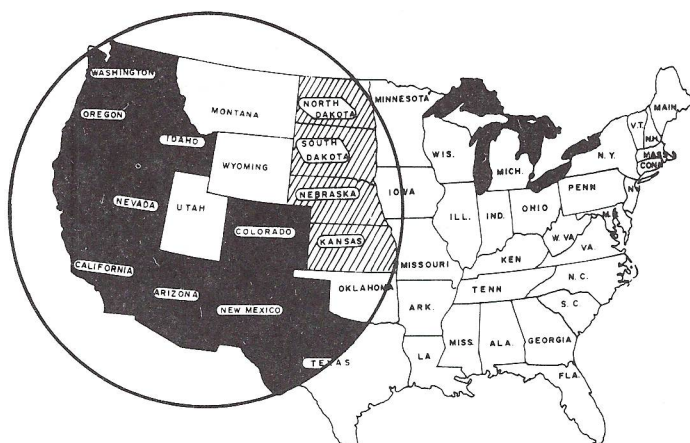
more economical to lease facilities. Each requirement must be examined on its merits. Full period circuits are available on a lease basis from the common carriers and should be considered in communications planning. These facilities can be used for voice, data, telemetry, facsimile, etc.

There are some limitations on common carrier facilities, inasmuch as some company's policies do not permit sharing of building and antenna structures. Common carrier installations are not located to meet the State's requirement for good FM mobile and television



coverage. For some of these communications needs, Utah will have to go to state owned facilities or enter into a lease contract with other carriers. Many large communications users have found it economical and feasible to own and operate their own facilities. We presently find several microwave systems in Utah, such as Utah Power and Light, and Union Pacific Railroad shown on the following page. In addition there are other similar systems such as Mountain Fuel Supply, El Paso Gas, D.R. & G. Railroad, Federal Aviation Administration,

**UNION PACIFIC RAILROAD
MICROWAVE SYSTEM****UTAH POWER & LIGHT COMPANY
MICROWAVE SYSTEM**



■ STATES HAVING ONE OR MORE STATE OWNED MICROWAVE OR
UHF CONTROL SYSTEMS

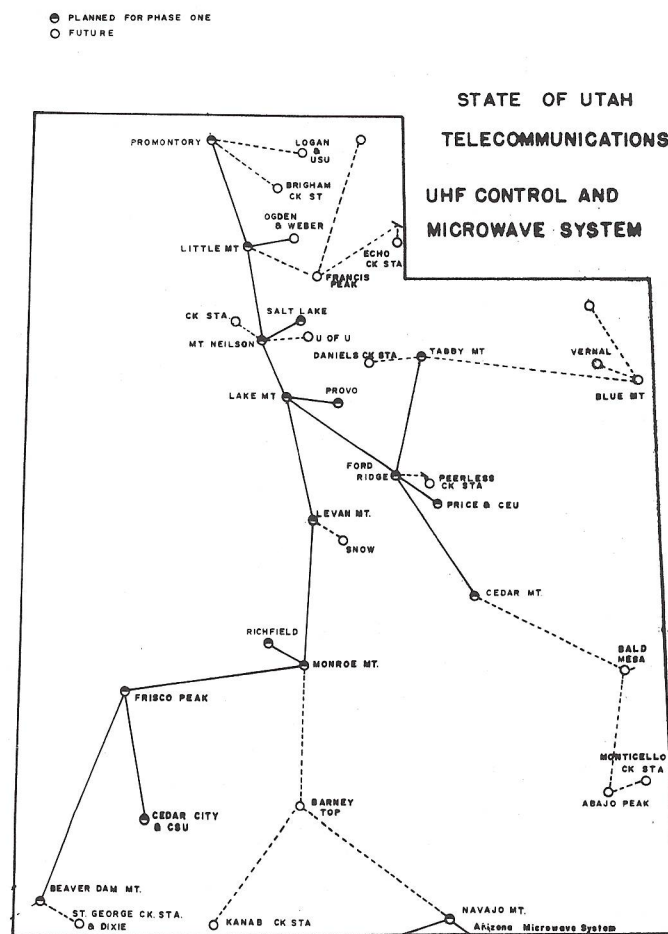
▨ STATES NOW IMPLEMENTING STATE OWNED MICROWAVE SYSTEMS

Many of the surrounding
states have microwave
systems to some degree
as shown in the illustration.

UHF CONTROL AND MICROWAVE

Shared system planning for UHF Control and Microwave is probably the most important aspect of the complete Telecommunications Study. The routing of the microwave system is designed in such a way that it follows the normal routing of the main communication points now operated by the various agencies in the State of Utah, as shown by the illustration. Many of these communication sites have been developed by the State Public Safety Departments or county agencies. Most of the communication sites in this Study, South and East of Provo, were developed for the television translator stations. All planning has been done with the goal of consolidating as many of the presently existing communication sites as possible into a concentrated communication system which could eventually include all of the communication needs for the State.

The concept of geographical consolidation of communication sites could also help in combining some of the communication maintenance involving several agencies in the State. The consolidation makes possible sharing of maintenance personnel,



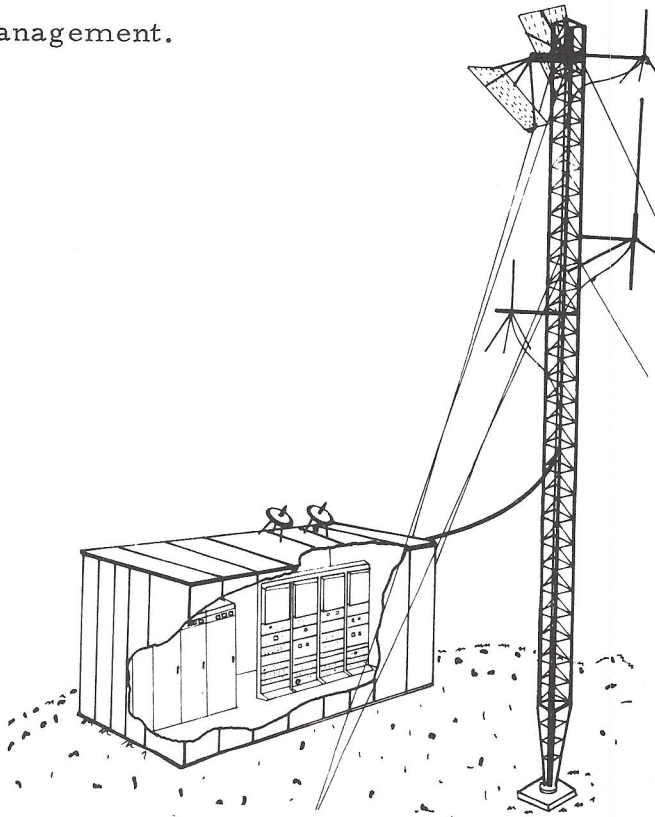
transportation and electronic maintenance facilities.

An example of the ability of the UHF control and microwave system would be to consolidate UHF control for statewide two-way radio systems. Routing all communications into the District Communication Center would assist the private common carriers in their planning. The system would be able to carry not only the control for two-way radio but also library communications, teletype, computer data, facsimile slow scan television, etc.

One such site is already underway atop Monroe Mountain near Richfield, Utah. A site development, similar to the illustration, is a repeater site being developed by the Highway Department, Highway Patrol, Educational Television plus two Federal agencies, the Forest Service and the Bureau of Land Management.

The work, costs and basic equipment are shared by all. This will be a monetary saving to all, in fact without the help of each department this key site would not have been possible for several years.

This type site is justified wherever communications grouping is necessary. Although mountain top repeaters pose problems of maintenance and accessibility



Mountain Top Repeater

due to weather extremes, the terrain makes this type operation a necessity in order to supply the State with 100% communication capability.

80% of Utah's population lies within the Salt Lake - Wasatch front area, yet the roads and terrain separating the remaining 20% of the inhabitants require mountain top repeaters to insure economy and efficiency in covering the widespread area.

Television and other communication systems operated by the State already maintain and operate 32 mountain top communication sites. This Study will also endeavor to point out a plan of site sharing which would help cut down expenses and at the same time increase efficiency within each of the State's agencies.

Once these key sites are developed they might well be incorporated into multi-state planning. As needs and facilities develop, interconnection for radio, data and necessary communications for government business could be greatly improved by a plan such as the Interstate UHF plan illustrated

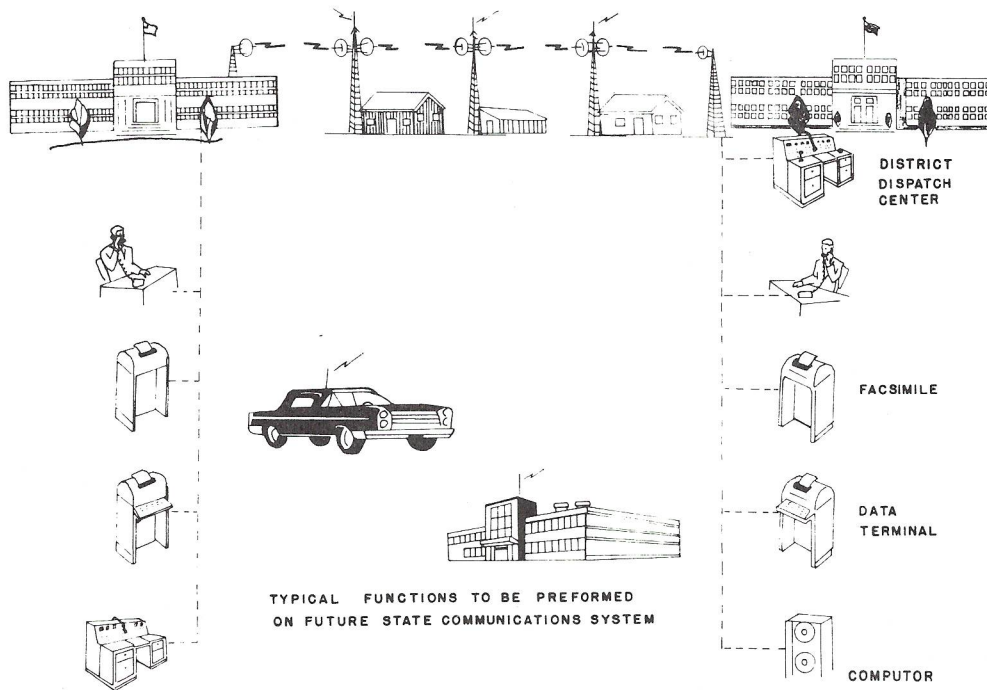


Inter-State UHF Planning

New developments underway by the Federation of Rocky Mountain States include a survey of institutions of higher education to determine interest in networking to allow sharing of academic excellence through course work exchange. Sharing of library resources, data, equipment and facilities could provide expanded educational services at a reduced per student cost.

A coordinated, module planning of a microwave system is a must to insure reliable communications which will be able to expand with no waste of effort or money as Utah grows.

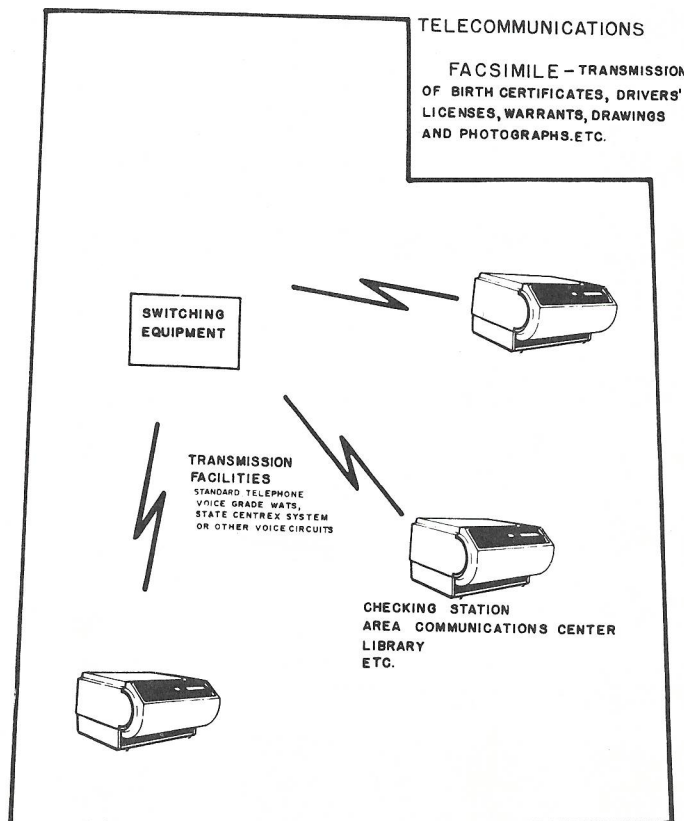
This system can grow to the expanded needs as they arise, handling necessary communications at present and growing into a system capable of the typical function to be performed on future state communication systems as illustrated.



Facsimile - the sleeping giant of communications. Today there are about 17,000 Facsimile machines in service, plus 40,000 Western Union Desi-Fax units. Future estimates see 100,000 in use by 1972, and 400,000 by 1982. A few of these machines will be in use in the State of Utah on a shared or individual basis. Facsimile is very flexible, with slow scan transmissions that can be transmitted over standard grade telephone voice circuits. Microwave systems or wide band circuits will carry high-speed transmissions. These circuits will distribute needed copies of such items as birth certificates, driver licenses, warrants, drawings and photographs.

In New York City, Facsimile interconnection is used in place of shipping books between libraries. A study by the libraries shows this system will save thousands of dollars in duplication of books in each library.

Facsimile could be shared by all agencies by locating FAX machines in each of the District Communications Centers. Law Enforcement would be one of the largest users, for the transmission of photographs and other documents.



Facsimile

Chapter 3

SPECTRUM AND EQUIPMENT PLANNING

A correlated frequency usage plan is a mandatory requirement for effective communications. Fulfillment of Public Safety requirements is only possible by the establishment of a coordinated and rapid inter-communication capability.

In 1950 there were over 50,000 police transmitters. In 1965 police transmitters had increased to more than 200,000. It is estimated that by 1978 there will be more than 5 million transmitters in the public safety land mobile services. Proper planning at this time is of the utmost importance for the efficient use of the available frequencies in order to meet the State's projected needs over the next ten years. Our nation will see more communication expansion during this period than we have seen in the past two decades.

The intent of this Study is to provide the mechanics of radio inter-communications for all police agencies, as well as other public safety agencies, at the lowest possible cost. At the same time the Study would allow each entity to maintain full control of its own channels. The Study and certain FCC regulations pointed out the possibility of a complete change in channeling for Public Safety. It also showed the lack of frequencies in the low-band spectrum, interference of stations in adjacent

areas operating on the same frequencies, and "skip" interference from other states inherent in these frequencies.

Another factor considered in this decision was the age of the inventory of equipment. The Utah Highway Patrol has had 65 % of their mobile radio equipment more than 12 years. Only 20 % of the mobile radio equipment is less than eight years old, which is the recommended replacement age under Public Safety Mobile Radio Equipment. This could also apply to equipment acquisition of other departments.

Using the guidelines of the Associated Public Safety Communications Officers, Inc. (APCO) the Study provides for the transition of public safety users of the network to move from the low-band frequencies (42 MHz) frequencies to a coordinated plan composed of 25 high-band frequencies (155 MHz). With these guidelines, and the changes necessary for public safety, the ultimate plan points out some necessary changes needed , and it is recommended that each agency examine its future needs to assure that its planning is compatible with this Plan.

Equipment Transition - Low-Band to High-Band

The Utah Public Safety agencies should order all future new mobile and base station equipment on the high-band frequency plan. Mobile units should be of a standard four-channel configuration with specifications written to cover compatible equipment for easy change of crystals or plug-ins at a minimum cost. Existing low-band base stations however, should probably remain in service for seven years to maintain communications continuity during the change-over period assuring no undue hardship on the local entities that are now on the low-band

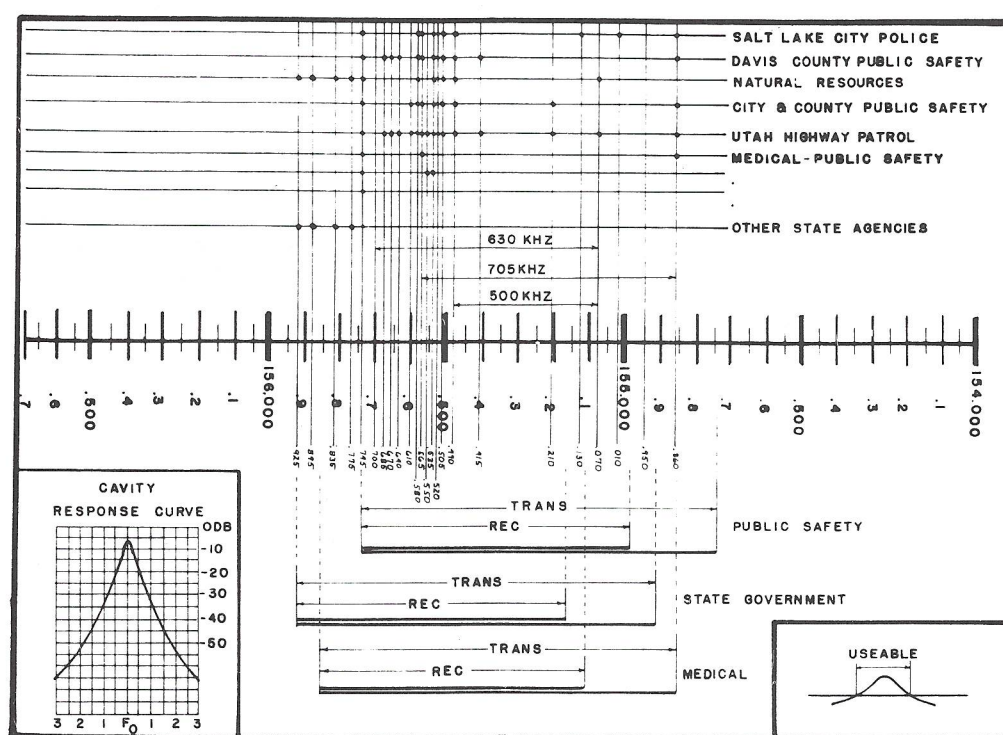
channels. Some mobile units will require the carrying of both low-band and high-band units during this transition period. The development of the high-band base stations will depend upon the funds for base stations and the UHF (microwave) control equipment.

An inband repeater system should be used while developing the UHF control network and in areas not sufficiently covered by the base stations. This plan should be followed closely for the following reasons: many stations on the inband repeater create interference, dispatchers lose much of their control when mobiles hear each other over long-distances and can intercommunicate, the system is not compatible with future mobile data.

The frequency planning for this report has required a considerable amount of effort on the part of the APCO Frequency Coordinator and the Utah Highway Patrol. Based on the information available at the time of printing, all police units are planned with the capability or the assignment of channels to operate with a 4% or 750 KHz (1MHz Receive Channel Separation, Transmit Channel Separations) which will provide compatible inexpensive operation and coordination between agencies.

Proper planning will save many thousands of dollars later on. It is vital to get equipment in operation on each of the State's frequencies to insure the effectiveness of this frequency planning. Inter-modulation and compatibility checks should be made as soon as possible to insure compatibility of frequencies. UHF control frequencies should also be obtained as soon as possible, due to the shortage of available VHF frequencies.

The JTEC study made for the FCC recommends that a more scientific approach be made in frequency planning. The frequency plan, as illustrated below, for the state of Utah includes all state, county, and city agencies (as far as information can be obtained). This plan will be updated to include federal, commercial, state, and local government in an effort to be ready to meet future requirements of the FCC.



Frequency Planning Chart

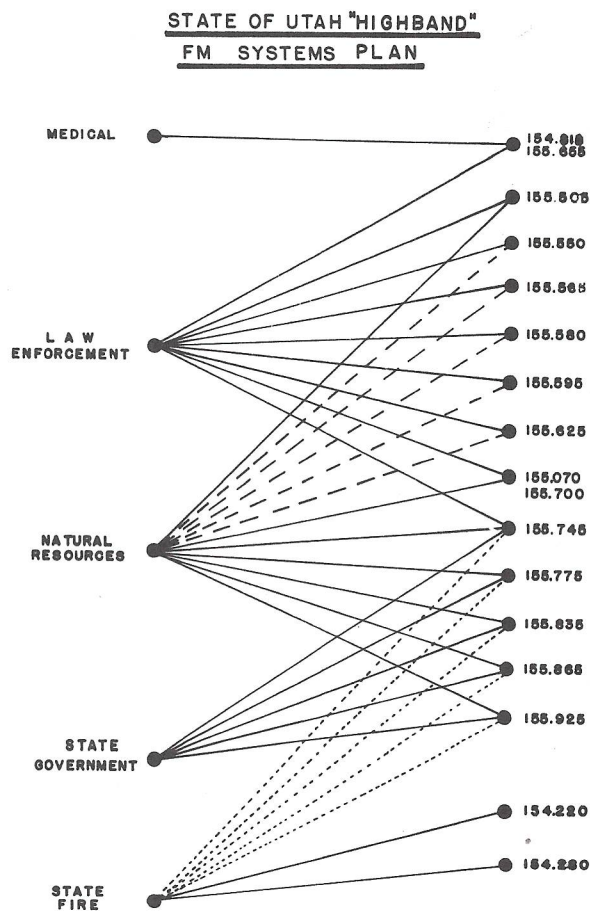
"F" designations are assigned to replace the old channels "A" and "B" used by each department. The assignment of these "F" numbers is for frequency planning. However, it is recommended that they be used on a day-to-day basis by the state and the local entities, to avoid misunderstanding between agencies.

The State of Utah - Telecommunications Frequency Assignment will be kept current, and the latest revision data should be checked to insure accuracy. (see Appendix)

The State of Utah Radio Network will be separated into five systems or networks as follows; The Highway Department network, Utah Highway Patrol (or State Police) network, Natural Resources network, and the State Government network. The Highway Department will continue to use its existing low-band frequencies and will add some new high-band frequencies in the 159 MHz range.

An example is shown at right.

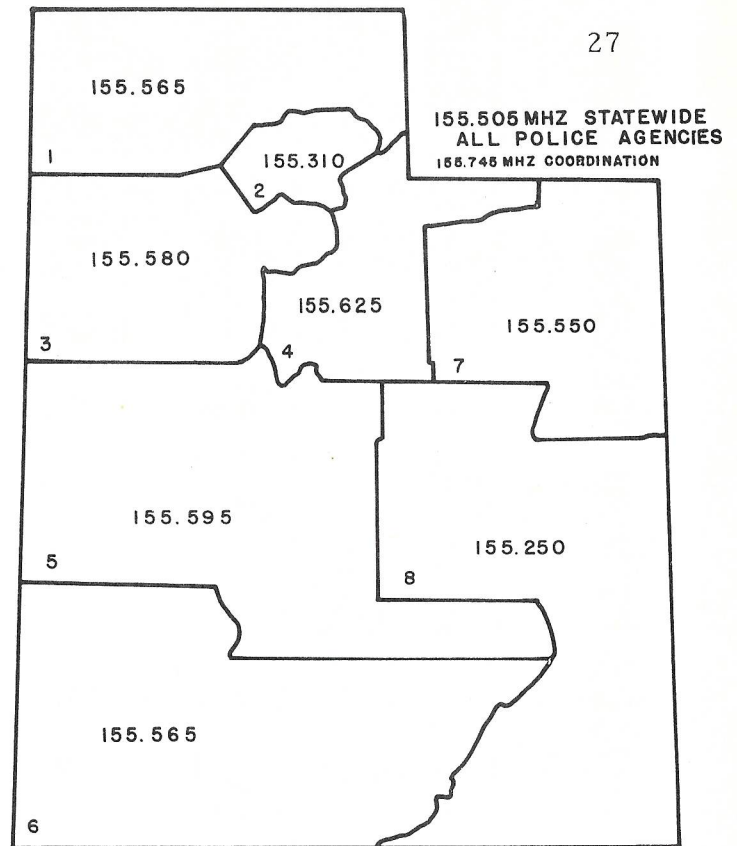
The Utah Highway Patrol will develop their communications channels into districts. The boundaries of the districts shown in their study are not to be considered firm and inflexible, but should be changed to meet the requirements of the command level of the Utah Highway Patrol.



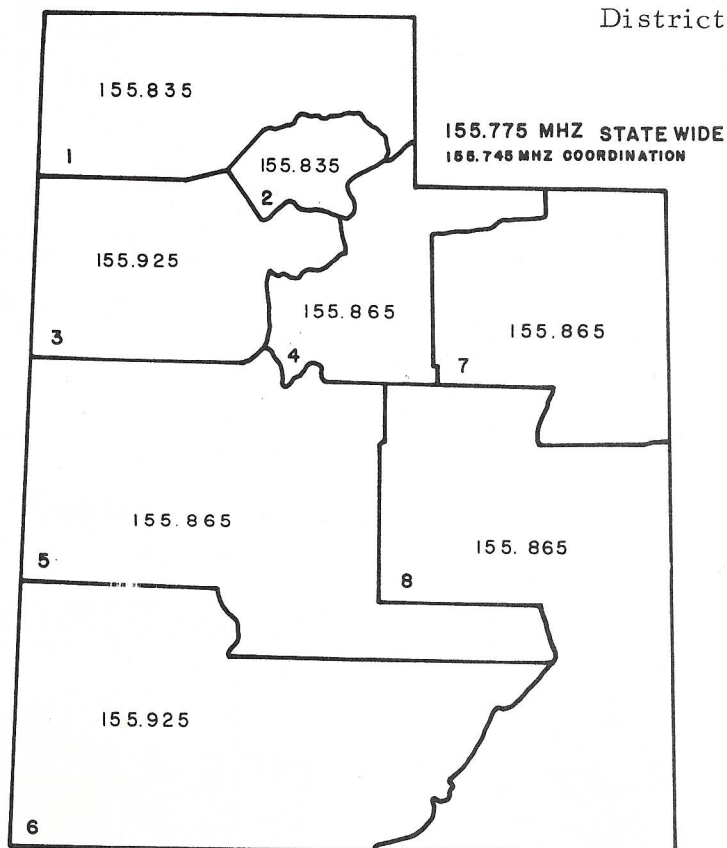
State of Utah FM System

The District Police frequencies shown are designed to eliminate interference between districts.

Statewide inband repeaters working on 155.070 and 155.700 MHz will be used to establish reliable communications in areas not covered by the base stations of the district



District Police Frequency Assignments



State Government Frequency Assignments

base stations of the District Police Frequencies. It will be used during the development of the UHF Control System. 155.505 MHz will be shared jointly by all agencies. Day-to-day dispatching will not utilize this frequency.

Natural Resources will have channels to coordinate their law enforcement

MHz	
154.010	
.025	U of U; Navajo Mt. School
.040	Lehi City
.055	Utah State Univ. (U of U)
.070	
.085	
.100	American Fork; Davis County Schls
.115	
.130	Orem Fire Department
.145	
.160	
.175	University of Utah
.190	Provo F.D.
.205	
.220	State Fire Coordinating
.235	
.250	Ogden F.D.
.265	
.280	State Fire Coord. Alternate
.295	
.310	Salt Lake City Fire
.325	
.340	
.355	
.370	South Ogden F. D.
.385	
.400	
.415	
.430	S.L.C. F.D.
.445	
.460	
.475	
.490	
.505	
.520	
.535	
.550	
.565	
.580	
.595	
.610	
.625	
.640	
.650	
.665	
.680	
.695	
.710	
.725	U. of U. P.D.
.740	
.755	
.770	
.785	Bountiful City
.800	Salt Lake City P.D.
.815	State Em Medical Rptr Input
.830	Salt Lake City P.D.
.845	Ogden P.D.
.860	
.875	(Used in Idaho)
.890	
.905	
.920	
.935	
.950	Ogden P.D.
.965	U. of U.; B.Y.U.
.980	Nephi City; Layton City
154.995	So. Ogden City; Ute Mt. Tribe

POLICE
 POLICE MOBILE ONLY
 LOCAL GOVERNMENT
 FIRE
 SPECIAL EMERGENCY
 MOBILE ONLY
 STATE USE ONLY

STATE WIDE PUBLIC SAFETY
 ALL AGENCIES LOCAL
 COORDINATING

TELECOMMUNICATION
 FREQUENCY PLANNING SHEET
 FOR UTAH
 DATE 11-25-69
 AREA

UTAH

RRB 9-69

MHz	
155.010	
.025	Ogden P.D.; Provo P. D.
.040	
.055	Tooele City; (Kaysville City)
.070	Bountiful City
.085	State Law Enforcement Rptr Input
.100	Ogden City Schools
.115	Salt Lake City Public Safety
.130	Utah State University
.145	S.L.C. P.D.; Grand County S.O.
.160	South Ogden City
.175	Servi-Car of Utah - SLC
.190	Mt. View Clinic (Lgn) Dr. Sciroenfield
.205	Provo P.D.
.220	Dr. R.J. White (Farmington)
.235	Lee N. Taylor SLC; Harold Jensen S.C.
.250	
.265	U.H.P.
.280	Intermtn. Amb. SLC; Ut Valley Med.
.295	Dr. Arters (Smfld) Dr. Gibson (Lgn)
.310	American Fork; Spanish Fork
.325	U.H.P.
.340	
.355	Hospital Admin. Net
.370	
.385	S.L. County S.O.
.400	
.415	
.430	Layton P.D.; Ute Mt. Tribe (Blndg)
.445	Orem P.D.; Carbon S.O.; Box E. S.O.
.460	
.475	Arizona H.P. Navajo Mt.
.490	
.505	
.520	State Police Coordinating
.535	UHP (Rep. Scotts PK.)
.550	Weber S.O.
.565	St. Indtl School; District 7 Pol.
.580	District 1 & 6 Police
.595	District 3 Police
.610	District 5 Police
.625	S.L. County S.O.
.640	District 4 Police
.655	Davis County S.O.
.670	State Em Medical (Working)
.685	Bountiful P.D.; Springville P.D.
.700	Davis S.O.
.715	State Law Enforcement Rptr Output
.730	Salt Lake City; San Juan County
.745	Grand County
.760	Utah Public Safety (Coordinating)
.775	Roy City; Utah Co. Road Dept.
.790	State Govt. Coordinating
.805	Weber S.O.
.820	Utah State Univ. (Cedar City)
.835	No. Ogden City; Spanish Fork City
.850	Utah Sec. of State; Utah Public Safety; St. Govt Dis. 1 & 2
.865	
.880	Weber Co; St Govt Dist. 4,5,7,8
.895	Orem City; Brigham City; Loc. Govt.
.910	Utah Public Safety
.925	S.L.P.D.
.940	Riverdale City; St. Govt Dist 3 & 6
.955	Park City; Springvll City; Bx Eldr Co
.970	Weber State College; Sandy City
.985	So. S.L.P.D.
156.000	
	South S. L. City

POLICE
 POLICE MOBILE ONLY
 LOCAL GOVERNMENT
 FIRE
 SPECIAL EMERGENCY
 MOBILE ONLY
 STATE USE ONLY

156.12 Murray City
 158.79 S.L. Sheriff

Communications Net (STACOM II). The Utah National Guard will change their 5 MHz channel to a 4 MHz channel compatible with the available SSB transceivers. The frequency of 4.656 MHz will be the primary STACOM II frequency for the State with alternate frequencies as shown in the Appendix.

Each network is detailed in other parts of this Study. However, it is the intent of this section to show the inter-network working relationship capability of meeting various situations and conditions. Many departments require participation on several networks and are required to work with the Utah Highway Patrol and other law enforcement entities. Law enforcement frequencies are designed for this service only, and whenever administrative traffic is to be used agencies must then shift to state government frequencies. This requirement points out the need for frequency planning for all agencies, and especially for those allowing network cross-over it is mandatory. Some agencies and organizations falling into this category are Business Regulations, Department of Aviation, prisons, Military Affiliate Radio Service, Radio Amateur Public Services, National Guard, and Civil Air Patrol, etc.

EQUIPMENT PLANNING

Mobile High-Band

The planning for the FM High-Band mobile requirements is to utilize a standard "off the shelf" four channel high-band mobile radio. Specifications are established to include the three major suppliers Motorola, General Electric, and RCA.

Operational Considerations -- All units to be "trunk mount" with a standard configuration of channel selection. All units (except for Highway Department and Fire Departments) will have the coordinating frequency 155.745. All law enforcements will have the State Police Frequency 155.505. Fire Departments will have the State Fire Frequency in the 154 MHz area. Frequencies have been applied for by the State Fire Marshall. Other channels to be selected as required by the using entity. Gain antennas are recommended for all state units and other mobile units operated in fringe areas.

Cost Considerations -- 4 channel mobile unit	\$ 600.00
Installation	<u>25.00</u>
	\$ 625.00

Mobile Lowband

Lowband equipment will be used by the Utah Highway Department and the jeep patrol.

Operational Consideration -- All units will be trunk mounted

Cost Consideration -- 4 channel mobile unit	825.00
Installation	<u>25.00</u>
	850.00

Base Station

Table Top Low Power Highband, single channel.

Operational Considerations -- This unit is designed for local and state agencies in remote areas for operation on the State Coordinating Frequency 155.745. Operation of this frequency will be coordinated by the State. Antenna height will be limited to reduce interference.

Cost Considerations -- 1 channel base station	\$ 750.00
Antenna	55.00
Installation	25.00
	<u>\$ 830.00</u>

Base Station

Desk Top, two channel, simultaneous receive, three channel transmit.

Operational Considerations -- To be used in all requirements where remote operation is not required.

Cost Considerations -- Desk Top transmitter -	
Receiver	\$ 900.00
Antenna	55.00
Installation	50.00
	<u>\$1,005.00</u>
Tone Encoding and decoding when required	

Base Station

Remote control, two channel, simultaneous receive, three channel transmit.

Operational Considerations -- To be used when remote operation is required.

Cost Considerations -- Remote Console	\$ 250.00
Transmitter -Receiver	1,000.00
Installation	100.00
	<u>\$1,350.00</u>
Tone Encoding and decoding when required	

Base Station

Remote control, mountain-top single channel, floor mount, meter panel - UHF controlled.

Operational Considerations -- To be used at mountain top locations and UHF controlled.

Cost Considerations -- Single channel base station	1,745.00
Antenna	150.00
Installation	50.00
	<u>\$1,945.00</u>

Inband Repeater

Mountain top inband repeater

Operational Considerations - for use in mountain top repeater
installations

Cost Considerations -	Repeater cavities, etc.	\$2,200.00
	Antenna	150.00
	Installation	<u>50.00</u>
		\$2,300.00

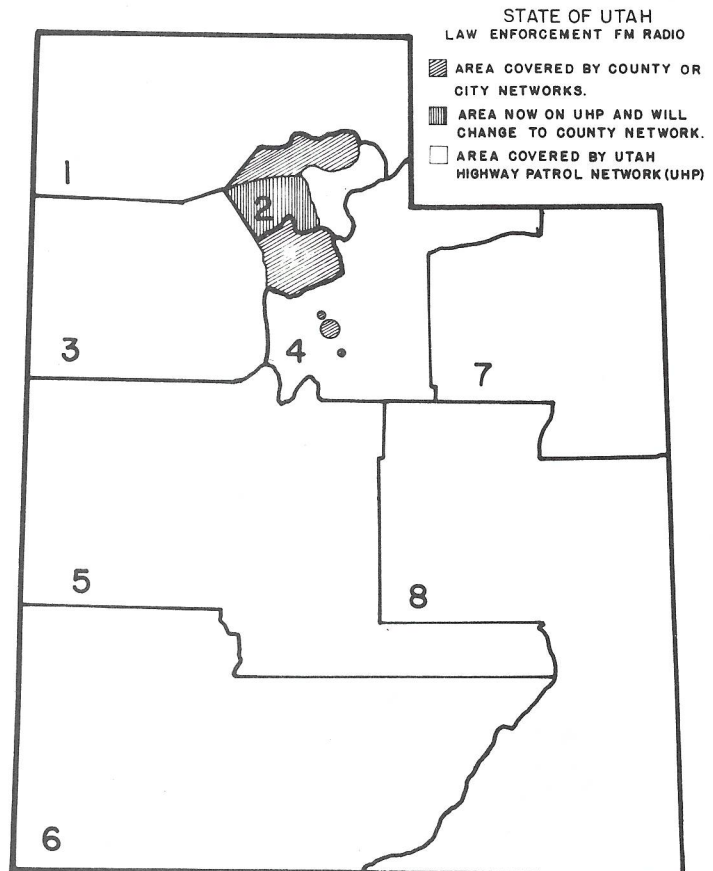
1. Equipment to be purchased on annual purchase contracts.
2. Equipment may qualify for OCD, Highway Safety, or LEAA matching funds.
3. The preceding prices are estimates which should only be considered for preplanning and would not necessarily be used for estimating prices on budget estimates on a basis for state equipment bids.

Chapter 4

PUBLIC SAFETY COMMUNICATION SYSTEM

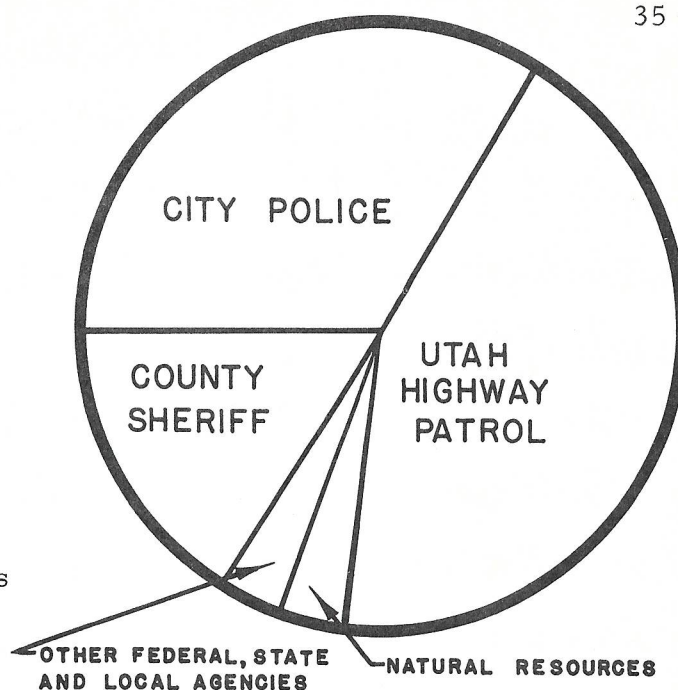
At the present time approximately six cities and two counties have frequencies and dispatching facilities providing for their own public safety requirements. Cities, counties, the State Prison, Natural Resources Department, Business Regulations, Council of Defense, Department of Aeronautics, the Governor's Office, the National Guard, ambulances and etc., all utilize the two existing Highway Patrol frequencies.

This is a "catch-all" system which is extremely overloaded on a day-to-day basis. The low-band radio system is licensed to the Utah Highway Patrol. However, as indicated on the figure on the following page they use only about 40% of the system. The cities and counties are the largest users, about 49% of the traffic supporting county and city law enforcement officers. Other



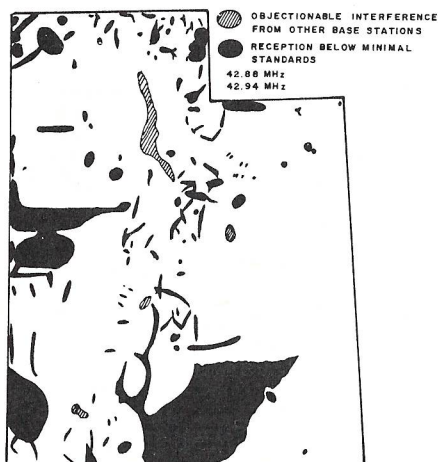
Law Enforcement FM Radio

agencies' traffic accounts for 11%. In the future over 80% of the State will have to depend on the District Dispatch Center and will utilize the district police frequencies. Only the larger metropolitan areas can afford the increasing dispatching cost. The small counties and cities



Utah Highway Patrol Radio
Lowband Usage Study 1968

are economically restricted from obtaining the data terminals and other equipment required for law enforcement. Studies conducted in 1968 showed that a large portion of the State does not meet the minimum requirements for proper coverage. As shown in the figure below, there are many areas which are "dead" or "spotty" coverage, resulting in



Utah Highway Patrol Lowband
Coverage Study 1968

unreliable communications. In some areas there is too much interference from other base stations creating an intolerable condition which seriously affects the usability of these communications, which are essential to the law enforcement communications requirements of the State.

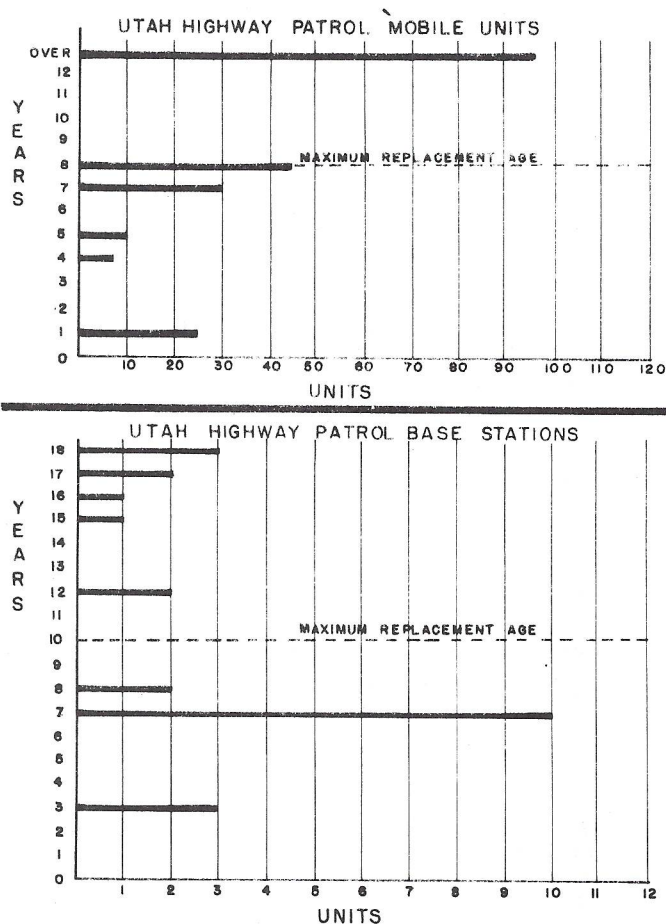
The location of the base stations presently does not provide proper coverage and are not tied together into a unified network. These base stations may require high mountain top locations to give better coverage in the rugged mountain terrain. Mountain top sites have been selected, taking into account other state requirements and where existing facilities are found. (See Shared Intrastate Facilities Section). The high-band control links will have to be changed to UHF in order to meet pending rules from the FCC.

The 1968 Equipment Study Chart indicates 65% of the mobile equipment over 12 years of age, and a very small percentage of low-band equipment within the national equipment standards for phase out. Most of the cities' and counties' equipment on the State System are found to be in similar conditions.

Utah engaged two out-

side consultants to examine the

facts. Based on their recommendations, Utah is planning and has begun the transition to high-band. (See Spectrum Planning Section).



Highway Patrol Equipment Study

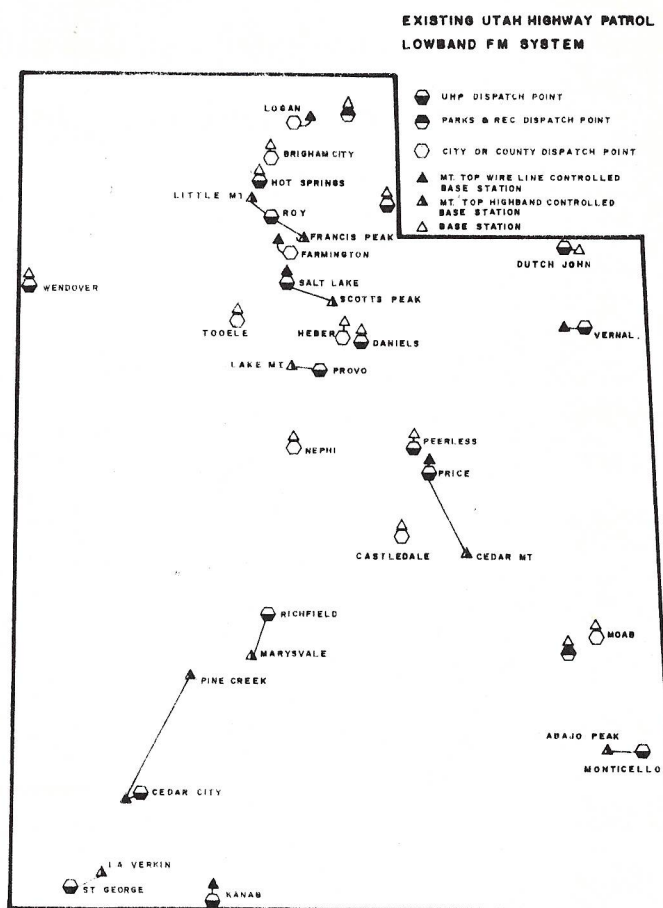
The overall effect is that the two existing Highway Patrol frequencies shown in the figure will be expanded to approximately fifteen frequencies. Cities and counties will add at least ten additional channels.

These frequencies have been selected very carefully in order to assure the compatibility between agencies and to fall within the specifications of the standard off-the-shelf equipment available from the major FM manufacturers.

Those public safety agencies that are presently using

frequencies not compatible with the new frequency plan are requesting frequencies which will be compatible.

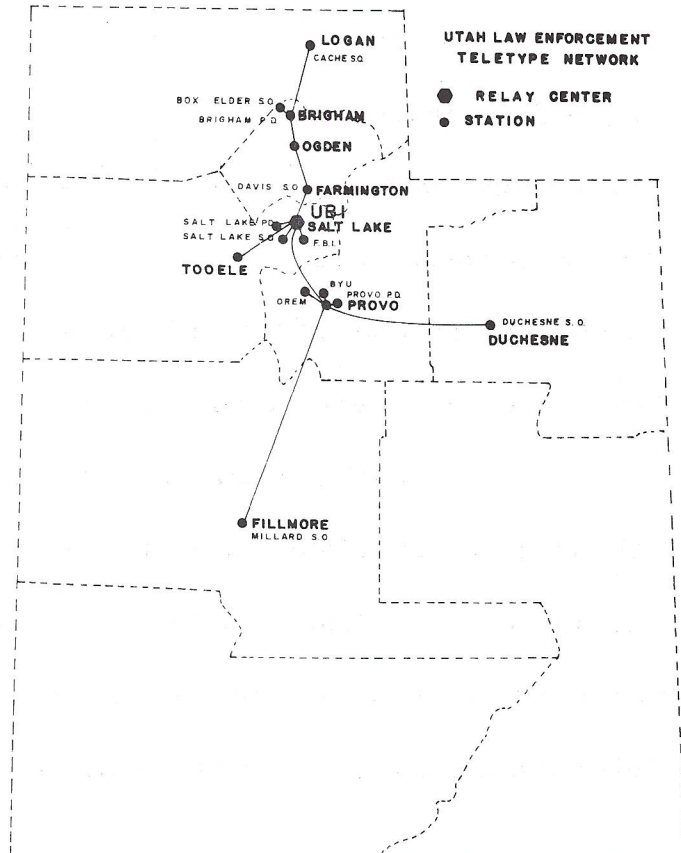
The National Association of Public Communications Officers (APCO) have added information to assist in a total State Public Safety Communications Plan. It is the recommendation of this Study that the public safety agencies of the State, cities and counties follow the State Telecommunications Planning Report to meet these objectives.



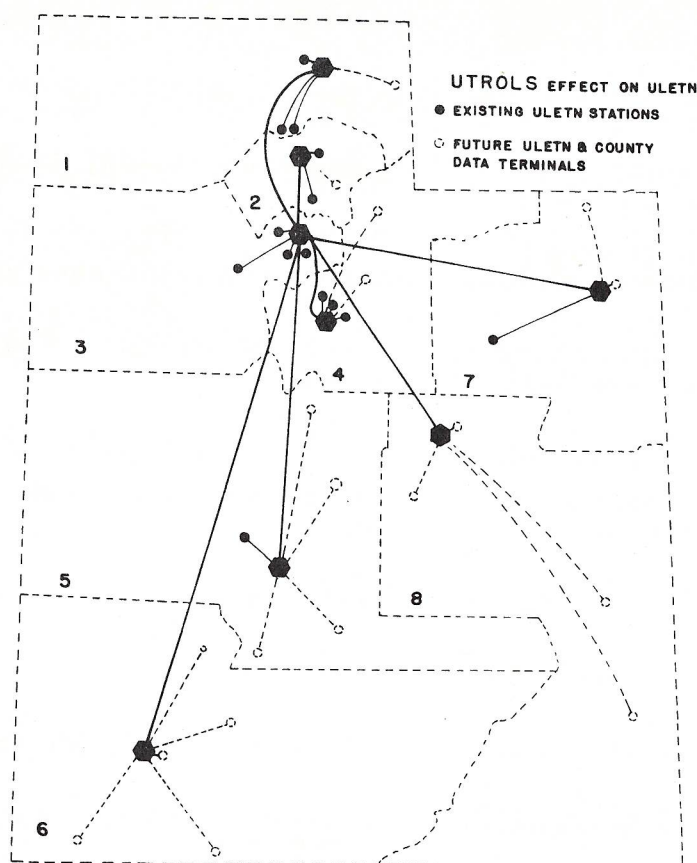
Existing Utah Highway Patrol
Low-Band FM System

1. To eliminate existing dead spots.
2. To have one dispatch point on the day-to-day working frequency.
3. To reduce or eliminate interference from other areas.
4. To have immediate access to NCIC and other Federal and State law enforcement data.
5. To have intercommunication capability with ambulances, hospitals, all law enforcement units and other state high-band mobile units.

The existing Utah Law Enforcement Teletype Network (ULETN), as shown on the illustration, provides information to local police agencies. These facilities are limited and do not provide statewide coverage. This Study recommends integration of ULETN with the Utah Telecommunications Rapid On Line System (UTROLS), shown on the following page. Enforcement information is required by each law enforcement agency for day-to-day requirements. Supplemental studies should be made on some of the major cities and counties law enforcement requirements.



Utah Law Enforcement Teletype Network



Utah Telecommunications Rapid On Line
System (UTROLS)

Police Mobile FM

The Utah Highway Patrol and the local agencies which will operate on the district police frequencies would have a control head configuration as required for their particular needs. As shown on the following pages, two district frequencies could be selected as required by the supervising line officer. One district frequency and an inband repeater, also on the following page, may be preferred depending on the need. Two channels are recommended to be common on all police vehicles, F20 - State Police and F10 - Coordinating. Local police entities could select two positions on their own channels leaving two channels available for the statewide mutual aid channels. County or state inband repeater

channels are planned so that counties may participate on the district police frequencies as well as having their own county inband repeater to handle long range car to car requirements.

Utah State Prison

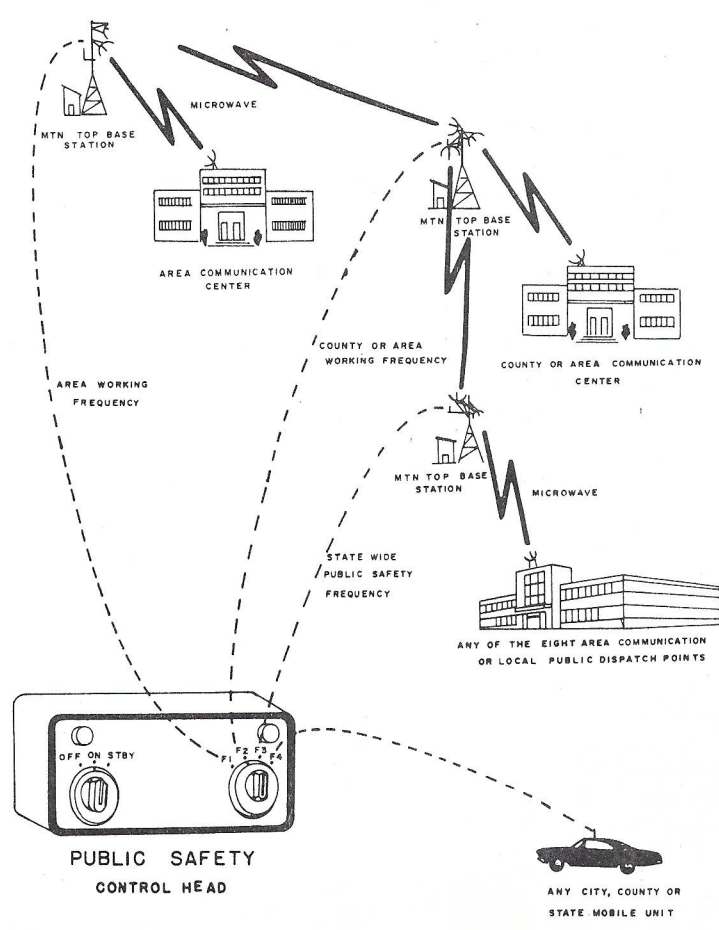
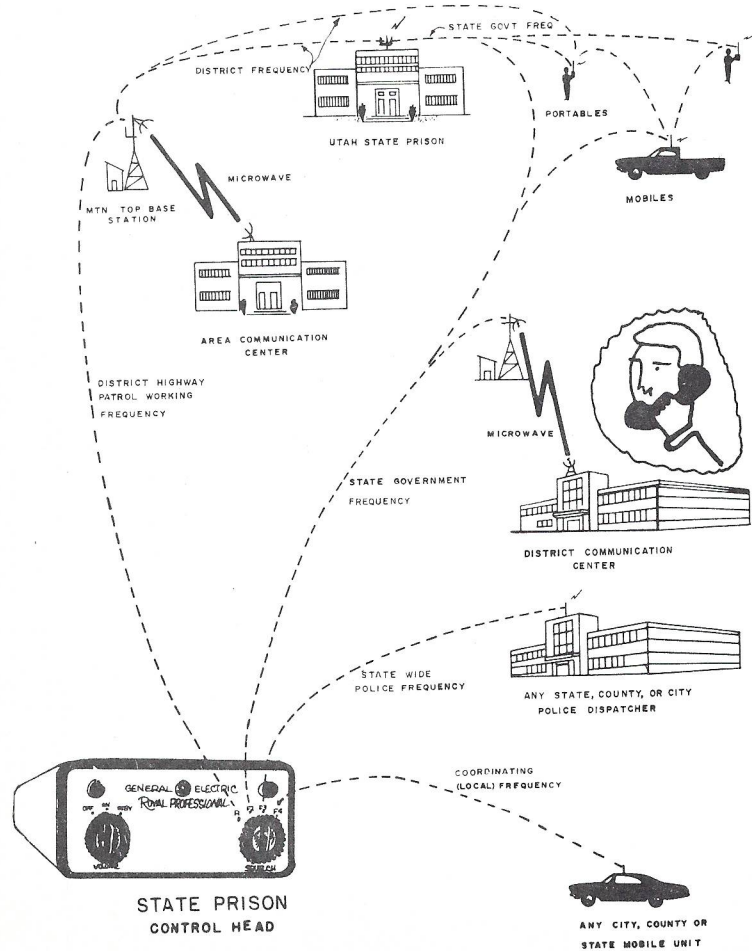
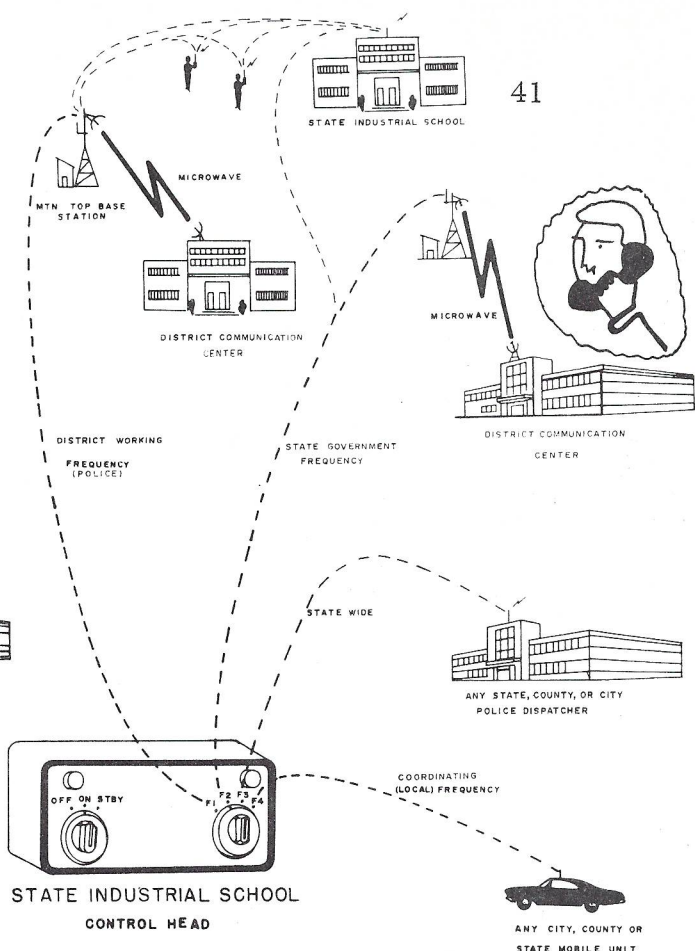
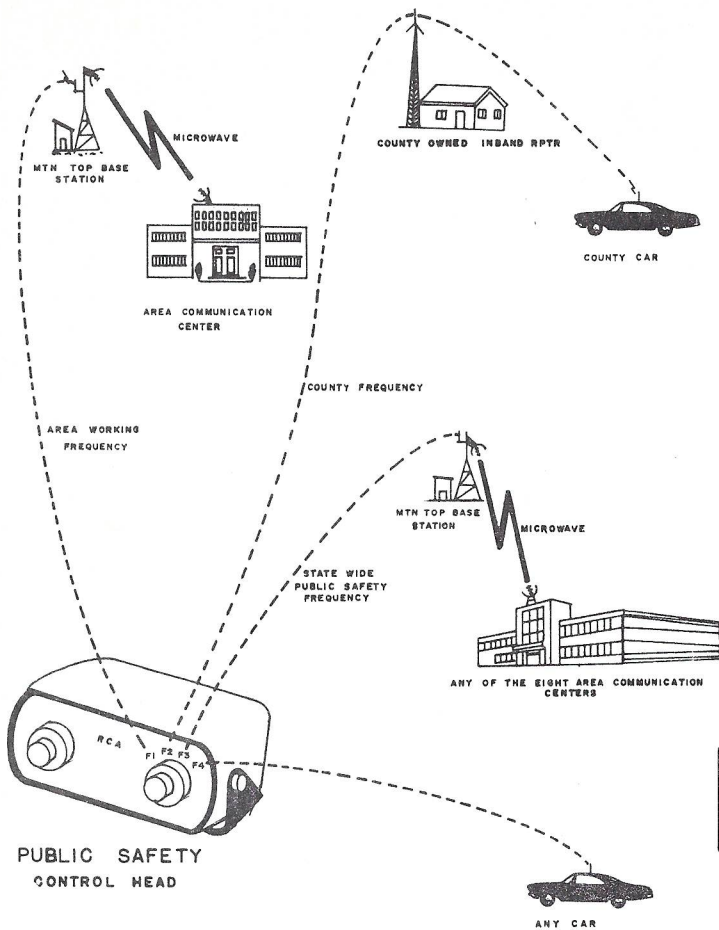
The Utah State government channels can be used for day-to-day requirements including simplex telephone. A flip of the channel selection switch on the mobile or portable radio would place the officer on the district or the state police frequency in order to meet an emergency situation requiring participation of several agencies. This control head configuration is also shown on the following page.

State Industrial School

The State Industrial School has similar requirements as the prison for participation with various law enforcement agencies and administrative requirements.

Fire Departments

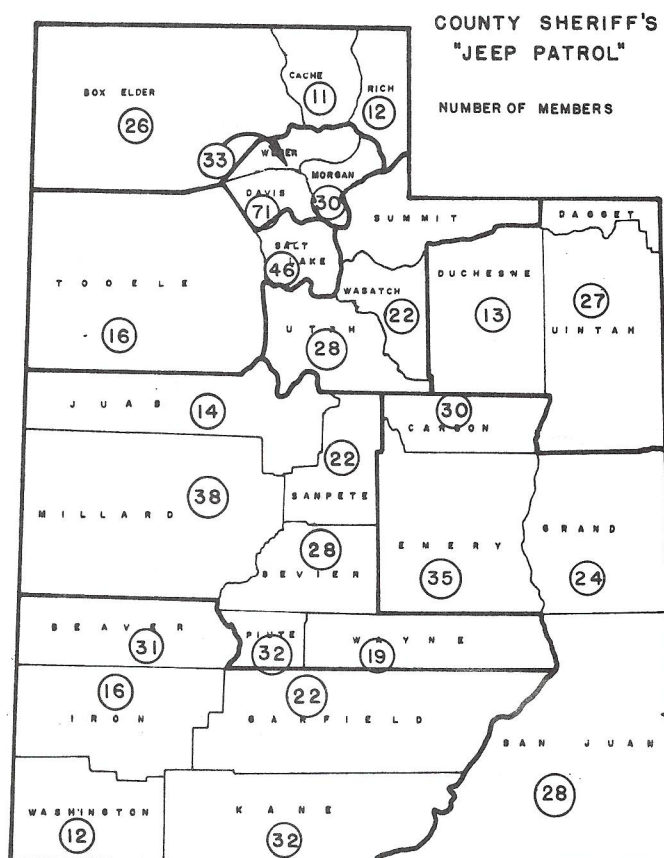
It is recommended that the Fire Departments now on low-band shift to standard four channel high-band radio, similar to those of other public safety agencies. The Fire Department Frequency Advisory Committee suggested frequency of 154.220 MHz for Utah Statewide Fire Coordinating channel with the fire intersystem operational frequency of 154.280 MHz. The Utah County Fire Departments are presently using the frequency of 154.280MHz for their intercounty frequency and this plan is fully compatible.



County Sheriffs' Jeep Patrols

The county sheriff's department's main back up resource in his law enforcement duties is the county jeep patrol. Membership in the county jeep patrols is approximately 580. Most counties depend on these volunteers to support various operations, such as search and rescue missions. Many of them are fully sworn officers with full law enforcement responsibilities. The average individual officer's investment is \$3,000 in vehicle and mobile radio equipment. The effective use of this two-million dollar non-tax supported facility is dependent upon FM radio.

It is the recommendation of this planning report that the present state owned low-band FM equipment be changed over to the National Jeep Patrol frequency when the present equipment is phased out within the next eight years. This low-band system would provide state-wide communication capabilities for all jeep patrols which would enable them to continue their support of county law enforcement agencies and to provide mutual aid to adjacent counties when needed.

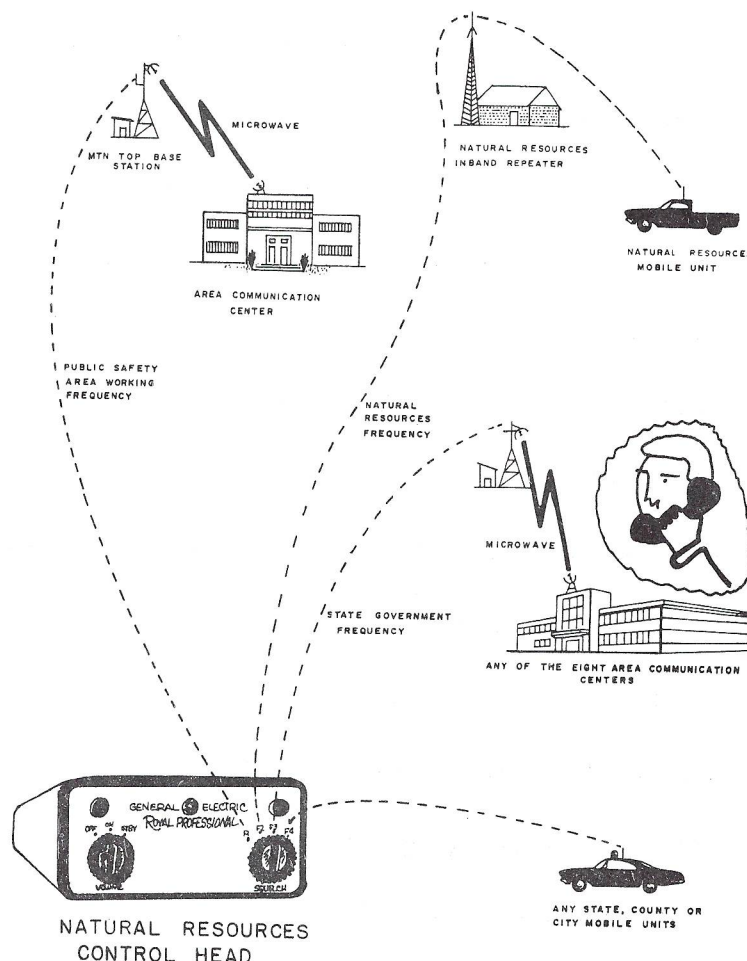


Department of Natural Resources

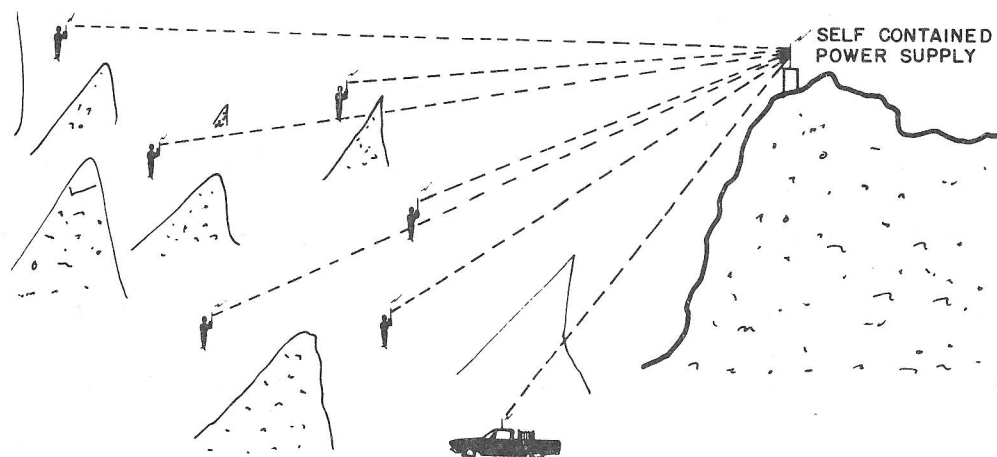
The Department of Natural Resources includes Fish and Game, Forestry and Fire Control, Parks and Recreation and Water Resources.

Communication requirements for Natural Resources are similar in that they mainly involve the state telephone facilities and mobile radio. Data requirements will be added at some future date when the facilities are available.

The telephone facilities are presently a major asset in the efficient operation of the Department and will be enhanced by the major



NATURAL RESOURCES PORTABLE INBAND REPEATER



district PBX. The Department of Natural Resources has approximately 386 employees with 63 main telephones and 27 extensions. The development of the centralized telephone system will provide direct dialing access to all employees. The new Salt Lake City office facility should have a satellite PBX connected to the state telephone system.

Natural Resources personnel provide an important function in the law enforcement effort of the State. Communications capability and day-to-day working with law enforcement is mandatory for a continuous program. It is, therefore, recommended that Natural Resources participate on the district law enforcement duties. An inband repeater should be shared for coverage in remote areas, such as lakes and other recreational areas, not covered by the base stations. These inband repeater facilities will be an asset in support of fire control, search and rescue missions. Ten shared inband repeaters will be planned as part of the law enforcement repeater program. Two portable self-contained inband repeaters should be in the inventory of Natural Resources on demand basis to support a mission. Twelve portable radios with repeater and public safety capabilities should also be included in the inventory. These portable radios could be assigned to other agencies with the portable repeater or separately depending on the need.

Based on a 1968 decision by the FCC Natural Resources administrative traffic cannot be passed over police frequencies. As shown in the previous illustration, the third channel of the Natural Resources Radio Control Head is on a local government frequency and will be

available for administrative traffic. The third channel will also include a telephone patch connection with any normal telephone circuit.

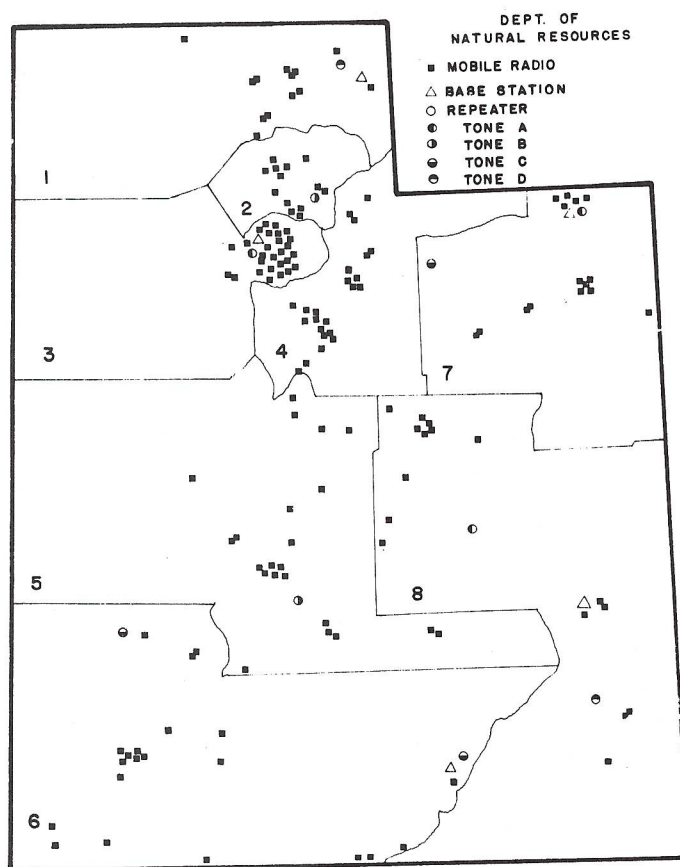
Shown at the right is the approximate location of the mobiles and repeaters required. Several base stations should also be provided as the need arises.

Day-to-day dispatching will be provided by the Utah Highway Patrol Dispatcher on a priority district channel. The Natural Resources inband repeater and the coordinating channel will relieve the district police channel for all car to car traffic and will not normally require dispatch service. When

desirable, the Public Safety

Dispatcher would handle this function. The local government channel will be handled by the State Government Dispatcher.

The following page lists Cost Considerations for the Department of Natural Resources.



Proposed Location of Mobiles and Repeaters

Telephone Facilities

With the centralization of the Natural Resources agencies the overall effect of this plan should show no increase in telephone costs for the Natural Resources Department.

Radio FacilitiesTotal Radios Required

<u>District</u>	<u>Fish & Game</u>	<u>Forestry & Fire</u>	<u>Parks & Rec.</u>	<u>Water Resources</u>	<u>Total</u>
Dist. 1	7	3	2	0	12
Dist. 2	10	2	2	0	14
Dist. 3	23	9	4	3	36
Dist. 4	15	4	6	0	25
Dist. 5	18	2	0	0	20
Dist. 6	15	3	3	0	21
Dist. 7	12	1	2	0	15
Dist. 8	10	3	3	0	16
Total Radios Required					159

The following figures do not show dispatch and maintenance service. Costs should be adjusted depending on use and maintenance records and studies. A quick estimate without additional study material available is about \$35,000 per year for maintenance of equipment and dispatch service.

<u>District</u>	<u>No. Mobile Radios</u>	<u>Cost</u>	<u>Base Stn.</u>	<u>Cost</u>	<u>Total</u>
Dist. 1	12	6,828	1	1,800	8,628
Dist. 2	14	7,956	0	-0-	7,956
Dist. 3	36	20,484	1	1,800	22,284
Dist. 4	25	14,225	0	-0-	14,225
Dist. 5	20	11,380	0	-0-	11,380
Dist. 6	21	11,949	1	1,800	13,749
Dist. 7	15	8,535	1	1,800	10,335
Dist. 8	16	9,104	1	1,800	10,904
12 portable radios @\$750					9,000
2 portable repeaters					5,600
Total Eight-Year Estimate					\$114,061

Law Enforcement Dispatching

Cities and counties desiring their own full dispatching facilities

must realize the increasing cost of dispatching. If an entity cannot afford a data terminal, they will not be able to dispatch adequately in the future. To meet these increasing dispatch costs, several LEAA studies recommend grouping or centralizing dispatching facilities. Larger metropolitan entities should provide their own dispatching and have their separate day-to-day channels. The small entities, and the State, should have a coordinated State Law Enforcement Network. The intercommunication is developed by the high-speed message switching network of the state police and the district police frequencies, depending on the requirements. This Study recommends that every law enforcement vehicle have the state police frequency of

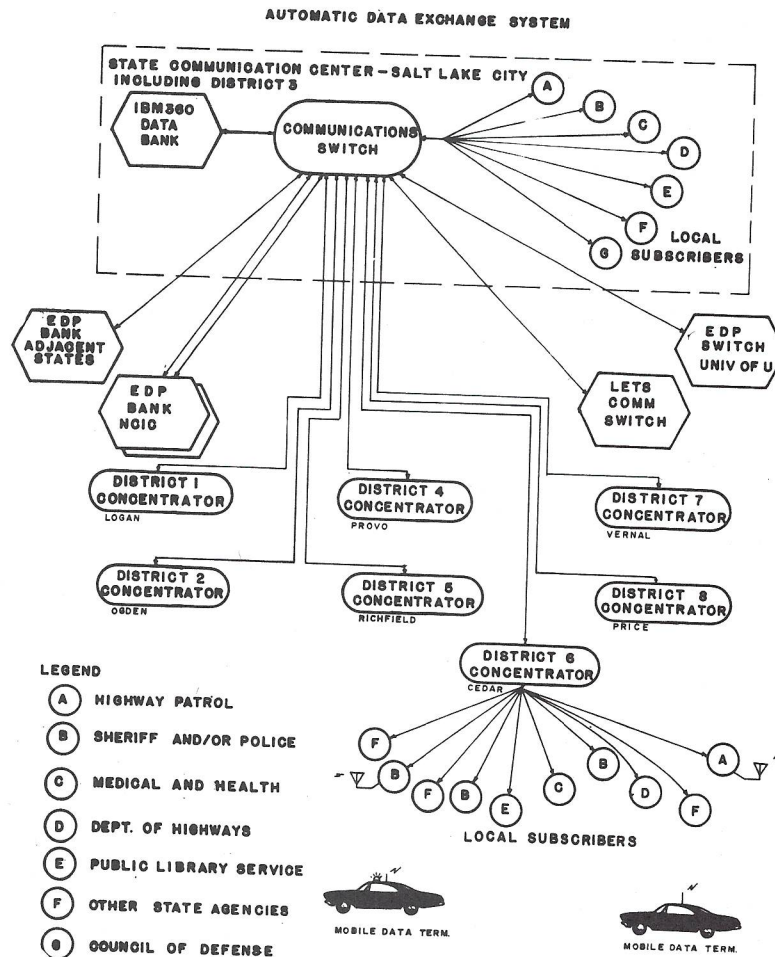
155.505 MHz as well as 155.745, the state local coordinating frequency.

The System is designed to meet compatibility with mobile data terminals when they are economically feasible, with automatic switching and non-voice data, the channel loading can be greatly increased even with the existing channels. Direct NCIC information can be obtained in seconds from the mobile unit.

HOT SHEET 8/4/69									
		REG		DESCRIPTION					
LIC NO	ST	YR	YR	MAKE	MOD	BDY	COLOR		
B332	NY	70	66	TRIU					
H9536	CD	69	63	CHEV	SS	CV	WHI/RD		
GM7184	NY	70	66	FORD	FAI	4D	BLUE		
GM7650	NY	69	63	CHEV		SD	RED		
QM2501	NY	70	61	CHEV	HDT	2D	BLUE		
ON2637	NY	70	64	PLYM	FUR	4D	GR/WHI		
OM1850	NY	70	61	OLDS	F85	SD	RD		
WHI									
OM5819	NY	70	60	CHEV	BEL	4D	BLUE		
427103	NY	68	66	HOME		TR	GREEN		
0351MG	NY	70	59	CHEV	BIS	SD	BLUE		
NO PLT			61	OLDS	F85	2D	GREEN		
NO PLT			60	CHEV	SD	2D	BROWN		
NO PLT			64	OLDS	CUT	2D	WHITE		
NO PLT			64	CHEV	IMP	SD	BR/WHI		
7452L	NY	70	65	TRIU	120	MC	MARN		
5M9009	NY	70	60	FORD	DES	2D	GREEN		
6M7388	NY	69	62	VW		2D	GRAY		
6M8801	NY	69	68	MERC	CYL	2D	GOLD		
6811CM	NY	70	68	PLYM	SAT	2D	WHITE		
9827MK	NY	70	60	CHEV	BEL	4D	BROWN		
7584H	NY	69	68	TRIU	BON	MC	RED		
9770RT	NY	69	67	FORD		SD	BLUE		

THIS MESSAGE PRINTED BY THE XEROX
MOBILE PRINTER AT THE APCO SHOW
DES MOINES, IOWA 1969.

Up to the minute wanted lists are in each law enforcement vehicle and a message can be received in an unattended vehicle, similar to the sample shown. For further information also see Data Section.



Flexible call assignments and operating signals have been established to meet each department's needs as shown in the Appendix under Call Number Assignment Plan.

Department of Highways

The Utah State Department of Highways communications system is currently one of the two existing systems in the State. They are required to provide a quick and economical method of deploying men and equipment,

control large inventories that change daily, and direct computer access to support their engineers working in the six districts.

The Department has followed an equipment retirement schedule, and therefore, has the most modern equipment system of the major state agencies. The Department has established an extensive low-band communications network including 570 mobile units, 11 base stations and 6 VHF controlled base stations with 27 different control points. They are presently using only two of the four low-band frequencies now available for highway maintenance in Utah. For this reason, the Highway Department has not been recommended to move to high-band operations as has been recommended for most of the other state agencies. Seven of the transmitters are currently being controlled by high-band links using four of the assigned high-band frequencies. The Highway Department, in compliance with the expected FCC Regulation change of removing high-band control links, will move to UHF control. This move will leave four frequencies available for other uses, such as direct computer access by field engineering units.

The Department of Highways has taken a leading role in implementing the development of the much needed UHF system. The first two UHF system sites are now under construction. These two sites are designed so that they could become part of the statewide microwave system depending on other State needs.

The Department of Highways presently utilizes a 100 WPM teletype network, as shown on the following page. This network provides inventory control, weather reports, road conditions and other data

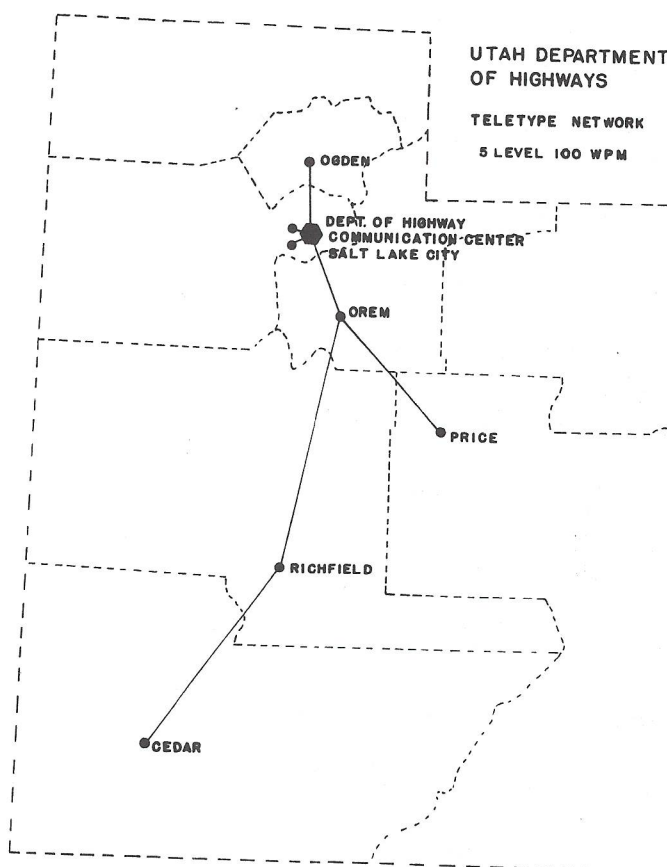
required for the engineers and the operation of the department. The headquarters office has equipment available to convert the 5 level data to punched cards for feeding to the state computer.

The UTROLS system would provide many advantages to the Department of Highways.

A shared message switching Teletype Network - 5 level 100WPM system would provide direct access to the computer as well as providing many other advantages.

The statewide microwave system will fill many current needs of the Department of Highways. With the ever increasing traffic density on state and interstate highways, the need to provide radio controlled traffic advisory signs, ice sensors, permanent counters and emergency calling or reporting systems, the Department of Highways will be a large user of the recommended microwave system.

The Department of Highways has several emergency assignments in addition to their day-to-day requirements. As an example, the maintenance and operation of the State RADEF system is assigned to

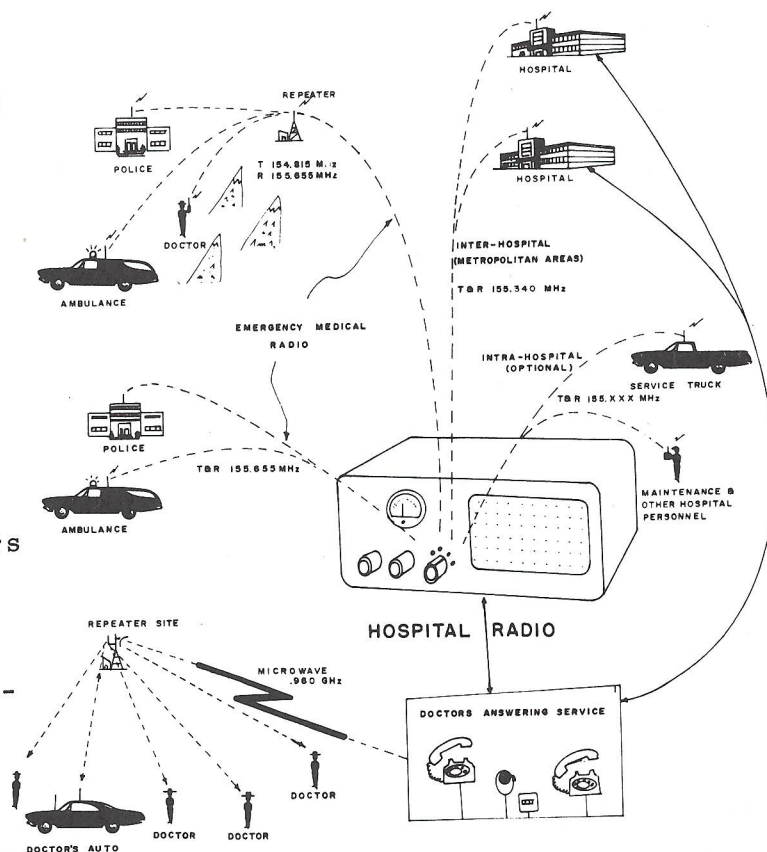


this same Department. Future goals of the Department should include fallout protection in the terminal points of their communications system. Emergency power should be available at every point of the communications network for continued operation in the event of commercial power failure for day-to-day and emergency requirements.

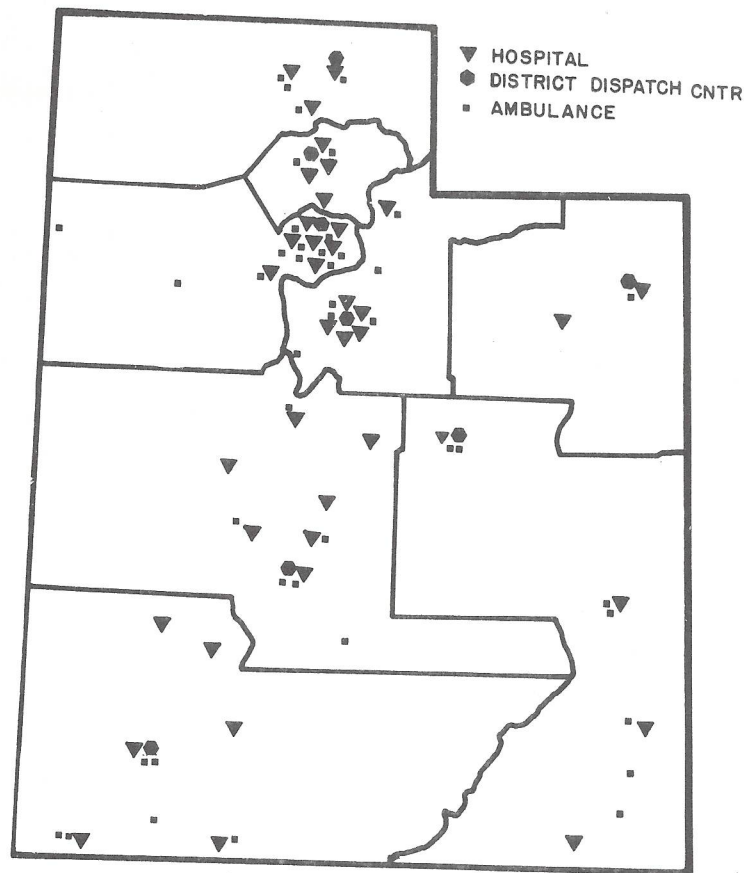
Emergency Medical Service

The Public Health Service is responsible for establishing a comprehensive Emergency Medical Service System (EMS) fully integrated and coordinated with local government, ambulances and hospitals. The program is to develop assured and rapid communications for dispatching ambulances and their operational support in both day-to-day and major emergencies.

As illustrated, the EMS FM network is designed to be compatible with the State Law Enforcement FM facilities. Dispatching will be under control of the State Public Safety District Dispatch Centers. Cities and counties in the metropolitan areas will participate in the dispatching and operation of the system. Particular effort has been



Public Safety Medical Network



EMS Coverage Map

made to be compatible with existing facilities such as those owned by local government entities.

The EMS FM network will be effective in the rural areas as well as in the metropolitan areas. An ambulance leaving a rural city in the southern part of the State to take a patient to a hospital in Salt Lake will have continuous communication.

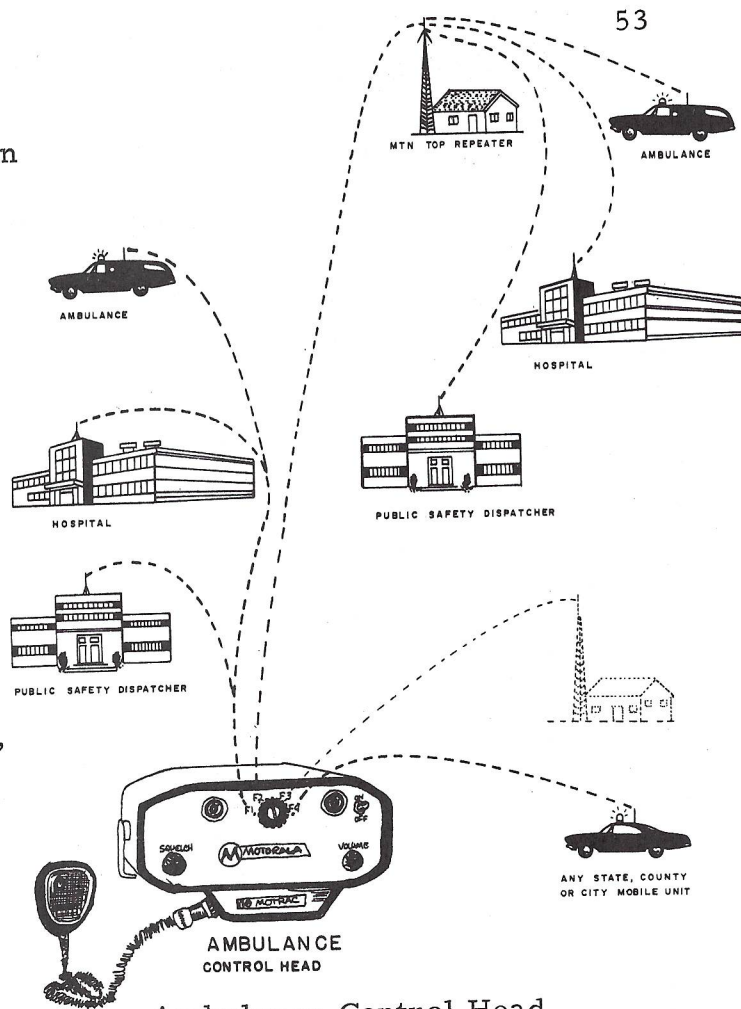
Out of state ambulances transporting patients to one of Utah's major hospitals is a common day-to-day practice. The out of state ambulance could pick up a "Port-a-Mobile" radio unit at a checking station and drop it off as he leaves the State, allowing the same means of communication as used by the ambulance on the state system.

The Four-Channel Control Head would allow flexibility of communications to meet the needs of the Statewide Plan. Position one on the control head switch will provide normal day-to-day needs of the metropolitan ambulance for communications to the Public Safety Dispatcher, hospitals and other ambulances. Position two provides access to a mountain top inband repeater for the extended coverage

required by the mountainous terrain of our State. Position three to be programmed to meet the local needs by the ambulance. For example; Intermountain Ambulance would use their own frequency, Salt Lake City Police Ambulance would use their police frequencies, and an ambulance in a rural area of the State will have the district police frequency. Position four is

the statewide coordinating frequency allowing communications with all public safety agencies and other state vehicles.

The large hospitals in the metropolitan areas are recommended to have a dual-simo-monitoring receiver on two frequencies, the EMS Network for ambulances, and the hospital to hospital frequencies. The option of a third channel will provide internal communications, as shown in the illustration. One switchable transmitter could service all three channels or separate units could be purchased. Three receivers would be required.



Ambulance Control Head

A compatible, but independent system is the Doctor's Network for paging and other administrative traffic. This network will provide a "beep" tone to the doctors to notify them they are being called, a voice message to the doctors, a provision for an option for communication between doctors and the answering services. These frequencies are within the compatible planning range of the overall VHF network.

PHASE ONE

The first phase would be the installation of low-powered base stations at each hospital in the vicinity of Salt Lake City. This installation would operate in accordance with the Utah State Frequency Plan (see Chapter 3 page 26). The hospital installation would be designed to meet the individual needs of that hospital. In most cases, the base station would be remote-controlled from a full-time occupied operator position or a remote-control in an emergency room.

In the normal operating procedure (non-disaster), the ambulance would contact the hospital directly for information such as, time of arrival and availability of emergency room facilities. During this normal operating time, the radio network would operate as a "free net", allowing all ambulances to contact hospitals at their discretion.

During the time of a large-scale disaster, involving many injured parties, the responsible agency would take control of the network, and would become a regulated net (meaning that the use of a net would be controlled by the Public Safety Dispatcher. At the first report

of the disaster, the responsible agency would poll the participating hospitals to determine availability of facilities such as beds, space, blood, emergency rooms and operating rooms. Procedures will be established concerning the destination of specifically injured cases, such as burn victims. After cataloging the above information, the responsible person would determine which hospital should receive the individual victim.

PHASE TWO

The second phase would involve the installation of similar systems in the outlying areas. The difference would be that the installation at the Dispatch Center would also have phone-patch facilities so that itinerant ambulances could reach specialist's aid from the metropolitan areas when necessary.

PHASE THREE

The third phase would be the expansion of the inter-city facilities to complete the tie-in of all EMS requirements shared with the requirements of other state communications.

Phase one may also include hospital-to-hospital facilities within the metropolitan areas for administrative traffic or local internal communication requirements, depending on the desires of each hospital. Upon implementation, simultaneous monitoring facilities will be required to assure that the EMS emergency channel is always covered.

TONE SELECT FOR HOSPITALS AND REPEATERS

The Hospitals Association wishes privacy on their monitors which will only activate upon selection by the calling party. This privacy will require some additional tone encoding and decoding on the hospital equipment and encoding equipment on the Public Safety Dispatcher's equipment. The local ambulance serving these hospitals would have the option of encoding equipment for direct access to the hospital. This would eliminate the Public Safety Dispatcher having to open the squelch circuit at the desired hospital.

Tone access to the mountain top inband repeaters may be required at a later date to select the repeater the ambulance operator wants to use, and to stop undue interference. It is felt this requirement is in the future and can be added to any of the mobile and repeater equipment at a reasonable cost.

OPERATIONAL CONSIDERATION

This facility will be dispatched by both the Highway Patrol Dispatcher and the local Police Dispatcher. The overall operation of the EMS Network will be supervised by the Highway Patrol Dispatcher, based on the guidelines as established by the Medical Communications Technical Committee.

EQUIPMENT CONSIDERATION

All equipment is to be standard as covered in Chapter 3. It is

recommended, however, that the hospitals obtain equipment with the additional capabilities for simultaneous monitoring of hospital-only channels, where applicable.

COST CONSIDERATIONS

Equipment to be purchased by the entity using the equipment with the exception of the inband repeater which should be developed by publically allocated funds.

Hospital Equipment Requirements

Base Station, 2 channel transmit, 1 receive	\$1500
30 Watt with remote control.	
(1,080 without remote control)	
Coaxial cable, connectors, and hardware	\$ 50
Antenna and mounting Hardware	\$ 200
Optional tone encoding equipment	\$ 200
Optional tone decoding equipment	\$ 200
Installation	\$ 100
Annual Maintenance	\$120

Ambulance Mobile Radio Equipment

4 channel FM Transceiver	\$ 850
Gain Antenna	\$ 17
Optional tone encoding equipment	\$ 200
Optional tone decoding equipment	\$ 225
Installation	\$ 35
Recurring Costs:	
Annual Maintenance	\$ 60.

STATE BUDGETING COSTS

Inband Repeater Equipment

Repeater, 100 Watt Inband	\$1975
Cavities for 100 DB at 500KHz	\$ 450
Coaxial Cable	\$ 75
Installation	\$ 100
Annual Maintenance	\$ 200
Mountain Top Building Rental	\$ 420

District 1	1 inband repeater	\$2, 800
District 2	1 inband repeater	\$2, 800
District 3	1 inband repeater	\$2, 800
District 4	0	
District 5	1 inband repeater	\$2, 800
District 6	1 inband repeater	\$2, 800
District 7	1 inband repeater	\$2, 800
District 8	2 inband repeaters	<u>\$5,600</u>

Total Eight-year Estimate \$22, 400 *

* May be eligible for OCD, Highway Safety, LEAA matching funds.

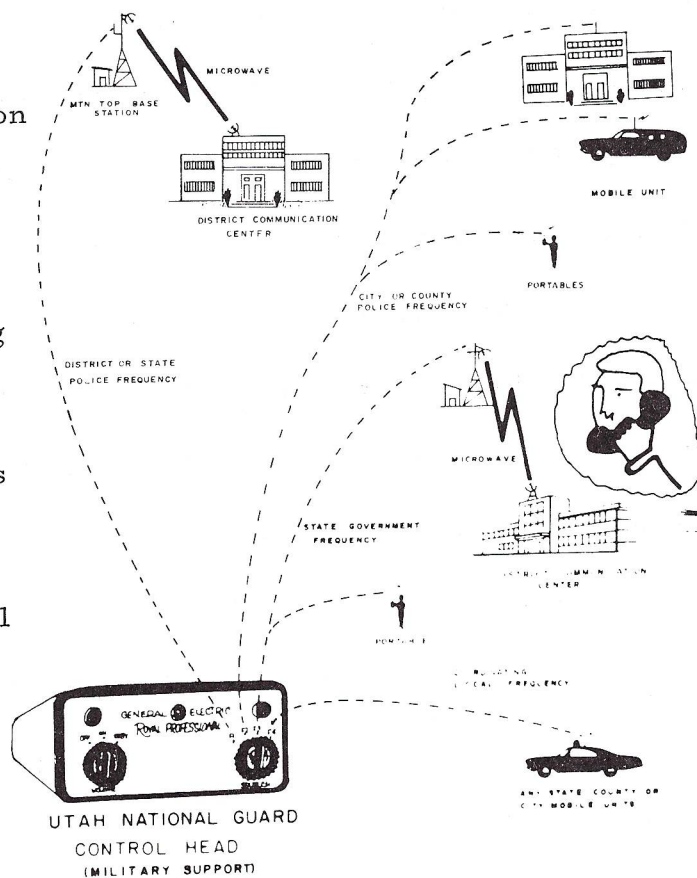
Utah National Guard

Future requirements for the Utah National Guard and the Utah Air National Guard will be limited to areas where guard units are located. There is a requirement for voice point to point communications, emergency high frequency single side-band communications statewide, and administrative data communications.

Each armory located within a District Center should have telephone extensions from the District PBX Board. Interchange tie lines between regional areas will be shared with other agencies. The IN WATS and OUT WATS telephone facilities should be used for voice communications with other armories in the State.

Dispatchers handling the Mobile FM Communication System will coordinate with National Guard personnel. In addition, F10 coordinating channel can be used for coordinating communications of all state public safety organizations in case of civil disorders.

Data requirements will increase as National Guard facilities are developed.



60 These facilities will include payroll, inventory controls, order for supplies, and organization in case of disaster for evaluation and support requirements.

Facsimile and slow scan television facilities will be required for training and providing military support.

Live television will be used to evaluate disasters. The television facilities could be a part of the educational television system.

The State Emergency Radio Communications System is required for back up and point to point traffic. This system will also provide long range communications between mobile units and base stations. The system is now organized to operate on the frequency of 5820 KHz. This frequency will change as it is incompatible with the new Collins Equipment to be received by the Utah National Guard. The new frequency 4565 KHz was chosen also because it is compatible with the low cost single side-band radio units from the Heath Company, designated HW18. The State Communications System II (STACOM II) requires all units to operate on the 4565 frequency on a day-to-day basis under a program as developed by the military support division for the Utah National Guard. During emergency conditions when traffic may build up excessively on this common frequency the various segments on the net will move to other frequencies at the direction of the military support group. For example, the county and the city civil defense equivalent will be switched to the Radio Amateur Civil Emergency Service frequencies of 3987.5 and 7248.5 KHz. In some areas, towns have arranged with the

Utah Wing of the Civil Air Patrol to have the county units switch to 4602.5 because of the capabilities of the HW 18. The Utah State Guard will have the capability of switching to 4565 or 4602 KHz. Successful tests have been made with federal agencies such as the Hillfield Airforce Base and the Airforce Detachment at St. George to operate on the radio back up frequency as a simulated coordination between rural activities and the State.

The call signs, as designated by the communications officer of the Utah National Guard is "Major Toot" for the National Guard and military support segment. The call "Smoked Lobby" is to be used by Civil Defense, Federal Agencies, city and county, and Utah State Guard. The "Smoked Lobby" calls will be assigned in accordance with the Call Number Assignment shown under the Appendix Operating Procedures.

The National Guard conducts daily roll calls on each working day. The Civil Defense and other segments conduct weekly roll calls. Semi-weekly training sessions are recommended for the training of operators working in this network. In the event of federalizing the Utah National Guard, the Utah State Guard should have qualified and trained personnel who can step in and take over the functions to support the military aspects of the State of Utah. This would include the manning of the radio equipment at the National Guard Armories.

Civil Air Patrol

The Utah Wing Civil Air Patrol (CAP) is unique in its position in the state government. CAP is a volunteer organization and a part of a national corporation which is supported by the US Air Force and the State of Utah. The Utah Wing Civil Air Patrol is subject to direction from the US Air Force, the Utah Director of Aeronautics, and the Utah Council of Defense.

Civil Air Patrol's primary mission is search and rescue for downed military and privately owned aircraft. They also provide support for lost personnel, youth training, aeronautical RADEF monitoring, and air and ground support for emergency requirements.

Communications is a support function to assist in the completion of the mission assigned to the CAP. Other assignments are, an additional network to supplement the State Telecommunications under emergency conditions, training of operators and youth training. The Utah Wing communications network is presently undergoing a revision of their communications mode of operation due to changes in the regulation concerning high frequency operation. In the past surplus government and military communications equipment was used and supplemented by direct purchase of some commercial equipment. The "state-of-the-art" has changed with the more efficient single side-band operation. Large and expensive transmitters and receivers are replaced with small desk top units that will do a better job. The Heath Kit HW-18 is accepted by the FCC and has been accepted as a standard for the Utah

Wing of the Civil Air Patrol. The cost of approximately \$170.00 in the kit form transceiver or \$200.00 in the ready built transceiver configuration provides a complete station at less cost than the modification and installation of the older equipment.

The frequency of 4602.5 KHz is designated as the primary frequency for the Utah Wing with an alternate frequency of 4507.5 KHz. The search aircraft of the Civil Air Patrol can be equipped with the small, lightweight transceivers for coordinating searches by communicating with mission control center even from long distances. 122.9 MHz is designated for air to air and short range air to ground purposes. Most aircraft are currently equipped with this capability.

The frequency of 26.620 MHz will be used primarily for training as well as a backup for operational requirements.

With the change in the communications capabilities and closer participation with the integrated State of Utah Telecommunications system most missions will be controlled directly from the Wing Building Control Center or the State Emergency Operating Center. The long range and integrated communications capabilities will save the cost of relocating mission control and setting up extensive remote search bases. Portable or mobile equipment can be dispatched to the airfield for coordination of refueling aircraft and briefing pilots by a liaison officer.

The majority of search efforts are conducted during non-normal working hours when the State Centrex Telephone requirements are at a minimum. This Study recommends that, when authorized by the State

Aeronautics Director and when it is an advantage to the State the State Telephone Centrex capability be made available for use by the Civil Air Patrol.

Radio Amateur Public Service

The Radio Amateur Public Service (ARPS) includes the National Traffic System (NTS), Amateur Radio Emergency Corps (AREC) and the Radio Amateur Civil Emergency Service (RACES). The RACES provides non-tax supported equipment to the State and local governments as authorized in the FCC Rules and Regulations Part 97. RACES is the only designated communications facility fully under the direct control of Civil Defense Agencies. Amateur Radio has broad frequency capability including HF, VHF and UHF frequencies to provide long and short range communications. In the United States there are over 300,000 licensed Amateur Radio Operators. Of these, 1,410 are located in Utah with 50% active members who have an estimated investment of over \$500,000 in equipment (non-tax supported).

The location of the active Amateurs are proportionate to the populace in the State. In order to take advantage of this, communications resource facilities must be available in the Emergency Operating Centers and have the capabilities of communication with the various networks.

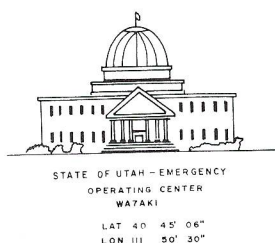
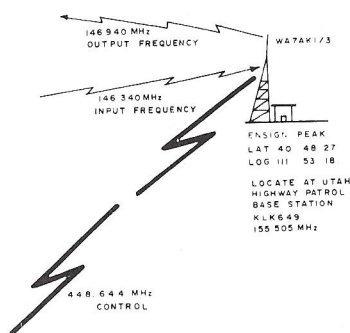
The RACES program provides many channels for use during emergency conditions. The frequency allocations are withdrawn from the non-participating amateurs during periods of declared emergencies.

The RACES program is designed to provide supplementary communications channels for state to state, state to county, county to city and at a minimal investment to the using agency.

Normal day-to-day activity in the Amateur Radio Service includes personal use by the licensee and other organizations such as the Amateur Radio Emergency Corps (AREC), and the West Coast Amateur Radio Service (WCARS), and many traffic nets. Utah has two regular traffic and training nets; the Utah Beehive net which meets daily at 1230 hours on 7272 KHz, and the AREC-RACES net which meets each Saturday and Sunday at 0800 hours on 3987.5 MHz on a statewide basis. There are other local networks mostly on VHF for local training and message handling.

The Utah RACES plan utilizes two areas of the frequency spectrum - HF and VHF. RACES frequencies are shown in the Appendix Frequency Planning Section. HF activity is largely single side-band with

some CW and Radio teletype, and provides long range point to point capabilities. The VHF includes AM and FM. A RACES sponsored FM Repeater is located for coverage of the Wasatch front counties. The primary costs in developing this repeater were donated by individuals and interested parties. An AM repeater



is currently being developed. An additional FM repeater (non-tax supported) is being developed in District 6 and will be available to the local government. The two repeaters are part of a National Repeater System.

The RACES program provides many highly skilled volunteer personnel for assistance in an emergency.

OPERATIONAL CONSIDERATIONS

Equipment to be operated by the second dispatcher in the Dispatch Center or by approved voluntary RACES operators.

EQUIPMENT CONSIDERATIONS

HF equipment. Single side-band equipment should be installed in each District Communications Center.

Equipment recommended. Drake R4B receiver and T4XB

Advantages: Will function as a transceiver
Can be crystal controlled
Easily modified for RATTY operation
25 KHz Calibration
Will cover CAP and MARS Channels
Upper and lower side-band and
AM selectable

Disadvantages: Will not cover 5.0 to 6.0 MHz and
is not usable STACOM frequency of
5.820 MHz.

VHF AM equipment. Only required in Districts 2, 3, and 4.

Equipment recommended: Heath Kit SB500

Advantages: Low Cost

Disadvantages: Require wiring by skilled personnel

VHF FM equipment. Required in Districts 2, 3, 4, and 6.

Equipment recommended: Surplus high-band FM equipment

Advantages: Low cost

Disadvantages: Equipment still scarce.

Military Affiliate Radio Service

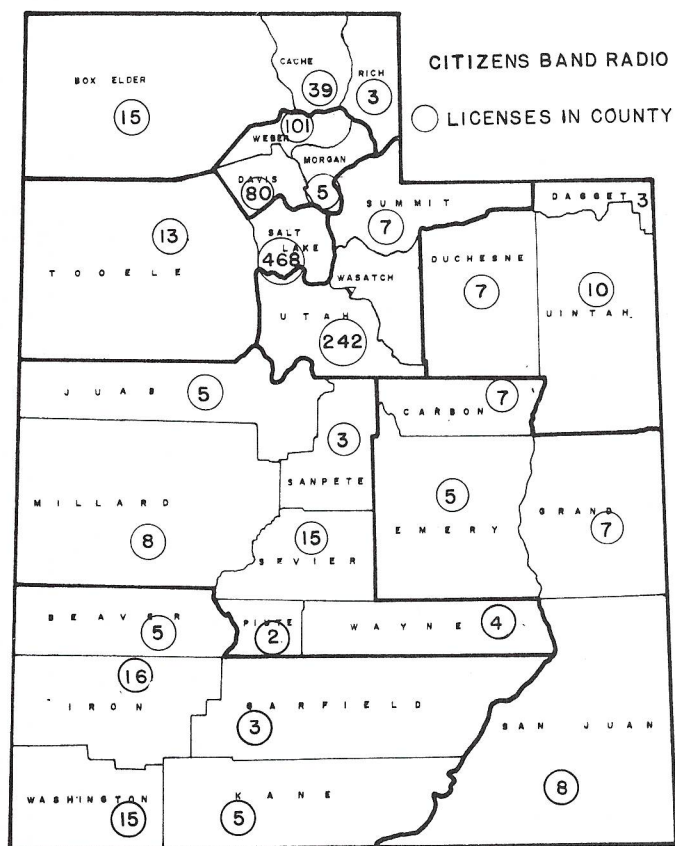
The Military Affiliate Radio Service (MARS) is made up of more than 23,000 radio amateur volunteers. MARS handles personal messages between servicemen and their families, and when needed acts as an emergency back up to normal communications circuits. Each MARS member falls under one of the three services Army, Navy and Air Force. Their first priority is service to the military and military personnel. Each MARS organization has a secondary assignment, that of supporting local and state Civil Defense when authorized by the military. The MARS facilities have been effective in support of disasters such as the Alaskan earthquake and Hurricane Camille.

A State MARS Director for each MARS group is presently assigned in the State of Utah and most of the members are found on the Wasatch Front. The Air Force MARS has the largest membership of 85 and is associated largely with Hill Field Air Force Base. The next largest is the Army MARS group with 60 members who are basically attached to the Army Depot at Ogden. The Navy MARS has approximately 12 members and is associated with the Utah Technical College in Salt Lake City.

The MARS Program is an asset to the State in that it is a morale builder for the families of servicemen, and the program provides additional equipment and trained personnel as a vital resource for communications capability.

Citizen Band Radio

Citizen Band Class D Radio Service is an asset to the local entities. Of the 3,000,000 licensees in the United States only a small number are located in Utah. Because of the small population Citizen Band operations will be an asset for short-range communications requirements such as shelter complex communications. Most Citizen Band Radios are privately owned and licensed for personal use. This equipment, non-tax supported, could be made available to carry some of the traffic and duties when normal Public Safety channels have exceeded their capabilities.



Citizen Band Radio

Citizen Band Radio was originally intended to cover the needs of citizens for their personal radio requirements. Citizen Band Radio has developed emergency capabilities such as Radio Emergency Associated Citizens Teams (REACT) as sponsored by General Motors Corporation. The 40,000 member national association of citizen two-way radio operators provide

emergency communications for their local communities. National sponsorship was assumed March 15, 1969 by General Motors Research Laboratories.

Individual members are public spirited citizens who operate Citizens Band Two-Way Radio equipment in their automobiles as well as their homes, offices or places of business. On a 24 hour monitor system REACT members in the Salt Lake area are able to report, via radio, a wide variety of local emergencies such as automobile accidents, fires, and suspicious actions to a central station. The central monitor post then relays the information to the appropriate authority such as; Police Department, Highway Department, hospitals or service stations. This aid provides the public a considerable amount of public service and saves many tax dollars.

Under fallout conditions resulting from a nuclear attack the Citizen Band Radio is planned by local authority to provide shelter to Emergency Operating Center communications. The Salt Lake area REACT team is among the 35% of the REACT teams that are officially affiliated with Civil Defense, police or fire authorities.

The FCC Docket 18705 provides for a CB channel dedicated for emergency use only. Some of the major automobile manufacturers feel that in the near future that a low-power two-way radio will be standard equipment on all passenger and truck vehicles. This will require a new consideration by law enforcement for aid and other services.

Transceivers located at the mountain top repeater site and controlled by UHF on the same systems as the Public Safety FM Radio will give coverage even in the remote areas of the State.

State Government Communication System

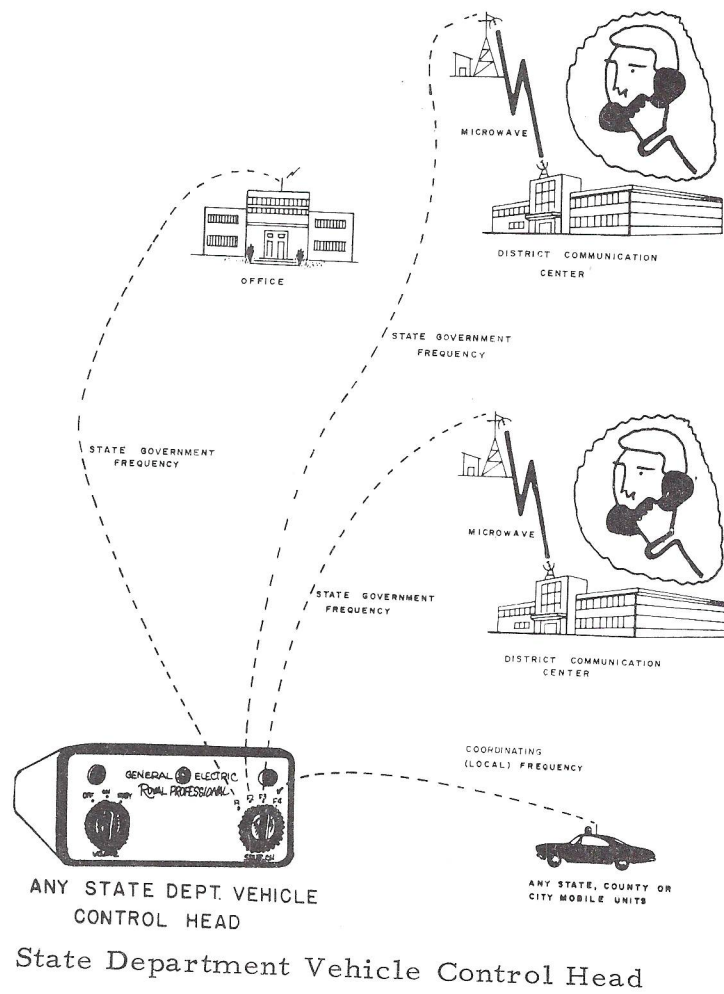
The State Government is not normally part of Public Safety, as far as communications are concerned. It has been inserted in this chapter to show its relationship with the State Telecommunication System which is designed primarily for Public Safety.

Two-way radio facilities have proved an asset to agencies other than Public Safety. The State Government mobile radio is designed to furnish those agencies radio facilities which have not previously been available because they were not acceptable on the Highway Patrol frequencies.

Several government motor pool cars can be equipped with radios to provide service. Portable radio equipment can be installed to provide local government capabilities to those agencies having assigned automobiles.

These inexpensive mobile telephone installations will have access to the State Centrex Telephone System by patching

The system used for building maintenance and



miscellaneous radio requirements of the departments will need realignment in order to fit into the overall Plan.

The District Dispatch Center will provide the necessary tie-in for communications.

Chapter 5

EDUCATIONAL COMMUNICATIONS

All education is taking a hard look at television as a teaching medium. New equipment and concepts may well change the future role that television will play in education. The method of live broadcast for classroom television might change to video tape, electron beam recording and film medium all operated within the classroom with the emphasis on individual learning.

The proven capability of television to teach, or more important, the method by which it is transmitted lends itself to many possibilities of the medium to transmit other information as well as television such as data, slow scan television, use of video file systems and multiplex FM for audio tutorial systems. All of these forms of communication can be carried by the same method as television.

Another television concept could be broadcast for mass distribution of materials to a point where it may be video taped "off the air". Late hours, after normal operation, could be scheduled by the schools on a demand basis to retrieve information which would be video taped and played back to suit the individual school's schedule. This late hour use would then free the television station during normal hours of operation for classroom television, in-service teacher training,

division of continuing education, and public television.

Educational Television Broadcast

Utah's broadcast television system at present consists of five educational television stations. Two stations KUED-Channel 7 in Salt Lake City and KBYU-Channel 11 in Provo furnish a comparable primary geographical coverage along the Wasatch Front from Box Elder County on the North to Juab County on the South. Channel 9 and 18 in Ogden provide educational signals to Weber, Davis, Box Elder, and Tooele counties. KUSU-Channel 12 in Logan blankets Cache Valley and a small area in northern Utah.

There are approximately 570 public schools in Utah (90%) within reach of an educational television signal. This coverage is accomplished by the five educational television stations and the primary and secondary translators carrying KUED-Channel 7.

At the present, day time television broadcast, from approximately 7:30 a.m. to 3:30 p.m., is mainly for use of the elementary and secondary public schools. The last complete survey showed 53 courses made up of 2,200 individual lessons partially produced and scheduled by the Utah Network for Instructional Television (UNIT) are available to more than 256,000 elementary and secondary students.

In a meeting December, 1969 representatives of the Utah Board of Higher Education, the Utah Joint Committee on Educational Television and the State Department of Public Instruction resolved to continue coordinated use of the Educational Television System and feel that:

"For the first time in approximately ten years of diverse, independent and scattered ETV development among the ETV licensed institutions in Utah, an interlinked system and coordinated service will be in effect. Appropos to coordination is a recent step taken by the Joint Committee to organize a special task force on microwave scheduling and programming. This group is to prepare a complete schedule of courses and ETV series to be carried via microwave beginning about February 1 when the system, barring any unforeseen delays, will be operational. The Joint Committee is endeavoring to minimize the duplication and overlapping of services by proposing that each of the three interconnected institutions give primary emphasis to a program speciality -- Utah State University, extension courses; Weber State, vocational-technical courses and University of Utah, general education and cultural programs".¹

The UJCET has plans to procure the professional services of a full time coordinator or projects director in the area of program development. This individual will contact all of the educational institutions in Utah to assess their television needs.

Television has assumed the role of participating in civic functions such as; the Governor's Monthly Report, contact with the Legislation for the dissemination of information to the public, and training for other institutions where there is a need to reach a mass audience.

Evening programs will consist of cultural programs, programs produced within Utah, programs for both culture and information furnished by the Corporation of Public Broadcast and regularly scheduled programming furnished by the Educational Television Network (NET).

¹Report of the Utah Joint Committee on Educational Television to the Governor of the State of Utah and the 1969 Legislature, November, 1968, page 15.

ETV Translator System

In the State of Utah it is necessary to have coverage beyond the capability of a normal primary signal of a television station. Two stations KUED-Channel 7 and KWCS-Channel 18 use translators to extend and relay their signals. KWCS reaches Morgan and Huntsville by this means. KUED-Channel 7 broadcasts the primary signal from approximately the northern border of Utah to Levan, Utah. This signal is sufficient at the Levan mountain top to qualify as a Class A signal. This signal is translated into a UHF frequency in the television spectrum. From the translator it is then broadcast to the public and the schools in the area, and at the same time relaying the signal to other points in Utah. The relay and coverage system of 22 backbone translators, and about the same number of secondary translators furnish approximately 90% television coverage to the schools.

The 22 backbone translators are located on strategic mountain tops transmitting to the outlying populated areas of the State. It will be possible to consolidate communications in several areas by the use of these already existing translator sites. The consolidation will lower both the cost of maintenance and site development as expansion of the state communications system becomes necessary.

The following figure indicates the presently existing UHF Backbone Translator System for statewide coverage. This system carries most of the educational television programs to the schools and public in Utah.

Programming to the public is limited in some areas where UHF (Channels 70-84) is used but should improve as older television sets with no UHF tuners are discarded.

The translator system needs some expansion and improvement. The UJCET requested recommendations to solve these problems. A Report on Utah School

Television Signal Reception

pointed out several problems

that prevented or disrupted good TV reception. Many of these problems, attributed to poor translator performance, were traced to troubles within the schools. Many schools had inefficient antenna installations, inadequate distribution systems and minor problems in school TV wiring.

The Survey also proved some elements in the translator system should be upgraded and the coverage expanded.²

The UJCET has resolved to improve the system, to furnish the best possible signal Utah can afford, and have made recommendations

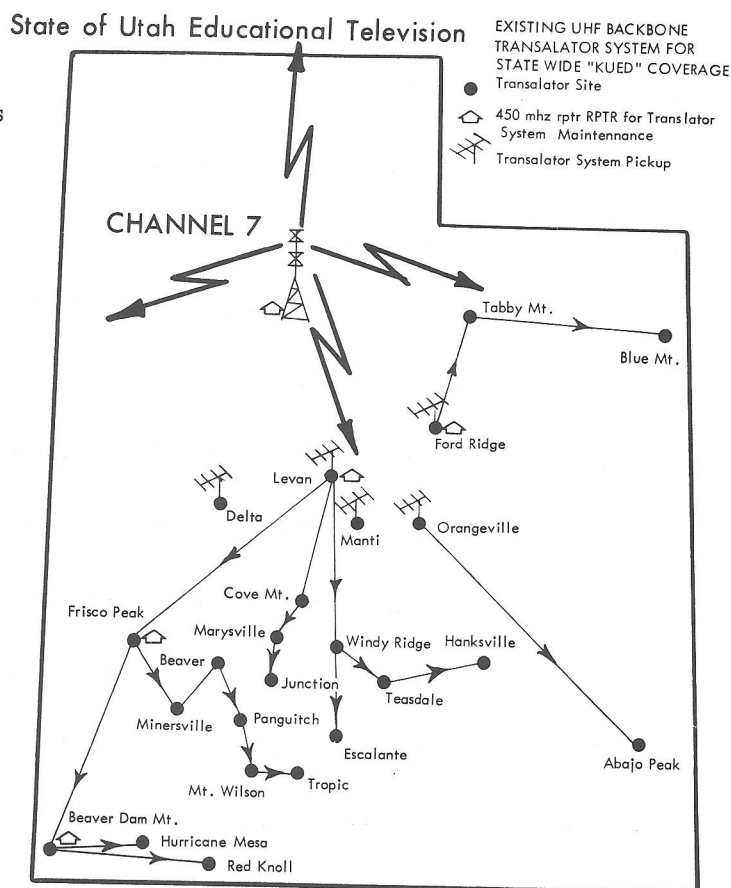


Figure 3
Through its primary coverage and the "backbone" translator system KUED has virtual state-wide signal distribution. The signal strength in Cache Valley could be increased with the installation of two translators. A Channel 7 signal would be accessible to all but a few isolated Utah communities with a slight modification in translator facilities and improvement of local retransmission devices and distribution systems.

²Report of Utah School Television Signal Reception, publication number 3, June, 1968.

for the needed improvement. See Appendix Proposals for Translator Expansion and Upgrading.

Educational Television Microwave

In the Fall of 1969 a two-way microwave system started operation on a test basis between KUSU, Logan; KWCS, Ogden and KUED, Salt Lake City; and will later be integrated into the KBYU private microwave system. This microwave system is considered to be of paramount importance in the coordination of the educational television stations in the State of Utah. This system has the potential for maximum utility on a statewide basis. Programs originating in the studios of KWCS, KUSU and KUED will all have the capacity to broadcast live over KUED-Channel 7 and the State Translator System. This allows exchange of programming separately or a simultaneous broadcast on all three of the TV stations with the program originating at any one of the studios. This type operation can lead to a savings on programming costs by cutting down duplication.

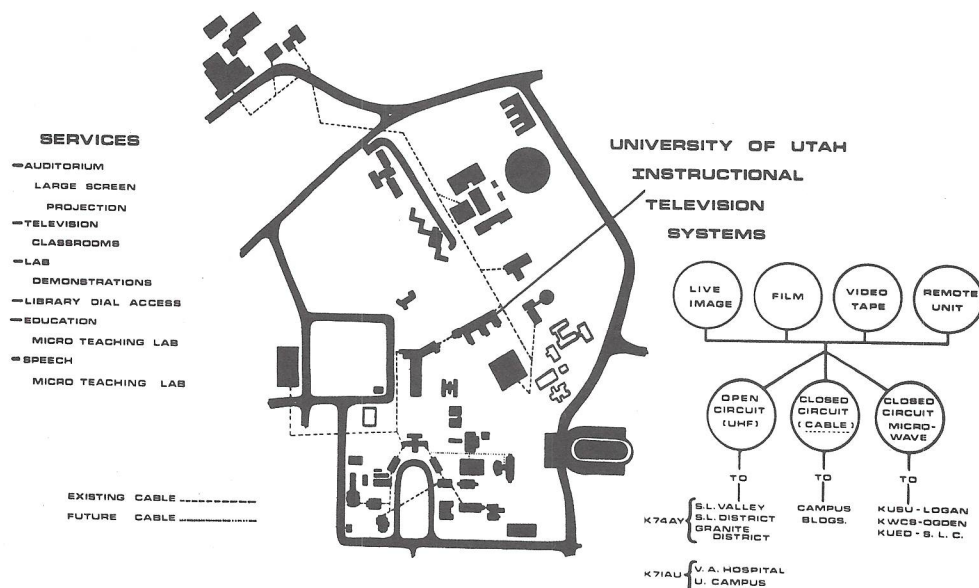
The State Telecommunications Study foresees the possibility of the extension of the two-way system into other areas of the State for educational uses other than TV. It may be some time before Utah can afford such a system, but the microwave network in a sense is an open ended and expandable system upon demand or need by using the same sites and facilities designated for the complete State Telecommunications System.

Since Utah lacks sufficient funds for education the State may

well have to adapt itself to the uses of all types of technology in order to insure everyone a first class education.

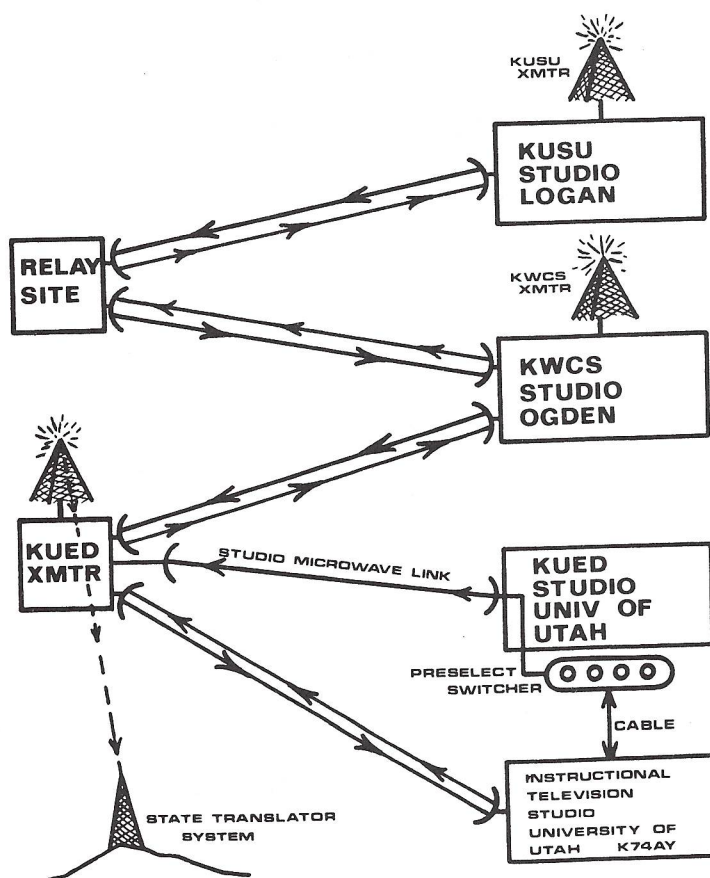
The microwave system would make possible the exchange of closed circuit television classes between the universities and colleges, using the expertise of each field and exchanging resources and information wherever possible. This same type program could be worked out for the exchange of medical information between institutions and hospitals using the services of medical specialists. Planning is underway for an expanded program in continuing education and vocational programs designed for the cooperative use by the entire State. It will supply a system for the distribution of national and intrastate information to all necessary institutions within the State, and by the use of closed circuit tv cable systems could be used directly on a campus or in a class room. Sample diagram of how TV sources are being used at the University of Utah.

Sources of Television Utilization



With additional terminal equipment lines for teletype, data, voice grade lines or even wide band channels will be available. In some cases computers are needed to operate beyond the normal capabilities of a wire line, when this need is great enough then microwave for this use becomes feasible. A microwave system with proper planning could be used on a computer time sharing basis whereby the computer operator appears to be the only user of the machine.

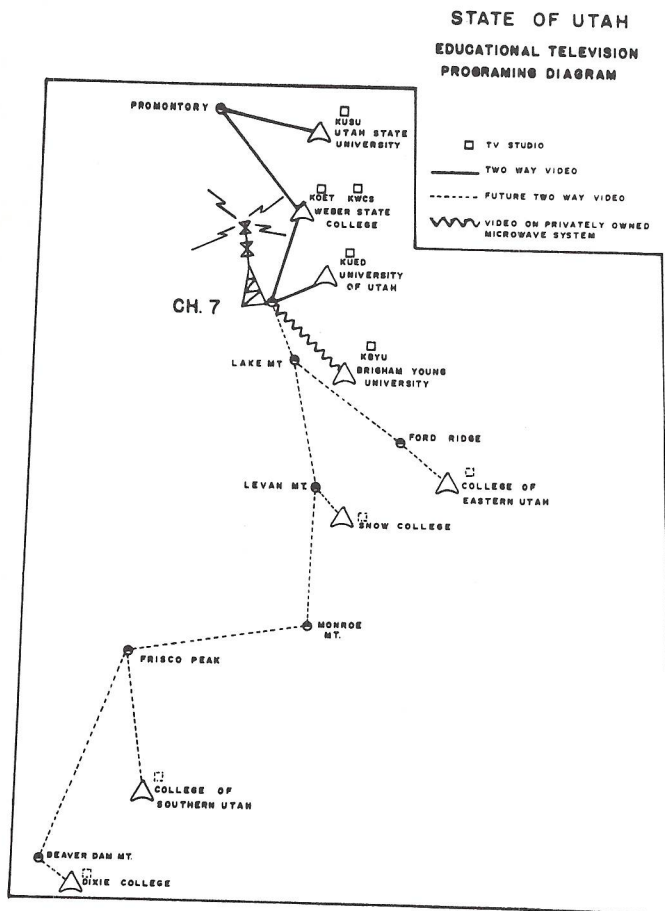
The microwave system could also open to the public a wide variety of live cultural and civic programs with two-way feedback, or sports events from the many new areas in the State.



Educational Television Programming Diagram

This figure shows the presently existing system for educational television uses. This system is capable of an additional approximately 100 voice grade lines for uses other than video circuits.

On the following page is a diagram of a system using the existing sites which have been planned into the State Telecommunications System. Although no plans for video at the present time



are included, this system would be feasible for uses of voice grade lines carrying needs of teletype, data and computer systems up to 4800 bits per second.

This system is non-existent. However, as the State's need progress it should be noted that the placement of the sites selected serve both the future District Communications Center and the institutions of higher education.

Public Library Service

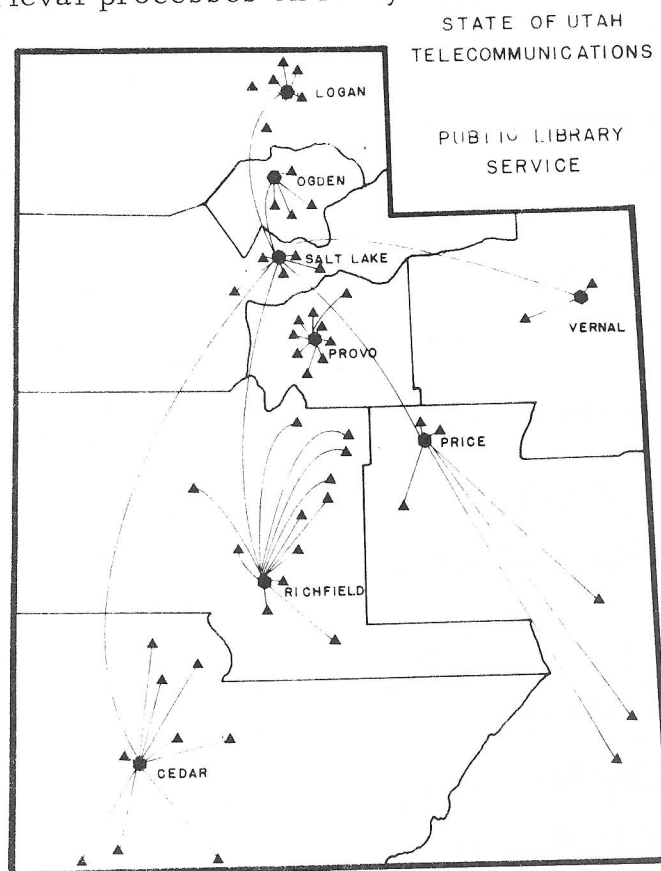
A new public library service was begun during the year 1968. This service, now supplied by Mountain Bell Telephone Company, consists of a teletype network at the present time connecting seven of the major libraries in the State of Utah.

The library systems could tie-in to the Multi-County Planning pattern by routing the Library Communications Service first to a District Communications Center, and then interconnect with each of the other District Centers.

The Library Service at this time consists of a means of checking inventories at each of the libraries and exchanging information. The teletype system may also be used for retrieving special information to be found in limited publications. Future planning of the communications system could include some of the new innovations in libraries such as dial access systems which exist at the University of Utah and Weber State College. This library system, if properly planned would make the audio portion of the dial access system available for exchange to other libraries. As the system develops and expands, new terminal equipment for data and computer services make feasible their use in the library area to speed up retrieval processes on many kinds of information.

The seven libraries presently connected are:

Brigham Young University Library
 Southern Utah State College
 State Library Commission
 University of Utah General Library
 University of Utah Medical Science Library
 Utah State University Library
 Weber College Library



Public Library Service

Chapter 6

DATA AND COMPUTER OPERATIONS IN UTAH

The development of an integrated communications system will open the way to computers and data information being economically feasible and within the range of use in education and government.

In the past most communications lines supplied by the common carriers could carry only 2400 bps (bits per second), adequate for most jobs but well below the speed capability of most computers. Inadequate terminal equipment has also been a hold back. New "modems" or terminal off the shelf equipment can carry 4800 bps on a voice grade line. A complete microwave system would have the needed bandwidth to carry 9600-1,000,000 bps and opens the door for using the full capability of the computers on a time shared basis.

The languages and uses of computers are quite varied and time sharing can create the intellectual partnership between man and computer that is needed in today's complex way of life.

For example, one agency in the state might need engineering, graphics, or bookkeeping information in the same day, thus needing the information from three different computers.

As its name implies, time sharing permits users at remote locations to simultaneously use a computer located anywhere that a good

communication system exists. The Telecommunication System makes it practical to install at various points in the State input-output terminals; operation then appears to the user of the terminal as though he were the only one using the computer.

Data Processing Operations

Data processing was set up primarily as a service bureau for the various departments of the State. To date, much of its operation has been devoted to batch processing. In fact, until recently all of their work has been batch processing.

Here is a brief run down on the Data Processing Operations for the various State Departments:

Agriculture -- license data and status reports.

Building Board -- space utilization data.

Business Regulations -- license data.

Board of Education -- accounting.

Utah State Board of Higher Education -- statistical analysis,
accounting.

Finance Department -- centralized accounting for all departments,
payroll, budgeting, purchase order processing, printing of checks.

Group Insurance -- financial data.

Insurance Department -- licensing data on agents.

Health Department -- statistical analysis.

Juvenile Courts -- data gathering and processing on each juvenile of
the courts.

Liquor Commission -- inventory data, sales data, sales analysis.

Motor Pool -- monthly cost data.

Oil and Gas Production -- production data, sales data.

Parks and Recreation -- licensing of boats, accounting.

Public Safety -- will use officer utilization report data, traffic report data, financial responsibility report data, driver's license data, Crime Omnibus information.

State Insurance Fund -- claim check processing, accounting.

State Road Commission -- engineering data, accounting, personnel data, on-line plotting.

State Tax Commission -- motor vehicle registration data, assessment notice data for counties, sales tax data, income tax data, income tax refund data.

Welfare -- recipient data, check processing, accounting, bank reconciliation data, report data for each social worker including status data on each case, nursing home data.

Some Departments' data operations are more complex than others. The following Departments will be operating with remote or nearby terminals:

Public Safety -- terminal at State Fairgrounds to process driver's licenses; backup 9-disk IBM 2314 storage acquired for this purpose.

Road Commission -- the present system of using the teletype at each district to transmit data to the teletype at the State Office Building in Salt Lake City where this data is converted onto punched cards via an automatic keypunch is being given a long hard look. Although the present

system is economical and workable now, future demands appear to make computer terminals at each district not only a convenience but a necessity. County Sheriffs -- the Salt Lake County Sheriff has a remote terminal in operation. He has immediate access to the files on motor vehicles, driver's licenses, stolen property, and wanted persons.

In conjunction with Public Safety and the County Sheriff, the NCIC System should be mentioned. The National Crime Identification Center has a computer system which supplies the nation with information such as stolen property and wanted persons. The NCIC handles three remote systems; inquiry, data-collection, and information distribution.

At the present time the Highway Patrol Dispatcher in Salt Lake City provides the NCIC computer with a simple remote terminal. The newly planned NCIC system will use a backup storage device in Salt Lake City to store the NCIC data for faster, more convenient response to inquiries within Utah.

Various other departments such as the State Tax Commission and those dealing with budget, are desirous of more convenient handling of their data. Terminal processing appears to be the logical choice. The Data Processing Bureau has two IBM 360, series 40 Computers which work in conjunction with each other.

University and College Data Processing

The University of Utah had an early start with electronic digital computers. About a decade ago, the University of Utah was already deeply involved in data processing with a Burroughs Datatron 205 Computer.

88 Today, the University of Utah has a sizable area of the third floor of the Merrill Engineering Center in use for data processing. They are equipped with one of the most advanced computers used in universities, a UNIVAC 1108. The University of Utah is safely in the top ten of the best computer science education centers in the world. This list would include such notables as the California Institute of Technology, and the Carnegie Institute of Technology. Furthermore, the Computer Science Department of the University of Utah is number one in the world in computer graphic research.

As for remote data-processing systems, the University of Utah is deeply involved in both the areas of remote batch processing and the interactive graphic systems.

Utah State University has two computers; a College of Engineering UNIVAC 9200 and at the USU Data Processing Center an IBM 360, series 44. Both of these computers are linked by a communications cable. Furthermore, the UNIVAC 9200 is linked to the University of Utah UNIVAC 1108 via GSA telephone line.

Weber State College has recently acquired an IBM 360, series 30. They also have a terminal connected to the University of Utah UNIVAC 1108.

The Salt Lake Trade Technical Institute, Bureau of Reclamation, and the University of Utah Medical Center all have UNIVAC 9200s which are connected to the University of Utah UNIVAC 1108 via telephone lines.

The UNIVAC plant at the Salt Lake Municipal Airport is also connected to the University of Utah UNIVAC 1108.

Furthermore, the University of Utah is connected with 17 other out-of-state universities in an 18 center network of computers.

Also, the University of Miami, Florida has an account with the University of Utah and performs all of their more difficult data-processing problems on the University of Utah UNIVAC 1108. Needless to say, the communications used by the Computer Science Department at the University of Utah is extensive.

Utah Educational Data Processing

"The Utah Educational Data Processing project was conceived of a need for a better way of keeping pace with the State's rapidly expanding educational needs and rising educational costs. Its chief objective is to aid and assist the educational process. It has been operational since 1968 and is currently most involved with pupil personnel services such as; grade reporting, attendance, accounting, scheduling, census and test scoring".³ This quotation is taken from a pamphlet published by the U. E. D. P. and best describes in a few words the present scope of the project.

The Data Processing System consists of an RCA Spectra 70 Computer with terminals consisting of a standard key board data terminal to supply a hard copy and/or a video readout. There are six terminals located in schools in Utah; the Parkview School in Salt Lake City, the Moss Elementary School in Salt Lake City, the Muir Elementary School in

³Modern Technology, published by the Utah Educational Data Processing.

Bountiful, the Grandview School in Provo, the North Elementary School in Cedar City, and East Elementary School in Tooele.

It is the intention of data processing to share the use of the computer through the multi-terminal concept with the 40 school districts in Utah and the State Board of Education. As of February, 1970, 26 districts will have participated in the use of this System. During the 1969-70 school year 225,116 pupil units were serviced by the Educational Data Processing. This type of explosive growth in the use of data probably resulted from a system that is tailored to individual districts and on down to the individual school level, thus answering the needs of a school system rather than a single concept within education.

Some of the program developments now underway are: Fiscal Service, Reporting and Information Systems, Information Management Systems, and student problem solving. The U. E. D. P. is also working on a program of computer assisted instruction.

As can be seen by this extensive type of project in elementary and secondary education alone to supply services such as this it is imperative that all users needs be forwarded to a central communications planning point and kept up to date and projected to meet tomorrow's needs.

Employment Security

Employment Security has an RCA Spectra 70 Computer which they are using as a part of a federal research project to test effectiveness of instant random access of employment data. This process is greatly involved with inquiry systems of remote data-processing systems. The

process begins with the employment interviewer submitting the input data through a keyboard in his office. This information is transmitted through a telephone line to the main computer where the required information is stored in back-up storage. Within a matter of seconds, the computer loads the required data from back-up storage, accesses the desired information, and sends this data back to the Employment Office where the output is displayed on a video screen (picture tube).

Possible Expanded Uses

The problem of criminal court overload and trial delay in the State points out one of the problems which might be helped with the use of a new and expanded data system. Through continual analysis of docket facts calendar management would be speeded up, and complex delays would be shunted into a manageable system of handling. Administrative duties and assignment for criminal process could be prioritively assigned proper government level, this would cut duplication of effort and expense. Management of the following problems could also be improved:

- analyzing enforcement, prosecution and rehabilitation experience

- with specific classes of offenders.

- schedule of court appearances and trials.

- coordinate attorney appearance commitments.

The advancements and uses of data and computers is so vast that one could fill many volumes on this alone. It is not the intent of this Study to explore this function for the State. The State Legislature appointed a new Data and Computer Board charged with this responsibility.

It is, however, the intent of this Study to call attention to the users of data and computers the importance of communications in connection with its uses. The Study urges the cooperation of users to coordinate their planning into an integrated system for the State following the guidelines of this Study.

CONCLUSIONS AND RECOMMENDATIONS

The findings of the Telecommunications Study show very definite needs in the overall communications system for the State of Utah.

Several agencies formed an interim committee that helped coordinate some of the expansion in the Public Safety and Highway Departments. However, this coordination has not extended to all of the agencies and institutions in Utah. It is evident that any planning or money spent for equipment which will not conform to the overall plan would be a needless expenditure which must be duplicated later.

The very design of this Telecommunications System will help all aspects of communication covering such entities as Public Safety, Civil Defense, Highway Department, Education, Natural Resources, Department of Health, libraries, educational television, computer and data systems. It will also assist in local emergencies and interconnection of federal government communications systems.

Utah is now at a stage to reap a real advantage in moving forward to insure adequate communications frequencies if we work on a coordinated plan with the State, counties and cities. A communications system built on a modular plan, as pointed out in the Survey will help the overall trend of coordination between federal, state and local government and should also help in coordinating planning with our local

telephone company. Many of the problems facing the entire nation are also present in our local cities and counties. Using this Study as a guideline should greatly assist in meeting all of the State of Utah's commitments. The following pages point out some of the deficiencies and the recommended action.

1. With the exception of the common carrier facilities now leased by the State, which consists mainly of telephone communications, the State of Utah has a very low inventory of communications equipment. Basically, there are not enough communications facilities to cover Utah's day-to-day requirements. In the event of an emergency and the sudden demand for additional communications capability the State of Utah would have serious difficulties.

2. Due to geography and natural phenomena which create dead and spotty areas, coverage of the State by FM radio for law enforcement and public safety requirements is limited in many areas of the State. These areas are considered below minimum standards to meet communications requirements.

3. Many areas of the State encounter heavy interference from base stations located in different geographical areas and even other states, which severely limit the usage of law enforcement VHF communications.

4. Emergency power is available in only a very few locations to protect state communications facilities in the event of commercial power failure. This shortcoming limits day-to-day communications as well as emergency and includes some telephone systems.

5. Communications procedures are not uniform, even within departments and agencies of state and local governmental jurisdictions, causing considerable confusion when required for interagency and inter-departmental coordination.

6. Fallout protected communications facilities are not found in existing communications networks, with the exception of the Provo Utah Highway Patrol dispatch installation and the State Communications Center. "Hardened" centers are prepared for Roy, Logan, Price, Vernal, Richfield, and Cedar City, but equipment or facilities are not prepared for quick movement into them. The State Radiological Reporting Network is completely without protection. Without this fallout protection the Highway Department also cannot qualify for priority restoration granted by the Federal Communications Commission (FCC Form 915).

7. There is presently an inadequate maintenance program in the State of Utah to maintain existing communications facilities. There is no centralized maintenance organization. We must maintain an adequate amount of test equipment and a sufficient number of technicians to effectively maintain the existing equipment and meet all of the requirements of the FCC.

8. There are only a limited means of written communications facilities, teletypewriter, radio teletype, facsimile, etc. in Utah. These facilities which include the Law Enforcement Teletypewriter system only cover a small portion of the State. The Highway Department has a teletype network connecting district headquarters, but is

the only user of the system. Other agencies need such facilities to meet sufficient day-to-day requirements.

Interstate communications are inadequate and becoming obsolete and do not meet the increasing load requirements. Requests between the neighboring states of Idaho, Colorado and Nevada require that a radio message be repeated several times by dispatchers in going to and from other states.

10. Interagency and interdepartment communications are limited on a day-to-day basis because correlated efforts have not been established.

11. The size and location of the State Emergency Communications Center is not convenient or capable of expansion to provide for the function as may be required under emergency conditions.

12. Educational Television Broadcast stations in Utah in the past have suffered because of no coordinated planning between the separate entities operating the broadcast stations. Duplication of programming by each of these stations has been abundant. Because of this lack of coordination, no one station has had sufficient funds to run a first class operation for the State.

13. The Educational Television Translator System, although extensive throughout the State, does not cover the complete commitment which should be met by furnishing a signal to all schools and the major population areas in Utah.

The System also still suffers from inadequate maintenance and

money for updating the present System.

14. A fully coordinated plan for the use of the microwave is not yet a reality. Complete terminal equipment for full use of the microwave is not available due to a lack of planning and sufficient funds.

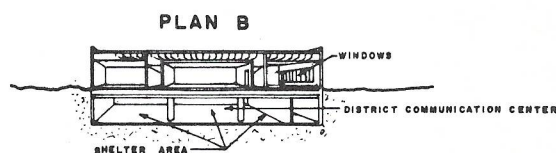
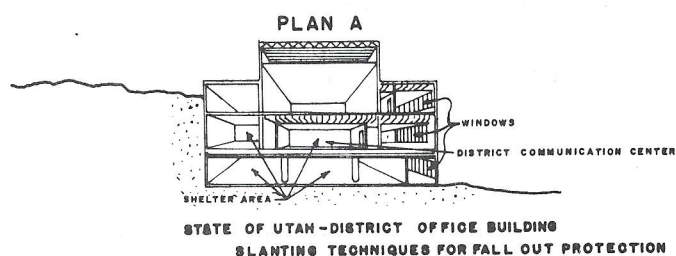
15. No master plan for uses of data and computers is available for all state institutions. Communications for time sharing are too costly and inadequate for high speed lines in order to accomplish the needs of some of the institutions, especially in the research areas.

Recommendations of the Utah Telecommunications Planning Study

1. The purpose of this Study is to develop an awareness of the inadequate communications facilities at present in the State. Due to the population distribution, the large sparsely populated areas found in our counties, the rugged mountainous terrain, the State of Utah should have a larger per capita investment in communications equipment than the average state. However, Utah is one of the states with the smallest per capita investment in communication equipment.
2. Many of the mountain-top base stations should be relocated in an effort to provide better VHF coverage over the total area of the State.
3. The creation of districts for police and state government users with adequate and properly assigned radio frequencies and the assignment of additional channels for new police traffic should correct the interference problems found on the existing two-way radio frequencies now in use in most of the State.
4. This Telecommunications Planning Study recommends the installation of protected auxiliary electrical power at each location of a major segment of the State Telecommunications System.
5. As part of this Telecommunications Plan a subcommittee of communications users was established for the correlation and recommendations of a standardization procedure to be used by all agencies and entities in the State. As a result of the subcommittee's recommendations, law enforcement agencies, with the exception of those in two

cities, have now changed to the nationally recognized standardization procedures program of the Associated Public Safety Communications Officers, (APCO). The high-frequency communication procedures have been recommended to be in accordance with the standardized military procedure. A new federal guide is being issued to standardize amateur radio procedure which will conform to procedures used on other high frequency services.

6. The District Communications Center is recommended to be located in a state or publically owned building with adequate fallout protection at each manned location throughout the State. Plan "A" and "B" show that communications centers can be built into existing or new structures at very minor costs, thereby meeting the fallout protection requirements. In the majority of cases operations can be conducted on a day-to-day basis from these locations.



7. The centralized maintenance program is recommended for all state-owned equipment. A fair share plan is recommended to be developed for a study of all equipment maintained by state technicians, so that either grant appropriations may be used to properly finance a centralized maintenance program. The proper number of technicians should be hired on a basis comparable with the national average, and adequate test equipment obtained to meet requirements of FCC Rules and Regulations.

8. The State Telecommunications Rapid On-Line System (UTROLS) is recommended to provide a shared message switching system for the departments of the state government and participating law enforcement agencies. This system will provide written traffic between all state agencies, access into on-line data storage facilities, and also access to national circuits such as the National Criminal Identification Center. The sharing of costs by all agencies will make the cost economically feasible to the State of Utah. Intercommunications in this Plan will provide direct access to the state capitol switching equipment of adjacent states.

9. Utah should develop interstate communications procedures, together with compatible facilities with the adjacent states for voice and/or switched data with the communications centers in those states.

10. It is recommended that interstate communications, inter-agency communications, and interdepartmental communications be set up on a systematic plan utilizing eight District Communication Centers

to be tied into the State Communications Center within the State Emergency Operating Center. Each District Communication Center would be assigned the responsibility of handling communications on a day-to-day or an emergency basis for all agencies operating within that District, thus providing a centralized exchange location between departments.

11. The State Emergency Communications Center, a part of the State Emergency Operating Center, should be relocated in the State Capitol Complex. A joint Communications Center should be developed to handle the District 3 and the State Communications requirements. The Communications equipment should be utilized for existing day-to-day requirements with the capability of expanded communications in emergencies. This will provide reliable communications to handle emergencies, either natural or man-made disasters. Additional communication frequencies and facilities are recommended by this Plan which will allow Natural Resources, State Aeronautics, Business Regulations, Civil Defense and other agencies to have communications capabilities by switched data, by use of VHF FM radio on State Government channels, simplex mobile telephone facilities, facsimile or telemetering. The requirements of each department will be part of the overall telecommunications requirements, including necessary expansion in emergencies. Recommendations of this Plan support the day-to-day needs for the State. Communications facilities in an emergency will be coordinated at the State Emergency Operating Center by the various department communications personnel, as directed by the

Council of Defense approved State Emergency Operating Plan. The same department communication controls that exist in a day-to-day operation will be those used in an emergency. The demands on each network will increase as agencies continue to control and operate their various networks under their assigned civil defense responsibility.

The backbone communications system in any emergency, including any nuclear disaster, is that of the law enforcement agencies; therefore, it is of prime interest that adequate communication facilities be established by law enforcement agencies. This investment is worthwhile for the protection of life and property on a day-to-day basis.

Supplementary communications are available from other sources. The Radio Amateurs Civil Emergency Service (RACES), a volunteer organization of amateur radio operators, authorized to remain on the air under a declared civil defense emergency have proven invaluable in disasters in many states. FCC Rules and Regulations establish this Amateur Radio Public Safety Corps (ARPS) to provide on site emergency communications as required. Communications facilities of the Civil Air Patrol (CAP) have support capabilities. The Military Affiliate Radio Service (MARS) provide support to the State Emergency Communications, but remain under control of the military. The Utah National Guard provides many types of communications support to State Emergency Communications. Some communications facilities are permanently located in the various National Guard Armories. In addition to organic tactical radios, the Utah State Guard also possesses

radio communications facilities and provides back up for the Utah National Guard, as well as assuming the military duties required within the State in case the National Guard is federalized. The publically owned educational television and radio capabilities also provide emergency communications capabilities.

Citizen band operators and the communications systems of private industry such as rail lines, truck lines, taxi-cabs, pipe lines, utilities, can also be utilized in an emergency, providing access to their systems can be accomplished from the various emergency operating centers, and providing the systems can function under emergency operating conditions.

12. Solving the deficiencies of the ETV broadcast stations have already begun by the resolution from both the Utah Joint Council on Educational Television and the State Board of Higher Education to approve in principle a recommendation that KUED-Channel 7 be the key television broadcast - transmission facility for Utah. Both of the boards supported the discontinuance of stations KUSU in Logan and KWCS in Weber County. They also approved the recommendation that a full time coordinator be procured to work with all of the institutions in assessing the State's needs for programming.

KUSU and KWCS, if eliminated would still retain their production facilities to work into the statewide system.

13. Following the guidelines set by the Legislature, the Utah Joint Committee on Educational Television has resolved to upgrade and expand the Translator System to assure one good educational television

signal to all schools in Utah.

It was also resolved to share the translator sites with other state agencies in the hope of improving roads, power lines, and the sharing of maintenance vehicles and maintenance personnel, if possible.

14. It has already been resolved by the Utah Joint Committee on Educational Television that a professional full time coordinator work in the area of need assessment of the microwave system as well as in the broadcast - production facilities.

15. Due to the recent appointment of a State Computer Board which, at the time of this writing, had not culminated a plan we make no policy recommendations. Recommendations will probably come from the newly created Board. The essential goal, as pointed out by this Telecommunications Planning Study, is to stay within the guidelines that will furnish adequate communications needs for data and computers.

APPENDIX

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APPENDIX A

COUNTY LAW ENFORCEMENT RECOMMENDATIONS

District 1

Box Elder County Develop a dispatch center with Brigham City and obtain a compatible high-band frequency or work with the District 1 Dispatch Center on the District working frequency.

Cache County Participate with the development of the District 1 Dispatch Center in Logan and work on the District 1 police frequency.

Rich County Participate with the State in developing a base station to cover the county and operate on the District 1 police frequency.

NOTE: District 1 and District 2 may be controlled from the District 2 communications center until the load justifies a District 1 communications center.

District 2

Weber County Has obtained new high-band frequencies and should move as soon as funds are available. They should develop a communications center working with Ogden City to share a computer terminal and other facilities.

Morgan County Participate with the State in developing coverage on District 2 police frequency.

Davis County Has obtained new high-band frequencies and should move as soon as funds are available. Due to the predicted popu-

lation expansion in Davis County, a considerable amount of planning should be given in the area of communications.

District 3

Tooele County Should obtain a high-band frequency and move to it as funds become available.

Salt Lake County Has obtained new high-band frequencies and should move as soon as funds become available. Salt Lake County could tie high-band and low-band channels together during the transition period. They should develop a Dispatch Center with Salt Lake City and share a computer terminal.

NOTE: Salt Lake City, Provo City, Ogden City should all obtain additional frequencies and agreements should be reached to move to non-interfering channels.

NOTE 2: The District 3 police frequency should largely be used for Utah Highway Patrol freeway patrolling in Salt Lake and Tooele Counties and there would not be a requirement for counties to utilize the District 3 facilities. Consideration should be given for UHP cars in Tooele County to work on the County frequency.

District 4

Utah County Should assist the State in developing the District 4 communications center and work on the District 4 police frequency. Planning should continue on frequencies and dispatch facilities being established for the North Utah County and the South Utah County Police.

Wasatch County Should assist the State in developing radio coverage of Summit County from the District 4 Dispatch Center and participate with them on the District 4 frequency.

District 5

Juab County Should assist the State in developing radio coverage of Juab County from the District 5 Dispatch Center and participate with them on the District 5 frequency.

Millard County Should assist the State in developing radio coverage of Millard County from the District 5 Dispatch Center and participate with them on the District 5 frequency.

Sanpete County Should assist the State in developing radio coverage of Sanpete County from the District 5 Dispatch Center and participate with them on the District 5 frequency.

Sevier County Should assist the State in developing radio coverage of Sevier County from the District 5 Dispatch Center and participate with them on the District 5 frequency. Sevier County and Richfield City should participate in the development of the District 5 communications center.

Piute County Should assist the State in developing radio coverage of Piute County from the District 5 Dispatch Center and participate with them on the District 5 frequency.

Wayne County Should assist the State in developing radio coverage of Wayne County from the District 5 Dispatch Center and participate on the District 5 frequency.

District 6

Beaver County Should assist the State in developing radio coverage of Beaver County from the District 6 Dispatch Center and participate on the District 6 frequency.

Iron County Should assist the State in developing radio coverage of Iron County and participate with the State and Cedar City in the development of the District 6 Communications Center.

Washington County Should assist the State in development of radio coverage of Washington County and participate on the District 6 frequency. Washington County should also obtain a supplementary county owned compatible repeater system.

Garfield County Should assist the State in developing radio coverage of Garfield County and participate on the District 6 frequency.

Kane County Should assist the State in developing radio coverage of Kane County and participate on the District 6 frequency.

District 7

Daggett County Should assist the State in developing radio coverage of Daggett County and participate on the District 7 frequency.

Duchesne County Assist the State in developing radio coverage of Duchesne County and participate on the District 7 frequency. They should also obtain a supplementary county owned compatible repeater system.

Uintah County Assist the State in developing radio coverage of

Uintah County and participate with them and Vernal City in the development of the District 7 Communications Center. Participation with Duchesne County may be desired in developing a joint county repeater system.

District 8

Carbon County Should assist the State in developing radio coverage of Carbon County and participate with them on the District 8 frequency. Carbon County and Price City should participate with the State in developing the District 8 Communications Center. Carbon County has obtained frequencies for a joint Carbon County, Emery County supplementary repeater network.

Emery County Should assist the State in developing radio coverage of Emery County and participate with them on the District 8 frequency. They should work with Carbon County in the development of the supplementary repeater system.

Grand County Should work with the State in developing radio coverage of Grand County and participate with them on the District 8 frequency. They have obtained a frequency to establish a compatible repeater system.

San Juan County Should work with the State in developing radio coverage of San Juan County and participate on the District 8 frequency. They should add a county base station to their county system for a supplementary county system.

APPENDIX B
LAW ENFORCEMENT COST CONSIDERATION
BY DISTRICT

It is recommended that joint purchasing contracts be developed in order to standardize types of equipment and to provide economic encouragement to local entities for participation in the overall state program.

The Public Safety System will give added control to the small entities in that they will be able to have their own frequencies and still have coordinated dispatching through the Regional Centers.

It is suggested that the system be called a State Law Enforcement Network and designed to fit the needs of all law enforcement requirements. The Utah Highway Patrol, in the past, has taken the burden of financing the entire system of which they are only a 40% user. A new look of financing this system should be developed in order to place the costs in a proper perspective.

	<u>Unit</u> <u>Cost</u>	<u>Total</u> <u>Cost</u>
<u>District 1</u>		

Special appropriation by legislature.

UHF Control System - See microwave cost Section

State Police Frequency		
Base Station	\$1,800	\$1,800
District Police Frequency 2		
Base Station	1,800	1,800
District Police Frequency 1		
Inband Repeater	2,800	2,800
Utah Highway Patrol		
17 mobiles	625	10,625

	<u>Unit Cost</u>	<u>Total Cost</u>
District 1 (Continued)		
<u>Box Elder County</u>		
Inband repeater	\$2,800	\$2,800
5 mobiles	625	3,125
1 base station	1,800	<u>1,800</u>
		\$7,725
Brigham City		
6 mobiles	625	3,750
1 base station	1,800	<u>1,800</u>
		\$5,550
Garland City		
1 mobile	625	625
1 base station	1,800	<u>1,800</u>
		\$2,425
Tremonton City		
2 mobiles	625	1,250
1 base station	1,800	<u>1,800</u>
		3,050
<u>Cache County</u>		
Sheriff's Office	625	4,375
7 mobiles		
Logan City Police Department		
6 mobiles	625	3,750
Smithfield City Police Department		
1 mobile	625	625
Hyrum City		
1 mobile	625	625
1 base station	1,800	<u>1,800</u>
		\$2,425
Utah State University		
1 mobile	625	625
1 base station	1,800	<u>1,800</u>
		\$2,425
<u>Rich County</u>		
1 mobile	625	625
1 base station	1,800	<u>1,800</u>
		\$2,425

District 2

Unit	Total
<u>Cost</u>	<u>Cost</u>

Special appropriation by legislature

UHF Control System - See microwave cost section.

State Police Frequency		
Base Station	\$1,800	\$1,800
District Police Frequency		
2 Base Stations	1,800	3,600
District Police Frequency		
1 inband repeater	2,800	2,800
		<u>\$8,200</u>

Utah Highway Patrol		
34 mobiles	625	21,250

Weber County

Sheriff's Office		
Data terminal \$250 shared with city		
1 base station	1,800	1,800

Ogden City Police Department		
Existing Equipment compatible need replacement of		
1 base station	1,800	1,800

North Ogden City Police Department		
Data terminal \$250 per mo. shared with county		
1 mobile	625	625
1 base station	1,800	1,800
		<u>\$2,425</u>

South Ogden City Police Department		
1 mobile	625	625
1 base station	1,800	1,800
		<u>\$2,425</u>

Riverdale Police Department		
1 mobile	625	625
1 base station	1,800	1,800
		<u>\$2,425</u>

Harrisville Police Department		
1 mobile	625	625
1 base station	1,800	1,800
		<u>\$2,425</u>

	<u>Unit Cost</u>	<u>Total Cost</u>
District 2 (Continued)		
Washington Terrace Police Department		
*special wide space radio required.		
1 mobile	*900	900
1 base station	1, 800	<u>1, 800</u>
		\$2, 700
Sunset Police Department		
1 mobile	625	625
1 base station	1, 800	<u>1, 800</u>
		\$2, 425
Uintah City Police Department		
1 mobile	625	625
Huntsville Police Department		
1 mobile	625	625
1 base station	1, 800	<u>1, 800</u>
		\$2, 425
<u>Morgan County</u>		
Sheriff's Office		
5 mobiles	625	3, 125
1 base station	1, 800	<u>1, 800</u>
		\$4, 925
Morgan City Police Department		
1 mobile	625	625
<u>Davis County</u>		
Sheriff's Office		
2 base stations	1, 800	3, 600
13 mobiles	625	<u>8, 125</u>
Data terminal \$500 per month		\$11, 725
Bountiful Police Department		
Existing equipment compatible need replacement of		
2 mobiles	625	1, 250
1 base station	1, 800	<u>1, 800</u>
		\$3, 050
South Davis Fire Department		
6 mobiles	625	3, 750
West Bountiful		
1 mobile	625	625

	<u>Unit Cost</u>	<u>Total Cost</u>
<u>District 2 (Continued)</u>		
North Salt Lake		
1 mobile	625	625
1 base station	1,800	<u>1,800</u>
		\$2,425

District 3

Special appropriation by legislature

UHF Control System - See microwave Section

State Police Frequency 1		
1 base station	1,800	1,800
District Police Frequency		
1 base station	1,800	1,800
District Police Frequency		
1 inband repeater	2,800	2,800
Utah Highway Patrol		
57 mobiles	625	35,625
1 base station	1,800	<u>1,800</u>
		\$37,425

Salt Lake County

3 base stations	1,800	5,400
50 mobiles	625	<u>31,250</u>
		\$36,650

Salt Lake City

30 mobiles (replace of old units)	625	18,750
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South Salt Lake Police Department

5 mobiles	625	3,125
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Murray Police Department

4 mobiles	625	2,500
1 base station	1,800	<u>1,800</u>
		\$4,300

Granger Police Department

2 mobiles	625	1,250
1 base station	1,800	<u>1,800</u>
		\$3,050

Tooele County

Sheriff's Office

1 inband repeater	2,800	2,800
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District 3 (Continued)

	<u>Unit Cost</u>	<u>Total Cost</u>
4 mobiles	\$ 625	\$2, 500
1 base station	1, 800	<u>1, 800</u>
		\$4, 300
 Tooele City Police Department		
3 mobiles	625	1, 875
 Grantsville Police Department		
1 mobile	625	625

District 4

Special appropriation by legislature

UHF Control System - See microwave Section

State Police Frequency		
1 base station	1, 800	1, 800
District Police Frequency		
2 base stations	1, 800	3, 600
Utah Highway Patrol		
23 mobiles	625	14, 375

Utah County

Sheriff's Office		
8 mobiles	625	5, 000
1 base station	1, 800	<u>1, 800</u>
		\$6, 800

Provo City Police Department
 25 mobile existing equipment is compatible
 Replacement 625
 Data terminal \$500 per month

Pleasant Grove Police Department		
4 mobiles	625	2, 500
1 base station	1, 800	<u>1, 800</u>
		\$4, 300

Orem City Police Department		
7 mobiles existing equipment is compatible		
1 base station	1, 800	1, 800

Springville Police Department		
2 mobiles existing equipment is compatible		
1 base station	1, 800	1, 800

	<u>Unit Cost</u>	<u>Total Cost</u>
District 4 (Continued)		
<u>Wasatch County</u>		
Sheriff's Office		
3 mobiles	625	1, 875
1 base station	1, 800	<u>1, 800</u>
		\$3, 675
 Heber City		
1 mobile	625	625
1 base station	1, 800	<u>1, 800</u>
		\$2, 425
 Park City		
1 mobile	625	625
1 base station	1, 800	<u>1, 800</u>
		\$2, 425
 <u>Summit County</u>		
5 mobiles	625	3, 125
1 base station	1, 800	<u>1, 800</u>
		\$4, 925
 Coalville City Police Department		
1 mobile	625	625
1 base station	1, 800	<u>1, 800</u>
		\$2, 425
 Henefer City Police Department		
1 mobile	625	625

District 5

Special appropriation by legislature

UHF Control System - See microwave cost Section

State Police Frequency		
1 base station	1, 800	1, 800
District Police Frequency		
3 base stations	1, 800	5, 400
District Police Frequency		
1 inband repeater	2, 800	2, 800
Utah Highway Patrol		
16 mobiles	625	10, 000

	<u>Unit Cost</u>	<u>Total Cost</u>
District 5 (Continued)		
<u>Juab County</u>		
Sheriff's Office		
1 mobile	625	625
1 base station	1, 800	<u>1, 800</u>
		2, 425
 Nephi City Police Department		
1 mobile	625	625
 <u>Sanpete County</u>		
Sheriff's Office		
3 mobiles	625	1, 875
State Police Frequency		
1 base station	1, 800	1, 800
 Manti City Police Department		
1 mobile	625	625
 Gunnison City Police Department		
1 mobile	625	625
1 base station	1, 800	<u>1, 800</u>
		2, 425
 Mt. Pleasant City Police Department		
1 mobile	625	625
1 base station	1, 800	<u>1, 800</u>
		\$2, 425
 Ephraim City Police Department		
1 mobile	625	625
1 base station	1, 800	<u>1, 800</u>
		\$2, 425
 <u>Sevier County</u>		
Sheriff's Office		
3 mobiles	625	1, 875
 Richfield City Police Department		
4 mobiles	625	2, 500
 Monroe City Police Department		
1 mobile	625	625
1 base station	1, 800	<u>1, 800</u>
		\$2, 425

	<u>Unit Cost</u>	<u>Total Cost</u>
<u>District 5 (Continued)</u>		
<u>Piute County</u>		
1 mobile	625	625
1 base station	1,800	<u>1,800</u>
		\$2,425
 <u>Wayne County</u>		
Sheriff's Office		
2 mobiles	625	1,250
1 base station	1,800	<u>1,800</u>
		\$3,050
 <u>Millard County</u>		
Sheriff's Office		
3 mobiles	625	1,875
1 base station	1,800	<u>1,800</u>
		\$3,675
 Fillmore City Police Department		
2 mobiles	625	1,250
1 base station	1,800	<u>1,800</u>
		\$3,050
 Delta City Police Department		
2 mobiles	625	1,250
1 base station	1,800	<u>1,800</u>
		\$3,050

District 6

Special appropriation by legislature

UHF Control - See microwave cost section.

State Police		
2 base stations	1,800	3,600
District Police		
3 base stations	1,800	5,400
District Police		
2 inband repeaters	2,800	5,600
Utah Highway Patrol		
20 mobiles	625	12,500
2 base stations	1,800	<u>3,600</u>
		\$30,700

	<u>Unit Cost</u>	<u>Total Cost</u>
District 6 (Continued)		
<u>Beaver County</u>		
Sheriff's Office		
3 mobiles	625	1, 875
1 base station	1, 800	<u>1, 800</u>
		3, 675
 Beaver City Police Department		
2 mobiles	625	1, 250
 Milford Police Department		
1 mobile	625	625
1 base station	1, 800	<u>1, 800</u>
		2, 425
 <u>Garfield County</u>		
Sheriff's Office		
3 mobiles	625	1, 875
1 base station	1, 800	<u>1, 800</u>
		\$3, 675
 Panguitch Police Department		
2 mobiles	625	1, 250
 <u>Iron County</u>		
Sheriff's Office		
4 mobiles	625	2, 500
 Cedar City Police Department		
5 mobiles	625	3, 125
 Parowan City Police Department		
2 mobiles	625	1, 250
1 base station	1, 800	<u>1, 800</u>
		\$3, 050
 <u>Kane County</u>		
Sheriff's Office		
3 mobiles	625	1, 875
 Kanab Police Department		
3 mobiles	625	1, 875

	<u>Unit</u> <u>Cost</u>	<u>Total</u> <u>Cost</u>
<u>District 6 (Continued)</u>		
<u>Washington County</u>		
Sheriff's Office		
2 mobiles	625	1,250
1 base station	1,800	1,800
1 repeater	2,800	<u>2,800</u>
		\$5,850
 St. George Police Department		
2 mobiles	625	1,250
 Hurricane Police Department		
1 mobile	625	625
1 base station	1,800	<u>1,800</u>
		\$2,425
 Springdale		
1 mobile	625	625

District 7

Special appropriation by legislature

UHF Control System - See microwave Section

State Police Frequency		
1 base station	1,800	1,800
District Police Frequency		
3 base stations	1,800	5,400
District Police Frequency		
1 inband repeater	2,800	2,800
Utah Highway Patrol		
10 mobiles	625	6,250

Uintah County

Fire Department		
2 mobiles	625	1,250

Duchesne County

Sheriff's Office		
4 mobiles	625	2,500
1 base station	1,800	1,800
1 inband repeater	2,800	<u>2,800</u>
		\$7,100

Duchesne City Police Department

1 mobile	625	625
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	<u>Unit Cost</u>	<u>Total Cost</u>
<u>District 7 (Continued)</u>		
Roosevelt Police Department		
2 mobiles	625	1, 250
<u>Daggett County</u>		
Sheriff's Office		
1 mobile	625	625
1 base station	1, 800	<u>1, 800</u>
		\$2, 425

District 8

Special appropriation by legislature

UHF Control System - See Microwave Cost Section

State Police Frequency		
1 base station	1, 800	1, 800
District Police Frequency		
3 base station	1, 800	5, 400
District Police Frequency		
2 inband repeater	2, 800	5, 600
Utah Highway Patrol		
15 mobiles	625	9, 375

Carbon County

Sheriff's Office		
6 mobiles	625	3, 750
1 repeater	2, 800	<u>2, 800</u>
		\$6, 550

Price City Police Department		
2 mobiles	625	1, 250

Helper City Police Department		
1 mobile	625	1, 250

Wellington City Police Department		
1 mobile	625	625

Castle Gate City Police Department		
1 mobile	625	625

Sunnyside Police Department		
1 mobile	625	625

	<u>Unit Cost</u>	<u>Total Cost</u>
<u>District 8 (Continued)</u>		
<u>Emery County</u>		
Sheriff's Office		
4 mobiles	625	2,500
1 base station	1,800	<u>1,800</u>
		\$4,300
Green River City Police Department		
1 mobile	625	625
<u>Grand County</u>		
Sheriff's Office		
4 mobiles	625	2,500
1 base station	1,800	1,800
1 inband repeater	2,800	<u>2,800</u>
		\$7,100
Moab City Police Department		
2 mobiles	625	1,250
<u>San Juan County</u>		
5 mobiles	625	3,125
1 base station	1,800	<u>1,800</u>
		\$4,925
Monticello Police Department		
1 mobile	625	625
Blanding Police Department		
1 mobile	625	625
1 base station	1,800	<u>1,800</u>
		\$2,425

NOTE 1: Base stations at the city and county offices are two-frequency receive and three-frequency transmit minimum.

NOTE 2: Base stations at the mountain top repeater sites are simplex transmit and receive.

NOTE 3: All mobile are high-band four channel - See Spectrum and Equipment Section of this report.

NOTE 4: All repeaters should be standard - see Spectrum and Equipment Section of this report.

NOTE 5: Where the state or county equipment is planned, no additional equipment is recommended, i. e. Richfield has a district center.

therefore, Sevier County and Richfield City are not listed as having additional equipment required.

NOTE 6: This list of requirements are the minimum recommended by this Planning Report and may be increased or decreased as desired by the responsible entity.

NOTE 7: Costs as shown in this section may be eligible for matching funds LEAA Program. Some costs may be eligible for OCD matching funds.

APPENDIX C

MICROWAVE AND TRANSLATOR COST CONSIDERATION

Listed below are the improvements and locations of the translators recommended by the Utah Translator Coordinator as being necessary for complete and adequate coverage of Utah schools.

Improvements include:

One complete new site to be added to the primary back bone system proposed at Louis Peak.

Blue Mountain would be changed to a back bone site.

Monroe Peak would be a change of location of an existing back bone site.

Blue Mountain - Vernal area - change to back bone

Two 10 watt amplifiers	2,170.00
Two antennas	800.00
Cable and installation	300.00
Parts inventory	<u>150.00</u>
Total	\$ 3,420.00

Louis' Peak - Summit County - new back bone

One 100 watt translator	10,000.00
Antenna assembly	9,000.00
Cable and installation	<u>500.00</u>
Total	\$19,500.00

Monroe Peak - Richfield area - improved (new) back bone site

One UST 20 translator	5,000.00
Two RA7 amplifiers (100 watts)	10,000.00
One Rohn S4S tower 40'	3,500.00
Antennas	10,000.00
Cable and Installation	<u>2,000.00</u>
Total	\$30,500.00

Green River - Orangeville and Cedar Mountain sites

Cedar Mountain (County)

One UST 20 translator	5,000.00
Two antennas	1,000.00
Installation	<u>200.00</u>
Total	\$ 6,200.00

Orangeville - Emery County

100 watt Translator	10,000.00
Antennas	4,000.00
Installation	<u>350.00</u>
Total	\$14,350.00

Note: Site not only improves
Green River area but San Juan as well

Daggett County (County)

Two 1 watt translators	2,800.00
Four antennas	800.00
Building	1,500.00
Installation	<u>300.00</u>
Total	\$ 5,400.00

UHF CONTROL AND MICROWAVE PLANNING COST ESTIMATE

The following costs are representative of an average of several manufacturers, and should be used only for preplanning. Costs can vary due to the type of system put together by the manufacturer.

Planning of UHF control systems must be done on an individual site basis, taking into consideration the number of transmitters to be controlled and the function desired.

The Microwave System will be capable of at least 300 channels but the modems must be determined on use such as voice, data, control, and etc. Voice and control modems average about \$900 - \$1000 per terminal.

Referring to the UHF Control and Microwave Map on page 17 an estimated 15 sites are used as a sample in planning a system.

Example of Cost Estimate for First Phase Microwave System - UHF Control

<u>Site</u>	<u>Terminal Eqpt.</u>	<u>Hardware</u>	<u>Repeater</u>
Promontory Point	\$5, 900	\$1, 875	
Little Mountain	5, 900	2, 850	\$12, 000
Ensign Peak	5, 900	2, 850	12, 000
Lake Mountain	5, 900	3, 750	24, 000
Ford Ridge	5, 900	3, 750	24, 000
Cedar Mountain	5, 900		
Tabby Mountain	5, 900	1, 875	
Provo	5, 900	975	
Price	5, 900	975	
Levan		1, 875	12, 000
Monroe Peak	5, 900	2, 850	
Frisco	5, 900	3, 750	24, 000
Beaver Mountain	5, 900	975	
Richfield	5, 900	975	
Cedar City	5, 900	975	

Repeaters	\$120,000
Terminals	82,600
Antenna-Hardware	30,300
Buildings on Sites	56,000
Modems	30,800
Towers	15,000
NewSite Development	34,500
Remodeling of Centers	25,000
Freight, transportation installation costs	<u>30,000</u>
Total	\$424,200

When the need for added communications arises in a specific area, a check of the overall Plan for base stations, and UHF -Microwave control can be determined by the use of the following map. This map shows the overall need by departments and can be a guide for setting down the number of transmitters, types of tower to handle all antennas, and the number of modems needed for the UHF-Microwave Control System.

- ▲ F20 STATE P.S.
- ▲ F21 AREA P.S.
- ▲ F22 AREA P.S.
- ▲ F23 AREA P.S.
- ▲ F24 AREA P.S.
- ⬢ F1 UHP
- ⬢ F2 UHP

- F11 STATE S.G.
- F13 AREA S.G.
- F14 AREA S.G.
- ⬢ F4 UHD
- ⬢ F5 UHD
- NATURAL RESOURCES
- NATURAL RESOURCES RPTR

- ⊙ MEDICAL RPTR
- ⬢ MEDICAL
- COORDINATING



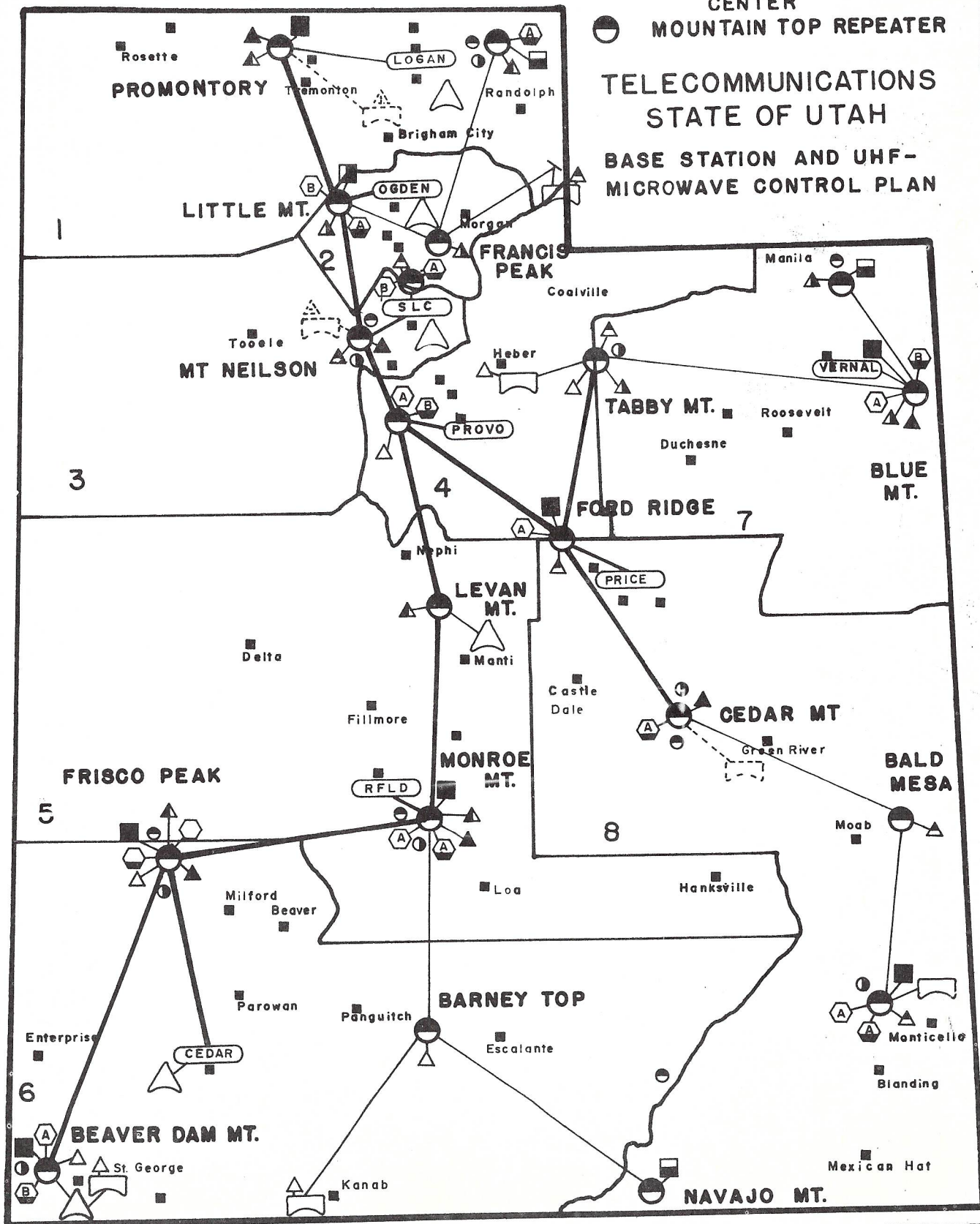
CHECKING STATION
COLLEGE

AREA COMMUNICATIONS
CENTER

⊙ MOUNTAIN TOP REPEATER

TELECOMMUNICATIONS
STATE OF UTAH

BASE STATION AND UHF-
MICROWAVE CONTROL PLAN



APPENDIX D

STATE OF UTAH - TELECOMMUNICATIONS FREQUENCY ASSIGNMENTS

<u>Channel Des.</u>	<u>MHz Frequency</u>	<u>Service</u>	<u>Licensee</u>	<u>Mode</u>	<u>Description</u>
<u>Highway Patrol Low-Band</u>					
F1	42.94	Public Safety	Utah Highway Patrol	20F3	Law Enforcement.
F2	42.88	Public Safety	Utah Highway Patrol	20F3	Law Enforcement.
F3	42.78	Public Safety	Utah Highway Patrol	20F3	Law Enforcement Mobile Only.
<u>Highway Department Low-Band</u>					
F4	47.04	Highway Maint.	Utah Highway Dept.	20F3	State Highway Maint.
F5	47.16	Highway Maint.	Utah Highway Dept.	20F3	State Highway Maint.
F6	Future	Highway Maint.	Utah Highway Dept.	20F3	State Future Maint.
F7	Future	Highway Maint.	Utah Highway Dept.	20F3	State Future Maint.
F8	Future	Highway Maint.	Utah Highway Dept.	20F3	State Future Maint.

State Govt. High-Band

F10	155.745	Local Govt.	State of Utah - Public Safety	20F3	Coordination, State-wide local channel.
F11	155.775	Local Govt.	State of Utah - Public Safety	20F3	State Administration.
F12	155.895	Local Govt.	State of Utah - Public Safety	20F3	State Administration, State-wide.
F13	155.835	Local Govt.	State of Utah - Public Safety	20F3	District 1 & 2 State Govt.
F14	155.925	Local Govt.	State of Utah - Public Safety	20F3	District 3 & 6 State Govt.
F15	155.865	Local Govt.	State of Utah - Public Safety	20F3	District 4, 7 & 8 State Govt.
F16	Future	Local Govt.	State of Utah - Public Safety	20F3	District State Govt.
F19	Future	Local Govt.	State of Utah - Public Safety	20F3	District State Govt.

Police High-Band

F20	155.505	Police	Utah Highway Patrol	20F3	State-wide Law Enforcement.
F21	155.310	Police	Utah Highway Patrol	20F3	District 2 Law Enforcement.
F22	155.580	Police	Utah Highway Patrol	20F3	District 3 Law Enforcement.
F23	155.625	Police	Utah Highway Patrol	20F3	District 4 & 6 Law Enforcement.
F24	155.565	Police	Utah Highway Patrol	20F3	District 1 Law Enforcement.

<u>Channel Desig.</u>	<u>MHz Frequency</u>	<u>Service</u>	<u>Licensee</u>	<u>Mode</u>	<u>Description</u>
<u>Police High-Band (Continued)</u>					
F 25	155. 595	Police	Utah Highway Patrol	20F 3	District 5 Law Enforcement
F 26	155. 550	Police	Utah Highway Patrol	20F 3	Industrial School, Ogden & District 7 Law Enforcement
F 27	155. 700	Police	Utah Highway Patrol	20F 3	Law Enforcement Repeater Output
F 28	155. 070	Police	Utah Highway Patrol	20F 3	Law Enforcement Repeater Output
F 29	Future	Police	Utah Highway Patrol	20F 3	Law Enforcement
F 30	Future	Police	Utah Highway Patrol	20F 3	Law Enforcement
F 31	Future	Police	Utah Highway Patrol	20F 3	Law Enforcement
F 32	Future	Police	Utah Highway Patrol	20F 3	Law Enforcement
F 33	Future	Police	Utah Highway Patrol	20F 3	Law Enforcement
F 34	Future	Police	Utah Highway Patrol	20F 3	Law Enforcement
F 35	155. 655	Police	Utah Highway Patrol	20F 3	Public Safety Medical (working)
F 36	154. 815	Police	Utah Highway Patrol	20F 3	Public Safety Medical (Repeater Input)
F 37	Unassigned				

Channel Des.	MHz Frequency	Service	Licensee	Mode	Description
F38					
F39					
F40	155.130	Police	Salt Lake Police Dept.	20F3	Salt Lake City Police
F41	154.800	Police	Salt Lake Police Dept. Grand County	20F3	Salt Lake City Police Grand County Sheriff
F42	154.830	Public Safety	Salt Lake Police Dept.	20F3	Salt Lake City Police (mobile only)
F43	Future	Public Safety	Salt Lake Police Dept.	20F3	Salt Lake City Police
F44	Future	Public Safety	Salt Lake Police Dept.	20F3	Salt Lake City Police
F45	155.010	Police	Ogden Police Dept. Provo Police Dept.	20F3	Ogden City Police Department Provo City Police Department
F46	154.845	Police	Ogden Police Department	20F3	Ogden City Police Department
F47	154.950	Police	Ogden	20F3	Ogden City Police Department (mobile only)
F48	Future	Police	Ogden	20F3	Ogden City Police Department
F49	155.190	Police	Provo Police Department	20F3	Provo City Police Department
F50	Future	Police	Provo Police Department	20F3	Provo City Police
F51	Future	Police	Provo Fire Department	20F3	Provo Fire Police

<u>Channel Design.</u>	<u>MHz Frequency</u>	<u>Service</u>	<u>Licensee</u>	<u>Mode</u>	<u>Description</u>
F 52	155.670	Police	Bountiful Police Dept. Springville Police Dept.	20F3	Bountiful City Police South Utah Valley Police
F 53	155.415	Police	Layton Police Dept.	20F3	Layton City Police
F 54	155.640	Police	Davis County Sheriff Off.	20F3	Davis County Sheriff
F 55	155.685	Police	Davis County Sheriff Off.	20F3	Davis County Sheriff
F 56	Future	Police	Davis County Sheriff Off.	20F3	Davis County Sheriff
F 57	155.370	Police	Salt Lake County Sheriff Off.	20F3	Salt Lake County Sheriff's Office
F 58	155.610	Police	Salt Lake County Sheriff Off.	20F3	Salt Lake County Sheriff's Office
F 59	Future	Police	Salt Lake County Sheriff Off.	20F3	Salt Lake County
F 60	155.430	Police	Orem City Police Dept. Carbon County Sheriff Off.	20F3	Northern Utah County Police Carbon County Sheriff's Office
F 61	154.740	Police	University of Utah	20F3	University of Utah
F 62	154.785	Police	Bountiful City Police Dept.	20F3	Bountiful City Police Dept.
F 63	155.535	Police	Weber County Sheriff Off.	20F3	Weber County Sheriff's Office
F 64	155.790	Police	Weber County Sheriff Off.	20F3	Weber County Sheriff's Office
F 65	Future	Police	Weber County Sheriff Off.	20F3	Weber County Sheriff's Office

<u>Channel</u> <u>Des.</u>	<u>MHz</u> <u>Frequency</u>	<u>Service</u>	<u>Licensee</u>	<u>Mode</u>	<u>Description</u>
F66	155.730	Police	Grand County	20F3	Grand County
F67	156.210	Police Police	Carbon County Sheriff Off. Murray Police Department	20F3	Carbon County Sheriff's Office Murray City Police Department
F68	Unassigned				
F69	"				
F70	"				
<u>County Low-Band (Sheriff's Office)</u>					
F80	47.46		National Jeep Association	20F3	Nationwide Jeep Patrol
F81	45.12	Police	Davis County Sheriff Office Duchesne County Sheriff Off. Uintah County Sheriff Off. Wasatch County Sheriff Off.	20F3 20F3 20F3 20F3	Sheriff and Jeep Patrol Sheriff and Jeep Patrol Sheriff and Jeep Patrol Sheriff and Jeep Patrol
F81	45.20	Police	Carbon County Sheriff Off. Emery County Sheriff Off. Sevier County Sheriff Off.	20F3 20F3 20F3	Sheriff and Jeep Patrol Sheriff and Jeep Patrol Sheriff and Jeep Patrol
F82	45.36	Police	Beaver County Sheriff Off. Garfield County Sheriff Off. Iron County Sheriff Off. Washington County Sheriff O.	20F3 20F3 20F3 20F3	Sheriff and Jeep Patrol Sheriff and Jeep Patrol Sheriff and Jeep Patrol Sheriff and Jeep Patrol
F83	45.32	Police	Morgan County Sheriff Office	20F3	Sheriff and Jeep Patrol

Channel Desig.	MHz Frequency	Service	Licensee	Mode	Description
F 84	45.40	Police	Tooele County Sheriff Off	20F3	Sheriff and Jeep Patrol
F 85	45.50	Police	Utah County Sheriff Off	20F3	Sheriff and Jeep Patrol
F 86	45.90	Police	Grand County Sheriff Off San Juan County Sheriff Off Weber County Sheriff Off	20F3 20F3 20F3	Sheriff and Jeep Patrol Sheriff and Jeep Patrol Sheriff and Jeep Patrol

F 87 Unassigned

F 88 "

F 89 "

Highway Department High-Band Assignments

F 90	Future	Highway Maint.	Highway Dept.	20F3	Highway Maintenance
F 91	Future	Highway Maint.	Highway Dept.	20F3	Highway Maintenance
F 92	Future	Highway Maint.	Highway Dept.	20F3	Highway Maintenance
F 93	Future	Highway Maint.	Highway Dept.	20F3	Highway Maintenance
F 94	Future	Highway Maint.	Highway Dept.	20F3	Highway Maintenance
F 95	Future	Highway Maint.	Highway Dept.	20F3	Highway Maintenance
F 96	Future	Highway Maint.	Highway Dept.	20F3	Highway Maintenance

<u>Channel</u> <u>Des.</u>	<u>MHz</u> <u>Frequency</u>	<u>Service</u>	<u>Licensee</u>	<u>Mode</u>	<u>Description</u>
F97	Future	Highway Maint.	Highway Dept.	20F3	Highway Maintenance
F98	Future	Highway Maint.	Highway Dept.	20F3	Highway Maintenance
F99	Future	Highway Maint.	Highway Dept.	20F3	Highway Maintenance
<u>Fire Assignments</u>					
F100	154.220	Fire	State Fire Marshall	20F3	State Fire Frequency
F101	154.280	Fire	State Fire Marshall	20F3	State Intersystem Fire
F102	154.310	Fire	Salt Lake City	20F3	Salt Lake City Fire Department
F103	154.430	Fire	Salt Lake City	20F3	Salt Lake City Fire Department
F104	Future	Fire	Salt Lake City	20F3	Salt Lake City Fire Department
F105	Future	Fire	Salt Lake County	20F3	Salt Lake County Fire (154.400 suggested)
F106	Future	Fire	Salt Lake County	20F3	Salt Lake County Fire (154.340 suggested)
F107	Future	Fire	Salt Lake County	20F3	Salt Lake County Fire
F108	154.250	Fire	Ogden City	20F3	Ogden City Fire Department

<u>Channel Desig.</u>	<u>MHz Frequency</u>	<u>Service</u>	<u>Licensee</u>	<u>Mode</u>	<u>Description</u>
F109	154.130	Fire	Orem Fire Department	20F3	Orem Fire Department
F110	154.174	Fire	University of Utah	20F3	University of Utah Fire Dept.
F111	154.190	Fire	Provo Fire Department	20F3	Provo Fire Department
F112	Future	Fire			
F113	Future	Fire			
F114	Future	Fire			
<u>Special Emergency</u>					
F120	155.340	Spec. Emer.	Various	20F3	Hospital Administration
F121	155.355	Spec. Emer.	Various	20F3	Hospital Only
F122	155.385	Spec. Emer.	Various	20F3	Hospital Only
F123	155.400	Spec. Emer.	Various	20F3	Hospital Only
F124	155.325	Spec. Emer.	Various	20F3	Hospital Only
F125	155.160	Spec. Emer.	Various	20F3	Various Assignments
F126	155.175				Various Assignments
F127	155.205				Various Assignments

Channel

<u>Design.</u>	<u>Frequency</u>	<u>Service</u>	<u>Licensee</u>	<u>Mode</u>	<u>Description</u>
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138

F128	155.220				Various assignments.
F129	155.235				Various assignments.
F130	155.265				Various assignments.
F131	155.280				Intermountain Ambulance.
F132	155.295				Various assignments
F133	Future				
F134	Future				

Through to F149 Unassigned

RACES

F150	3.9875	Amateur	State Comm. Officers	A3LSSB	State to County/county to county
F151	7.2485	Amateur	State Comm. Officers	A3LSSB	State to County/county to county
F152	3.5025	Amateur	State Comm. Officers	A1	State to State
F153	Future				
F154	14.0500	Amateur	State Comm. Officers	A1	State to State
F155	21.052	Amateur	State Comm. Officers	A1/F1	State to State

<u>Channel Desig.</u>	<u>MHz Frequency</u>	<u>Service</u>	<u>Licensee</u>	<u>Mode</u>	<u>Description</u>
F156	7.110	Amateur	State Comm. Officers	A1	
F157	3.5255	Amateur	State Comm. Officers	A1	
F158	50.35	Amateur	State Comm. Officers	A3	
F159	50.75	Amateur	State Comm. Officers	A3	Intercounty
F160	53.36	Amateur	State Comm. Officers	A3	Utah County
F161	50.4	Amateur	State Comm. Officers	A3	Salt Lake County
F162	50.5	Amateur	State Comm. Officers	A3	Box Elder County
F163	Future				
F164	Future				
F165	145.32	Amateur	State Comm. Officers	A3	Davis County
F166	145.2	Amateur	State Comm. Officers	A3	Utah County
F167	145.32	Amateur	State Comm. Officers	A3	Weber County
F168	145.50	Amateur	State Comm. Officers	A3	Salt Lake County
F169	146.68	Amateur	State Comm. Officers	A3	Box Elder County

<u>Channel Design.</u>	<u>MHz Frequency</u>	<u>Service</u>	<u>Licensee</u>	<u>Mode</u>	<u>Description</u>
Civil Air Patrol					
F170	4.5075	CAP	Utah Wing CAP	A3a(USSB)	Statewide Civil Air Patrol Statewide alternate
F171	4.6025	CAP	Utah Wing CAP	A3a(USSB)	Statewide Civil Air Patrol Statewide primary
F172	26.620	CAP	Utah Wing CAP	A3	Air to Ground Civil Air Patrol
F173	122.9	CAP	Utah Wing CAP	A3	Air to Ground Civil Air Patrol (Commercial Coord.)
F174	2.374	CAP	Utah Wing CAP	A3a(USSB)	Statewide Civil Air Patrol Statewide
<u>Military</u>					
F175	Classified	NACOM II	U.S. Army	A1, A3	Natl. Comm. System II
F176	Classified	NACOM II	U.S. Army	A1, A3	Natl. Comm. System II
F177	4.565	Government	U.S. Army	A3	Utah National Guard
F178	5.820	Government	U.S. Army	A3	Utah National Guard
F179	4.835	Government	U.S. Army	A3	Utah National Guard
F180			U.S. Army	A3a	Army Milit. Affil. Radio System
F181			U.S. Army	A3a	Army Milit. Affil. Radio System
F182			U.S. Army		

<u>Channel</u> <u>Design.</u>	<u>MHz</u> <u>Frequency</u>	<u>Service</u>	<u>Licensee</u>	<u>Mode</u>	<u>Description</u>
<u>Military (Continued)</u>					
F183					
F184					
F185	3. 292		U. S. Air Force	A3aUSSB	Air Force Military Affiliate Radio System
F186	4. 580		U. S. Air Force	A3aUSSB	
F187	143. 95		U. S. Air Force	A3	Air Force Military Affiliate Radio System VHF State Net.
F188	Unassigned				
F189	Unassigned				
F190	7. 301. 5	Navy	U. S. Navy	A3a	Navy Military Affiliate Radio System
F191	7. 375. 0	Navy	U. S. Navy	A3a	Navy Military Affiliate Radio System
F192	7. 500	Navy	U. S. Navy	A3a	Navy Military Affiliate Radio System
F193	148. XX	Navy	U. S. Navy	A3a	Navy Military Affiliate Radio System Repeater Input

<u>Channel</u> <u>Deisgn.</u>	<u>MHz</u> <u>Frequency</u>	<u>Service</u>	<u>Licensee</u>	<u>Mode</u>	<u>Description</u>
<u>Military (Continued)</u>					
F194	150. XX	Navy	U. S. Navy	A3a	Navy Military Affiliate Radio System Repeater Output
<u>Citizen Band (Class D)</u>					
F201	26. 965	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 1
F202	26. 975	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 2
F203	26. 985	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 3
F204	27. 005	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 4
F205	27. 015	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 5
F206	27. 025	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 6
F207	27. 035	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 7
F208	27. 055	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 8
F209	27. 065*	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 9
F210	27. 075*	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 10
F211	27. 085*	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 11
F212	27. 105*	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 12

<u>Channel Design.</u>	<u>MHz Frequency</u>	<u>Service</u>	<u>Licensee</u>	<u>Mode</u>	<u>Description</u>
<u>Citizen Band (Class D) (Continued)</u>					
F213	27.115*	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 13
F214	27.125*	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 14
F215	27.135	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 15
F216	27.155	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 16
F217	27.165	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 17
F218	27.175	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 18
F219	27.185	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 19
F220	27.205	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 20
F221	27.215	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 21
F222	27.225	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 22
F223	27.255*	Citizen Band	Utah Council of Defense	A3	Citizen Band Channel 23

*May be used for communication between other stations not covered by State call.

APPENDIX E

SINGLE SIDEBAND PLANNING SUMMARY

This appendix includes an inventory of single sideband equipment owned by State and local agencies. Additional equipment is also recommended to fill deficiencies.

The "date of procurement" column indicates the year equipment was obtained or the year equipment is recommended to be acquired.

The number shown in the remarks column is the serial number recommended to conform with the documentation section of this planning report.

STATE OF UTAH EQUIPMENT PLANNING SUMMARY

NAME OF ENTITY	LOCATION	EQUIPMENT	EMISSION	PRIMARY FREQUENCY	1ST ALT FREQUENCY	2ND ALT FREQUENCY	3RD ALT FREQUENCY	4TH ALT FREQUENCY	DATE OF PROCUREMENT	EST COST	REMARKS
Utah National Guard	Salt Lake City	Swan-400	A3a	4.565	5.820	3.345	8.050	8.180	1967	820	3-15-N001
	Ogden	Swan-400	A3a	4.565	5.820	3.345	8.050	8.180	1967	820	2-15-N001
	Murray	Swan-400	A3a	4.565	5.820	3.345	8.050	8.180	1967	820	3-17-N001
	American Fork	Swan-400	A3a	4.565	5.820	3.345	8.050	8.180	1968	820	4-16-N001
	Salt Lake City	Swan-400	A3a	5.820	4.565	3.345	8.050	8.180	1968	820	3-15-N002
	Provo	Swan-400	A3a	4.565	5.820	3.345	8.050	8.180	1969	820	4-15-N001
	Mobile	Swan-400	A3a	4.565	5.820	3.345	8.050	8.180	1969	820	3-15-N003
	Mobile	Swan-400	A3a	4.565	5.820	3.345	8.050	8.180	1969	820	3-15-N004
	Salt Lake	Collins-KWM-2A	A3a	4.565	8.050	3.345	8.180	4.6025	FY 1970	1500	
	Bountiful	Collins-KWM-2A	A3a	4.565	8.050	3.345	8.180	4.6025	FY 1970	1500	
	Salt Lake	Collins-KWM-2A	A3a	4.565	8.050	3.345	8.180	4.6025	FY 1970	1500	
	Tooele	Collins-KWM-2A	A3a	4.565	8.050	3.345	8.180	4.6025	FY 1970	1500	
	Beaver	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1970	170	
	Manti	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1970	170	
	Garland	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1971	170	
	Spanish Fork	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1971	170	
Air National Guard	Layton	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1972	170	
	Smithfield	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1972	170	
	Richfield	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1973	170	
	Nephi	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1973	170	
	Mt. Pleasant	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1974	170	
	Mobile	Heath HW-18	A3a	4.565	4.6025	-	-	-			
	Salt Lake	Collins-KWM-2A							1969	1500	3-20-M001
	Salt Lake	Collins-KWM-2A							1969	1500	3-20-M002

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STATE OF UTAH EQUIPMENT PLANNING SUMMARY

NAME OF ENTITY	LOCATION	EQUIPMENT	EMISSION	PRIMARY FREQUENCY	1ST ALT FREQUENCY	2ND ALT FREQUENCY	3RD ALT FREQUENCY	4TH ALT FREQUENCY	DATE OF PROCUREMENT	EST COST	REMARKS
Utah State Guard	Salt Lake	Heath HW-18	A3a	4,565	4,6025	-	-	-	1969	170 3-	16-S001
	St. George	Heath HW-18	A3a	4,565	4,6025	-	-	-	1969	170 3-	16-S002
	Logan	Heath HW-18	A3a	4,565	4,6025	-	-	-	1969	170 3-	16-S003
	Brigham City	Heath HW-18	A3a	4,565	4,6025	-	-	-	1969	170 3-	16-S004
	Mobile	Heath HW-18	A3a	4,565	4,6025	-	-	-	1969	170 3-	16-S005
	Price	Heath HW-18	A3a	4,565	4,6025	(Now on 5.820)	-	-	1969	170 3-	16-S006
Department of Aeronautics	Springville	Heath HW-18	A3a	4,565	4,6025				FY 1970	170	
	Fillmore	Heath HW-18	A3a	4,565	4,6025				FY 1971	170	
	Lehi	Heath HW-18	A3a	4,565	4,6025				FY 1972	170	
	Salt Lake	Heath HW-18	A3a	4,565	4,6025				1969	170 3-	21-A001
	Bull Frog Bsn	Heath HW-18	A3a	4,565	4,6025				1969	170 3-	21-A002
	Cedar City	Heath HW-18	A3a	4,565	4,6025				1969	170 3-	21-A003
Utah Wing-CAP	Salt Lake	Heath HW-18	A3a	4,565	4,6025				FY 1970	170	
	Salt Lake	Heath HW-18	A3a	4,565	4,6025				FY 1971	170	
	Salt Lake	Heath HW-18	A3a	4,6025	4,5075				1969	170 3-	22-T001
	Salt Lake	Heath HW-18	A3a	4,6025	4,5075				1969	170 3-	22-T002
	Salt Lake	Heath HW-18	A3a	4,6025	4,5075				1969	170 3-	22-T003
	Vernal	Heath HW-18	A3a	4,6025	4,5075				1969	170 3-	22-T004
	St. George	Heath HW-18	A3a	4,6025	4,5075				1969	170 3-	22-T005
	Bountiful	Heath HW-18	A3a	4,6025	4,5075				FY 1970	170	
	Ogden	Heath HW-18	A3a	4,6025	4,5075				FY 1970	170	
	Price	Heath HW-18	A3a	4,6025	4,5075				FY 1970	170	
	Cedar City	Heath HW-18	A3a	4,6025	4,5075				FY 1971	170	
	Kanab	Heath HW-18	A3a	4,6025	4,5075				FY 1971	170	
Monticello	Monticello	Heath HW-18	A3a	4,6025	4,5075				FY 1971	170	
	Salt Lake	Heath HW-18	A3a	4,6025	4,5075				FY 1972	170	

STATE OF UTAH EQUIPMENT PLANNING SUMMARY

NAME OF ENTITY	LOCATION	EQUIPMENT	EMISSION	PRIMARY FREQUENCY	1ST ALT FREQUENCY	2ND ALT FREQUENCY	3RD ALT FREQUENCY	4TH ALT FREQUENCY	DATE OF PROCUREMENT	EST COST	REMARKS
Utah Wing-CAP	Salt Lake	Heath HW-18	A3a	4.6025	4.5075				FY 1972	170	
	Salt Lake	Heath HW-18	A3a	4.6025	4.5075				FY 1972	170	
Ut Cnc1 of Def.	St Comm Cntr	Drake R4-T4	A1, A3a F1	4.6025	4.565	4.5075	3.292	4.830	1968	900	3-15-C001
Salt Lake City	St Mobile Cntr	Drake R4-T4	A1, A3a	4.6025	4.565	4.5075	3.292	4.830	1967	900	C002
	St Comm Cntr	Nat1 NCX 5	A1, A3a	3.987	7.248	3.5025	7.099	3.525	1967	600	C003
	St Mobile Cntr	Nat1 NCX 5	A1, A3a	3.987	7.248	3.5025	7.099	3.525	1968	600	C004
	St Comm Cntr	Stoner SB100	A3a	4.565	5.820	3.292	4.830	-	1967	1000	C005
	Mobile	Stoner SB100	A3a	4.565	5.820	3.987	7.248	-	1967	1000	C006
	Mobile	Stoner SB100	A3a	4.565	5.820	3.987	7.248	-	1967	1000	C007
	Portable	Heath HW-18	A3a	4.565	4.6025	-	-	-			
Box Elder Co.	County EOC	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1970	250	
Cache County	County EOC	Drake R4-T4	A3a	4.565	3.9875	7.248	4.6025	4.5075	FY 1970	900	
Rich County	County EOC	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1973	250	
Weber County	County EOC	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1970	250	
"	"	Drake R4-T4	A3a	3.9875	7.248	-	-	-	FY 1971	900	
"	Mobile	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1972	250	
Morgan County	County EOC	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1970	250	
"	County EOC	Heath SB101	A3a	3.987	7.248	-	-	-	FY 1972	400	
Davis County	County EOC	RCA SB100	A3a	4.565	5.820	3.5025	7.099	3525.5	1968	1400	
"	County EOC	Drake R4-T4	A3a	4.6025	3.9875	3.9875	7.248	-	1969	900	
"	Mobile	Heath HW-18	A3a	4.565	4.6025	7.248	4.5075	3.5025	FY 1970	250	
Summit County	County EOC	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1971	250	
Daggett County	County EOC	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1972	250	
Tooele County	County EOC	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1971	250	
Salt Lake City	City EOC	Stoner SB100	A3a	4.565	5.820	3.987	7.248	-	1968	1000	
"	Mobile	Stoner SB100	A3a	4.565	5.820	3.987	7.248	-	1968	1000	
"	City EOC	Galaxy 5	A3a	3.987	7.248	3.5025	7.099	3.525	1968	400	
Salt Lake City	City EOC	Drake R4-T4	A3a	4.6025	4.5075	4.565	3.292	4.830	FY 1970	900	
Salt Lake Co.	County EOC	Drake R4-T4	A3a	3.9875	7.248	4.602	4.5075	4.565	FY 1970	900	

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STATE OF UTAH EQUIPMENT PLANNING SUMMARY

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Salt Lake Co.	County	Stoner SB 100	A3a	4.565	5.820	3.987	7.248	-	FY 1970	1000	
Salt Lake Co.	Mobile	Stoner SB 100	A3a	4.565	5.820	3.987	7.248	-	FY 1971	1000	
Wasatch County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1971	250	
Duchesne County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1971	250	
Uintah County	County	Stoner SB 100	A3a	4.565	5.820	3.987	7.248	-	1967	1000	
Uintah County	County	Drake R4-T4	A3a	3.9875	7.248	4.6025	4.5075	4.830	1968	900	
"	Mobile	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1970	250	
Utah County	County	Stoner SB 100	A3a	4.565	5.820	3.292	4.830	-	1967	1000	
"	"	Nat1 NCX 5	A3a	3.9875	7.248	3.502	7.099	3.5025	1967	600	
"	Portable	Heath HW-18	A3a	4.6025	4.5075	-	-	-	1969	250	
"	"	Heath HW-18	A3a	4.6025	4.5075	-	-	-	1969	250	
Juab County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1971	250	
Sanpete County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1970	250	
Carbon County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1970	250	
"	"	Drake R4-T4	A3a	3.9875	7.2485	3.5025	4.5075	4.830	FY 1971	900	
Emery County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1971	250	
Grand County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1971	250	
"	"	Drake R4-T4	A3a	3.9875	7.248	3.5025	7.099	4.830	1969	250	
Millard County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1971	900	
Sevier County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1971	250	
"	"	Drake R4-T4	A3a	3.9875	7.248	3.5025	4.5075	4.830	FY 1972	900	
Beaver County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1972	250	
Piute County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1973	250	
Wayne County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1972	250	
Iron County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1970	250	
"	"	Drake R4-T4	A3a	3.9875	7.2485	3.5025	4.5075	4.830	FY 1971	900	
San Juan County	County	Stoner SB 100	A3a	4.565	5.820	3.9875	7.2485	-	1967	1000	
Washington Co.	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1970	250	
"	"	Drake R4-T4	A3a	3.9875	7.248	3.5025	4.5075	4.830	FY 1971	900	
Kane County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1971	250	
Garfield County	County	Heath HW-18	A3a	4.565	4.6025	-	-	-	FY 1972	250	

SUGGESTED LOCATION NUMBER
FOR COMMUNICATIONS EQUIPMENT

EQUIPMENT IDENTIFICATION NUMBER

X - XX - X XXX

Major Part Number

Agency Identification

Location Number

District Number

3-01-	State Office Building. UHP
3-02 -	State Capitol Building. UHP
3-03	
3-04	
3-04	
3-06	
3-07	
3-09	
3-10	State Road Shops - 13 South
3-11	Natural Resources - North Temple
3-12	
3-13	
3-14	
3-15	Armory #1 - 1543 Sunnyside Avenue
3-16	Armory #2 - 1523 Sunnyside Avenue
3-17	Murray
3-18	
3-19	
3-20	Salt Lake City Airport - Air Base
3-21	- Dept. of Aeronautics
3-22	- Civil Air Patrol
3-23	
3-24	
3-25	
3-26	
3-27	
3-28	
3-29	
3-30	Ensign Peak
3-50	

COMMUNICATION INVENTORY

Control Number

A - Department of Aeronautics
B - Department of State
C - Council of Defense
D
E - Department of Higher Education
F - Natural Resources - Forestry & Fire
G - Natural Resources - Fish & Game
H - Department of Highways
I
J
K
L
M - Utah Air National Guard
N - Utah National Guard
O
P - Utah Highway Patrol
Q
R - Natural Resources - Parks & Recreation
S - Utah State Guard
T - Civil Air Patrol
U
V
W - Natural Resources - Water Resources
X
Y
Z

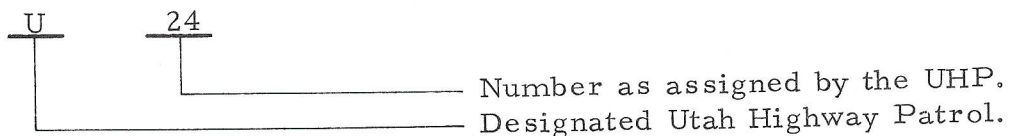
APPENDIX F

CALL NUMBER ASSIGNMENT PLAN

Communications between our federal, state, county and city governments require that a Call Number Assignment Plan be developed. Non-voice communications must also be considered in order to answer the requirements of data, and machine communicating with machine systems. The Telecommunications Study's Call Number Assignment Plan is designed to develop a plan that fully recognizes the independent control of the entity and provides a method of interagency operation as well as operation with other agencies. This system must also be compatible with existing public safety communications.

The system will utilize a call number as designated by the local entity. A prefix will be assigned when the unit is operating on a channel other than its own. The extent of the prefix will depend on the area in which the unit is operating. A unit does not normally leave its assigned area but must be identifiable when doing so.

The Davis County Sheriff and the Utah Highway Patrol may decide that there may be an advantage for the State trooper to work with the county on the county channel. The State trooper would then add a prefix designator to his call number. "Farmington Uniform 24, 10-52 Interstate 15 and Parley's Lane."



This may appear somewhat complicated at present, but if the reader understands that this Plan is designed for the ultimate, when the machine in the automobile is talking to a machine in another state or a machine in a car in another city it will become somewhat more understandable. During the interim, flexible modifications or abbreviation of this Plan can be utilized.

This Call Number Plan is recommended for the following; City Law Enforcement, County Law Enforcement, All State Agencies, State and Local Radio Amateur Civil Emergency Service, State and Local Citizen Band Emergency Service, Utah National Guard, Utah State Guard, Utah Wing - Civil Air Patrol.

The Call Number Plan is not compatible for; Air Force Military Affiliate Radio Service, Army Military Affiliate Radio Service, Navy Military Affiliate Radio Service or other federal agencies.

Utah Highway Patrol

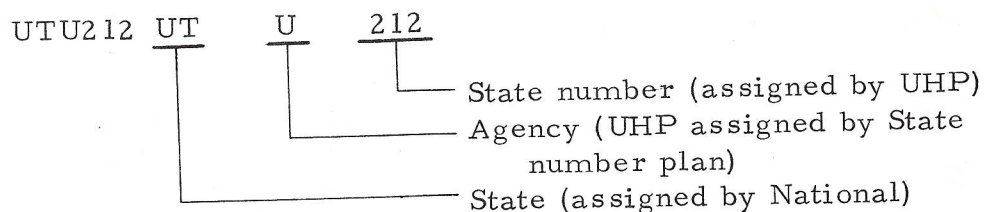
The Call Number Assigned in the Utah Highway Patrol has considerable significance, and the Telecommunications Plan is compatible with this system. "Car 1" is reserved for the Governor of the State of Utah, as the top ranking member of the State Law Enforcement organization. "Car 2" is reserved for the Public Safety Commissioner. "Car 3" and "Car 4" etc., can be assigned at the discretion of the Superintendent of the Highway Patrol. From there on the numbers are assigned, based on the seniority of the officer.

Due to the effects of the statewide police and other public safety

intercommunications requirements, the Highway Patrol must revise some calls and add prefixes to the present system now being used. As an example, the call "Salt Lake" is presently being used by the Utah Highway Patrol, Salt Lake County and Salt Lake City Police. This Plan recommends that the Utah Highway Patrol utilize the district numbers as recommended. Thus "Salt Lake" would become "District 3", St. George Checking Station would become Dispatcher 6 Charlie.

This Plan provides full responsibility to the Utah Highway Patrol for their own call number plan.

Example of Utah Highway Patrol



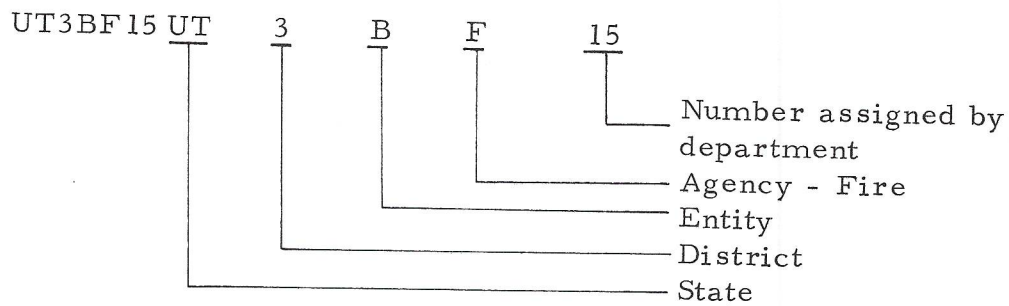
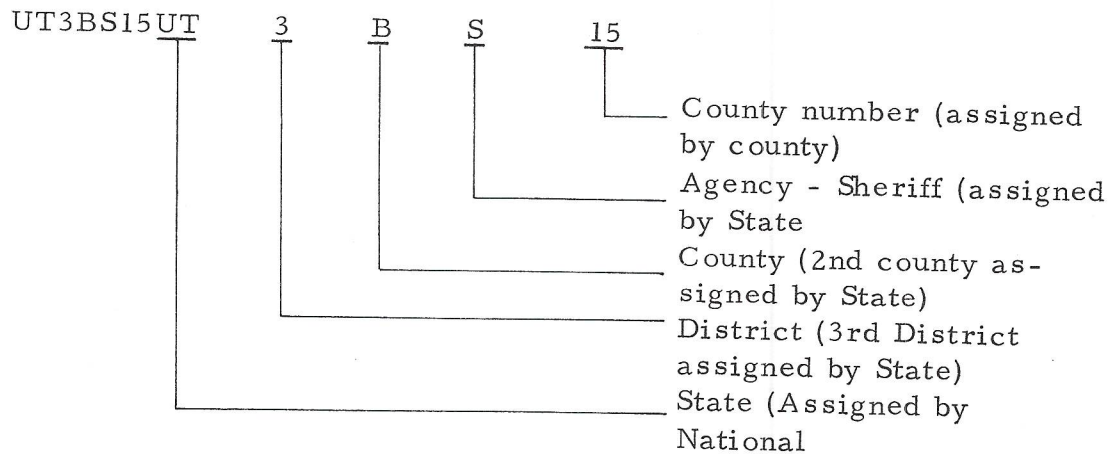
County Departments

Sheriff's Department's on their own frequencies usually assign the first number to the Sheriff, second number to the Chief Deputy, etc. Those counties on the Highway Patrol System has been assigned call numbers by the Utah Highway Patrol. This plan would provide each sheriff's office the responsibility of their own assignments. The prefix would be assigned by the State.

This Plan recommends no change in the use of the existing county sheriff's channels. However, when using the common public safety police frequency or the frequency assigned for fire departments the call

"Salt Lake SO" must be used in order to identify the sheriff's office being called, or the county fire department being called.

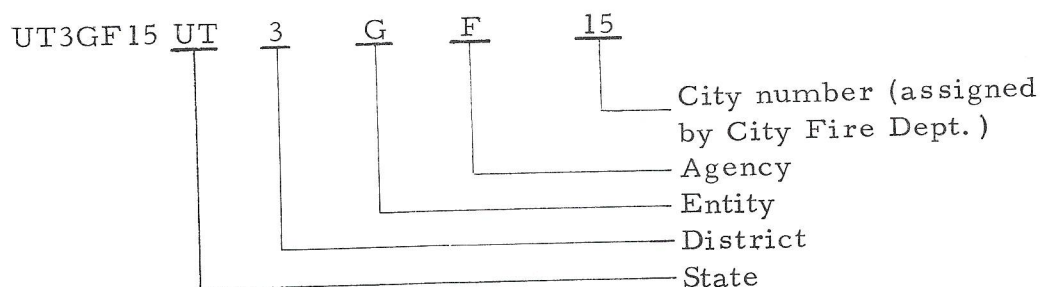
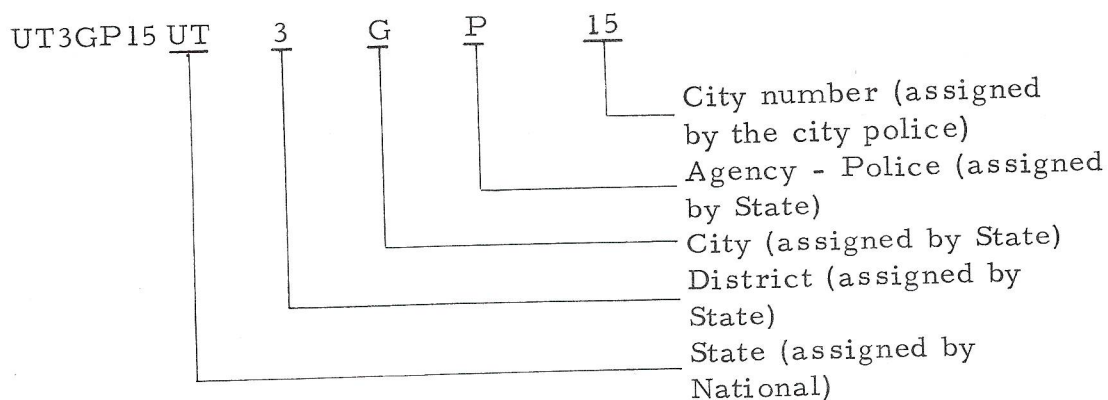
Example of a County



City Departments

Most police departments assign call numbers by areas and responsibilities. This Call Number Assignment Plan is fully compatible with all department numbering plans.

The dispatcher must identify as "Salt Lake Police" when on the State Police Frequency or Salt Lake City Fire when on the State Fire Frequency.

Example of a City

The city unit would normally be Car 15 on a day-to-day operation. If he normally operated in the area, on district frequencies or where a city does not have its own channel, it would be FP15, or Foxtrot Papa 15 (Frank Paul 15, for old timers). When the unit is required to leave the district, his identification would be three Foxtrot Papa 15 (3FP15), or when outside of the State, the state designation is assigned by National. This state designation assigned by National will conform to the NCIC and the Auto Switched LETS Network.

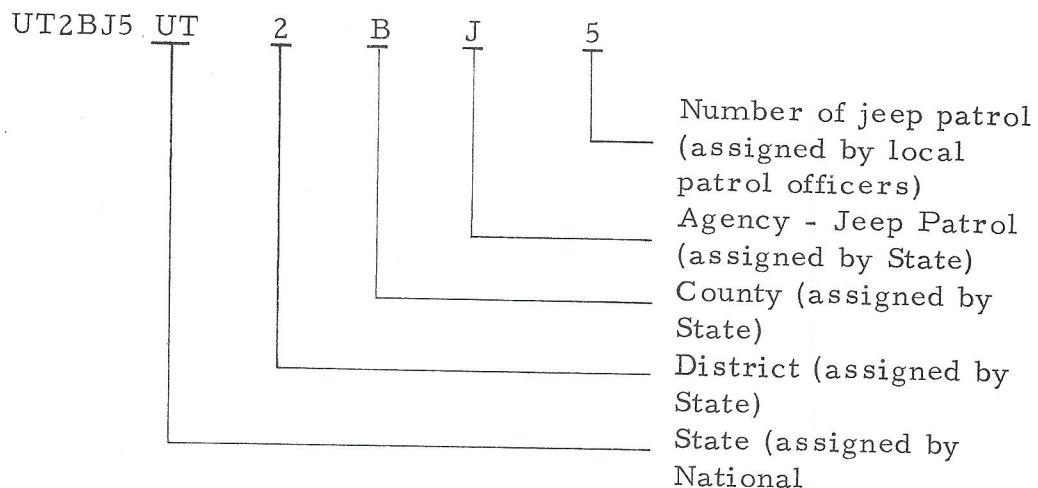
An alternate voice plan could allow each department to make their own call number assignments. Car 15, as an example, is assigned by Salt Lake City Police Department and while it is on Salt Lake City Police frequencies, it remains Car 15 as in the present condition.

The problem arises as to what to do when SLPD Car 15 comes up on the Statewide Public Safety Frequency where Salt Lake County, Ogden City Utah Highway Patrol may also have a Car 15. It is a necessity to use the name of the entity with the car number, or give them an added prefix such as 3815.

National Jeep Search and Rescue Association

This Plan covers only the sheriff's jeep patrols located in Utah but is compatible with the National Association. If working within a designated area to which they have been assigned they would then have to pick up the county designation such as Davis County 2 Bravo. For example, if working on a jeep patrol's own county frequency they would be Juliet 5. Working on the National frequency, but in Utah, they would be 2BJ5 - Two Bravo Juliet Five. When participating in another state they would use the call UT2BJ5 - Utah Two Bravo Juliet Five.

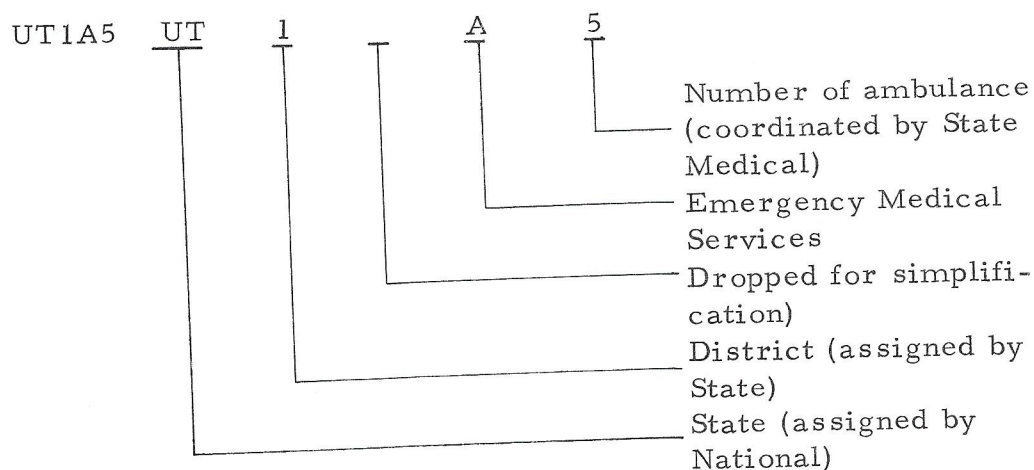
Example of Jeep Patrol



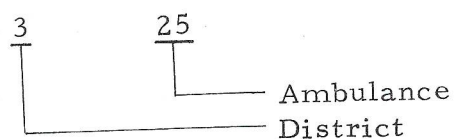
Utah Emergency Medical Service Net

Hospitals will receive a base call letter, but will identify with the name of their hospital, i. e. "Holy Cross". The base station call must be used at the end of the transmission. Ambulances will use the simplified call as shown below:

Example of Ambulance



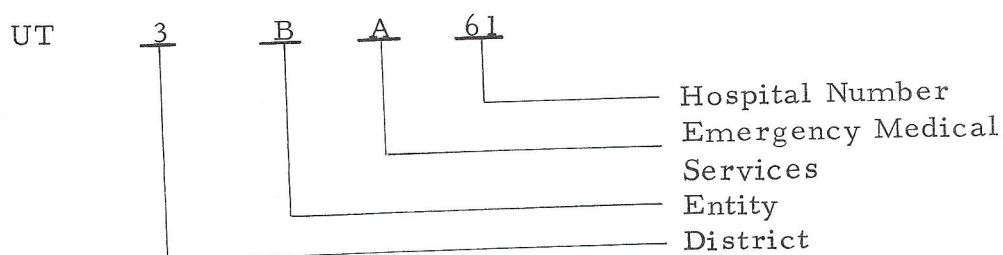
Ambulance Tone Select

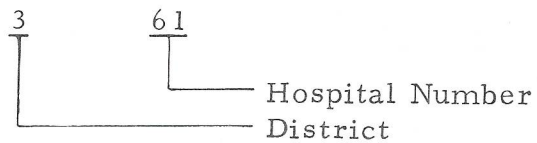
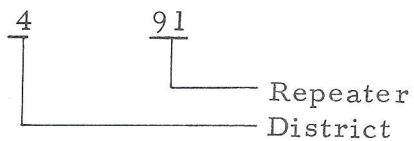


Hospital Call Assignment

Hospitals will utilize the name of their hospital as their call sign. Ending of the transmission must contain the identification letters as assigned by the FCC.

Data Number Assignment for Hospitals



Hospital Tone SelectRepeater Tone Select

NOTE: Ambulances will number 1 through 60, Hospitals will number 60 through 84 and repeaters will number 85 through 99).

Utah Department of Highways

There are presently no channels compatible between the Highway Department and other public safety and state government channels. Therefore, no special considerations are presently required. In the future when mobile data is established or when equipment frequency conditions permit this interface, the Highway Department would add the Alpha "H" before their call numbers, i. e. "District 6 - Hotel 601".

Utah State Communications System I (Land Line) and II (Radio Backup) Considerations

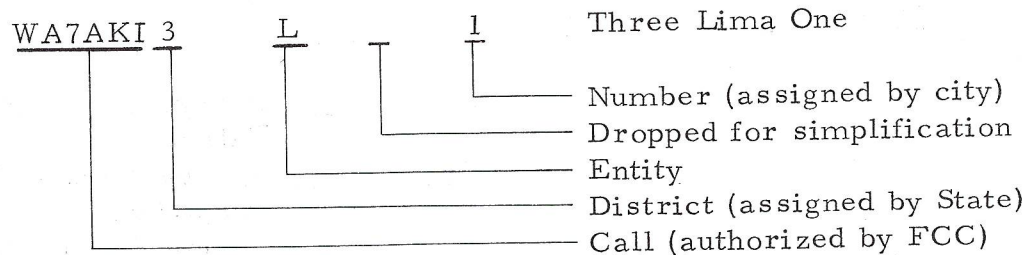
Each District Communications Center would be identified by the district number assigned by the Multi-County Planning Report. As shown on the following Call Number Assignment Plan, District 1 would be District 1. The State Communications Center and District 3 will be co-located and District 3 Communications Center will be recognized as the State Control. District 6 will assume control as backup for the State

Control, as set forth in the State Operational Plan. Unit 31 will be the first unit in District 3, 32 the second unit in District 3.

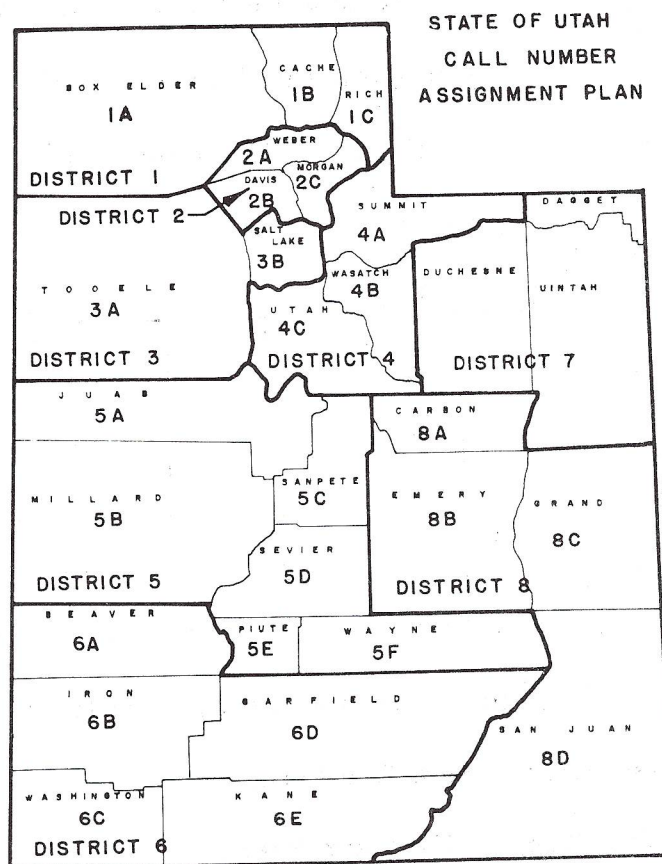
Radio Amateur Civil Emergency Service

WA7AK1 is utilized for the State RACES Program, as authorized by FCC Form 482. This call will be supplemented on the local level by calls as authorized for that entity. The Alpha Numerical prefix will be added after the call.

Example



Under full emergency conditions, only the Three Lima One (3L1) would be used.

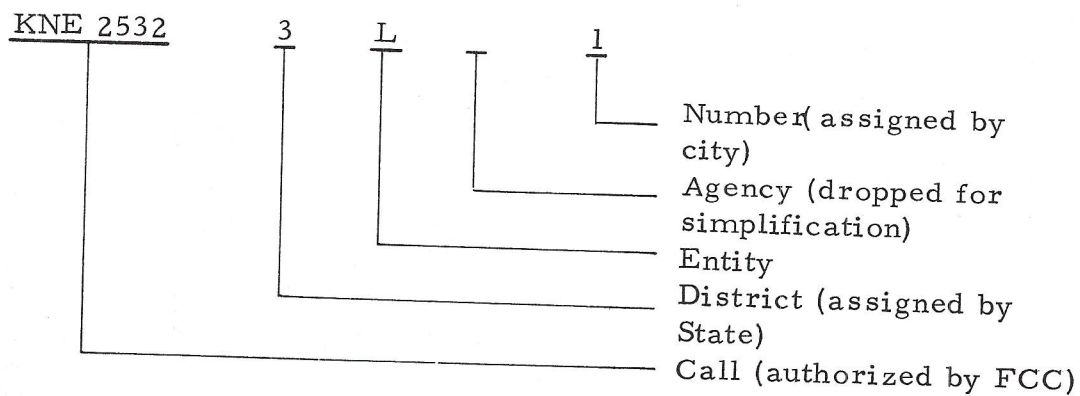


Call Number Assignment Plan

Citizen Band Civil Emergency Service

KNE 2532 is authorized by the FCC for the State of Utah. This call may be supplemented on the local level by calls as authorized for that entity. The Alpha Numerical prefix will be added after the call.

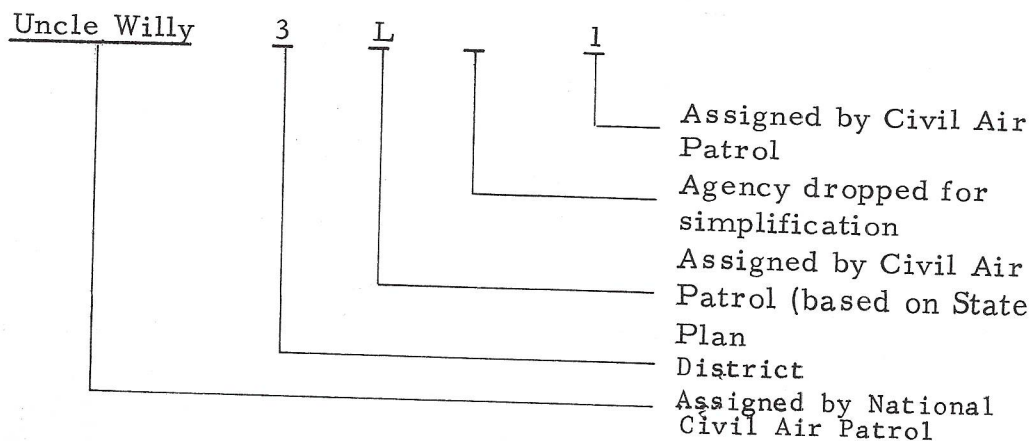
Example



Under full emergency conditions, the mobile units would only use Three Lima One (3L1).

Utah Wing - Civil Air Patrol

The base station call KOF421 is assigned to Utah by the Civil Air Patrol and the FCC. Unit designators of Uncle Willy are assigned base stations in the State. Uncle Mike is assigned mobile units and Uncle Able is assigned aircraft. The Alpha Numeric prefix is assigned after the unit designator.



Uncle Willy 3L1 will be used in full at all times.

Military Affiliate Radio Service

The Military Affiliate Radio Service call number assignment is not under the control of any state organization and is not compatible with the Call Number Assignment Plan.

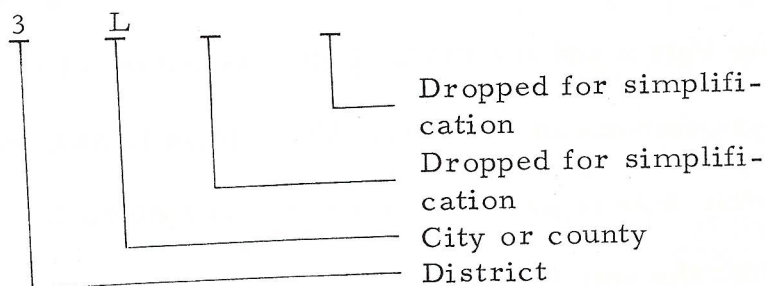
Utah National Guard

The Utah National Guard is assigned "Tactical Calls" by Sixth Army and they can assign their own suffices locally. "Major Toot" is used presently by the Utah National Guard on their SSB Network. Their calls could be the tactical call followed by the Alpha numeral for the National Guard Armory.

Calls are classified and are not included in this Plan.

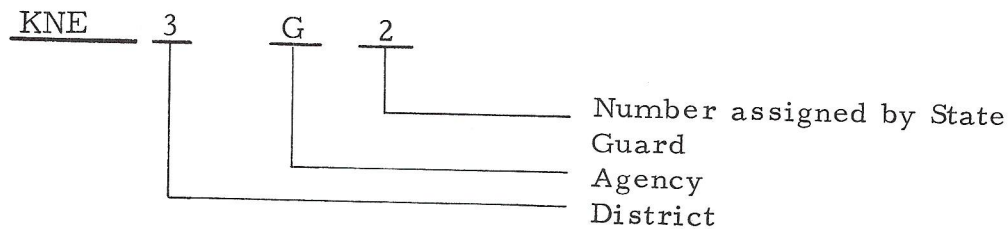
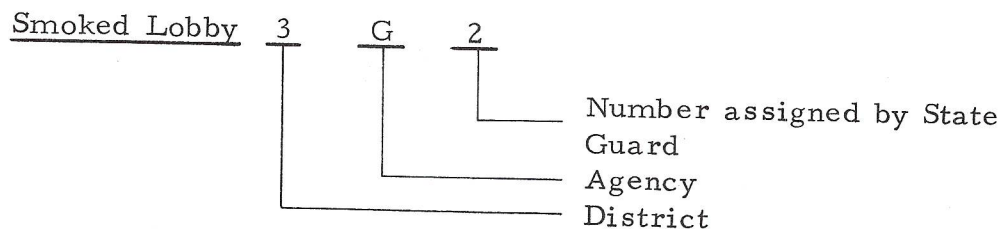
Example

Major Toot

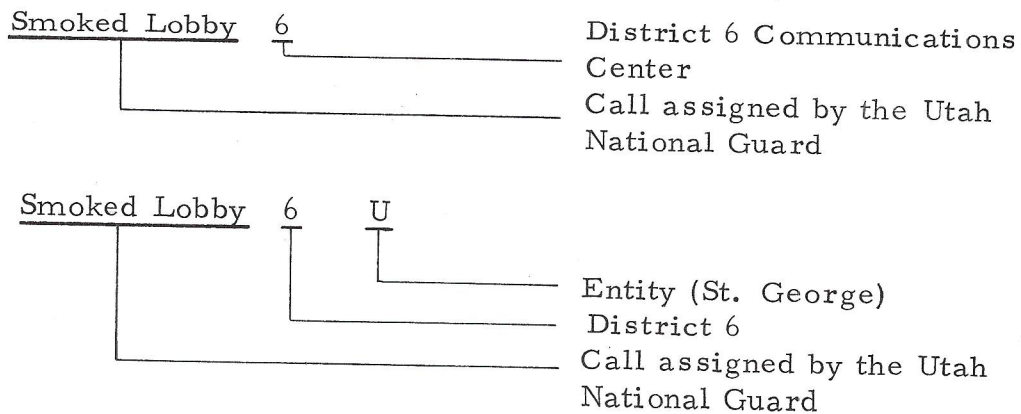


Utah State Guard

The Utah State Guard has a Citizen Band Call Number assigned by the Federal Communications Commission. In addition, they utilize other frequencies as authorized by the National Guard. Their call number assignments are fully compatible to this Call Number Plan.

ExampleState Guard on CB RadioState Guard on HF SSBEmergency Operating Centers and STACOM II

State, county and city Emergency Operating Centers operate in a program with the State Council of Defense and the National Guard. The tactical call "Smoked Lobby" has been assigned by the Utah National Guard. This call will also be utilized in the District Communication Centers for NACOM II.

Example

Smoked Lobby 3 District 3 Communications Center

Smoked Lobby 3 1
 Unit 1
 District 3

Smoked Lobby 3 15
 Unit 15
 District 3

STATE CALL NUMBER PREFIX PLAN

AGENCY- ALPHA DESIGNATOR

A	ALPHA	Emergency Medical Network
B	BRAVO	
C	CHARLIE	Correctional Institutions
D	DELTA	Council of Defense - Civil Defense
E	ECHO	
F	FOXTROT	Fire Department Assignments
G	GOLF	State Guard
H	HOTEL	Highway Department
I	INDIA	
J	JULIET	Jeep Patrol
K	KILO	Utah Wing, Civil Air Patrol
L	LIMA	
M	MIKE	
N	NOVEMBER	Natural Resources
O	OSCAR	
P	PAPA	City Police Assignment
Q	QUEBEC	
R	ROMEO	
S	SIERRA	County Sheriff Assignment
T	TANGO	
U	UNIFORM	Utah Highway Patrol
V	VICTOR	
W	WHISKEY	Liquor Control Commission
X	X-RAY	Federal Agencies
Y	YANKEE	Special Assignment
Z	ZULU	State Government

DISTRICT ALPHA
 NUMERIC NO

DISTRICT 1

Box Elder County	1A
Cache County	1B
Rich County	1C
Bear River	1G
Brigham City	1H
Clarkston	1I
Corinne	1J
Garden City	1K
Garland	1L
Honeyville	1M
Hyde Park	1N
Hyrum	1O
Laketown	1P
Lewiston	1Q
Logan	1R
Paradise	1S
Providence	1T
Randolph	1U
Richmond	1V
Smithfield	1W
Snowville	1X
Tremonton	1Y

DISTRICT 2

Weber County	2A
Davis County	2B
Morgan County	2C
Bountiful	2G
Centerville	2H
Clearfield	2I
Farmington	2J
Harrisville	2K
Huntsville	2L
Kaysville	2M
Layton	2N
Morgan	2O
North Ogden	2P
North Salt Lake	2Q
Ogden	2R
Roy	2S
South Ogden	2T
South Weber	2U
Sunset	2V

DISTRICT ALPHA
 NUMERIC NO.

DISTRICT 2 (Continued)

Washington Terrace	2W
West Bountiful	2X
Woods Cross	2Y

DISTRICT 3

Tooele County	3A
Salt Lake County	3B
Bingham Canyon	3G
Grantsville	3H
Midvale	3I
Murray	3J
Riverton	3K
Salt Lake City	3L
Sandy	3M
South Jordan	3N
Stockton	3O
Tooele	3P
Wendover	3Q
West Jordan	3R

DISTRICT 4

Summit County	4A
Wasatch County	4B
Utah County	4C
American Fork	4G
Cedar Fort	4H
Charleston	4I
Coalville	4J
Goshen	4K
Heber City	4L
Henefer	4M
Kamas	4N
Lehi	4O
Lindon	4P
Mapleton	4Q
Orem	4R
Payson	4S
Pleasant Grove	4T
Provo	4U
Salem	4V
Santaquin	4W
Spanish Fork	4X
Springville	4Y

<u>DISTRICT</u>	<u>ALPHA NUMERIC NO.</u>	<u>DISTRICT</u>	<u>ALPHA NUMERIC NO.</u>
<u>DISTRICT 5</u>		<u>DISTRICT 6 (Contd.)</u>	
Juab County	5A	New Harmony	6S
Millard County	5B	Panguitch	6T
Sanpete County	5C	St. George	6U
Sevier County	5D	Santa Clara	6V
Piute County	5E	Springdale	6W
Wayne County	5F	Tropic	6X
Delta	5G	Washington	6Y
Ephraim	5H		
Eureka	5I	<u>DISTRICT 7</u>	
Fillmore	5J	Daggett County	7A
Gunnison	5K	Duchesne County	7B
Holden	5L	Uintah County	7C
Junction	5M	Duchesne	7G
Kanosh	5N	Manila	7H
Manti	5O	Myton	7I
Marysville	5P	Roosevelt	7J
Monroe	5Q	Vernal	7K
Moroni	5R		
Mt. Pleasant	5S	<u>DISTRICT 8</u>	
Nephi	5T	Carbon County	8A
Oak City	5U	Emery County	8B
Redmond	5V	Grand County	8C
Richfield	5W	San Juan County	8D
Salina	5X	Blanding	8G
Scipio	5Y	Castle Dale	8H
		Castle Gate	8I
		Cleveland	8J
<u>DISTRICT 6</u>		Emery	8K
Beaver County	6A	Green River	8L
Iron County	6B	Helper	8M
Washington County	6C	Hiawatha	8O
Garfield County	6D	Huntington	8P
Kane County	6E	Moab	8Q
Beaver	6G	Monticello	8R
Cannonville	6H	Price	8S
Cedar City	6I	Scofield	8T
Enterprise	6J	Sunnyside	8U
Escalante	6K	Wellington	8V
Hatch	6L		
Hurricane	6M		
Kanab	6N		
Kanarraville	6O		
La Verkin	6P		
Milford	6Q		
Minersville	6R		

AMBULANCE CALL NUMBER ASSIGNMENT

PLANNING DISTRICT 1

ALPHA NUMERIC

CALL NUMBER

CALL NUMBER	NAME OF ORGANIZATION	COUNTY
1 Alpha 1	Tremonton Ambulance Service	Box Elder
1 Alpha 2	Tremonton Ambulance Service	Box Elder
1 Alpha 3	Logan-Cache County Ambulance	Cache
1 Alpha 4	Logan-Cache County Ambulance	Cache
1 Alpha 5	Logan-Cache County Ambulance	Cache
1 Alpha 6	Brigham City Vol. Fire	Box Elder
1 Alpha 7	Brigham City Vol. Fire	Box Elder

PLANNING DISTRICT 2

CALL NUMBER	NAME OF ORGANIZATION	COUNTY
2 Alpha 1	North Davis Vol. Fire	Davis
2 Alpha 2	North Davis Vol. Fire	Davis
2 Alpha 3	South Davis Vol. Fire	Davis
2 Alpha 4	Morgan County Ambulance	Morgan
2 Alpha 5	Moss Ambulance Service	Weber
2 Alpha 6	Moss Ambulance Service	Weber
2 Alpha 7	Moss Ambulance Service	Weber
2 Alpha 8	Ace Ambulance Service	Weber
2 Alpha 9	Ace Ambulance Service	Weber
2 Alpha 10	Washington Terrace Vol. Fire	Weber
2 Alpha 11	Ogden City Fire Department	Weber
2 Alpha 12	Hill Air Force Base	Weber
2 Alpha 13	Hill Air Force Base	Weber
2 Alpha 14	Hill Air Force Base	Weber
2 Alpha 15	Hill Air Force Base	Weber
2 Alpha 16	Hill Air Force Base	Weber
2 Alpha 17	Hill Air Force Base	Weber
2 Alpha 18	Hill Air Force Base	Weber
2 Alpha 19	Hill Air Force Base	Weber

PLANNING DISTRICT 3

CALL NUMBER	NAME OF ORGANIZATION	COUNTY
3 Alpha 1	Anderson Funeral Home	Juab
3 Alpha 2	Eureka Ambulance Service	Juab
3 Alpha 3		
3 Alpha 4	Midvale Volunteer Fire Group	Salt Lake
3 Alpha 5		
3 Alpha 6	Intermountain Ambulance Service	Salt Lake
3 Alpha 7	Intermountain Ambulance Service	Salt Lake
3 Alpha 8	Intermountain Ambulance Service	Salt Lake
3 Alpha 9	Intermountain Ambulance Service	Salt Lake
3 Alpha 10	Gold Cross Ambulance Service	Salt Lake
3 Alpha 11	Gold Cross Ambulance Service	Salt Lake
3 Alpha 12	University of Utah	Salt Lake
3 Alpha 13	Hercules Plant	Salt Lake
3 Alpha 14	Hercules Plant	Salt Lake
3 Alpha 15	Kennecott Copper	Salt Lake
3 Alpha 16	Kennecott Copper	Salt Lake
3 Alpha 17	Kennecott Copper	Salt Lake
3 Alpha 18	Utah Air National Guard	Salt Lake
3 Alpha 19	Utah Air National Guard	Salt Lake
3 Alpha 20	Army Air Force	Salt Lake
3 Alpha 21	Gillett Ambulance Service	Tooele
3 Alpha 22	Gillett Ambulance Service	Tooele
3 Alpha 23	Dugway Proving Grounds	Tooele
3 Alpha 24	Dugway Proving Grounds	Tooele
3 Alpha 25	Tooele Army Depot	Tooele
3 Alpha 26	Tooele Army Depot	Tooele
3 Alpha 27	Tooele Army Depot	Tooele
3 Alpha 28	Tooele Army Depot	Tooele
3 Alpha 29		

PLANNING DISTRICT 3 (Cont)

ALPHA NUMERIC

CALL NUMBER

CALL NUMBER	NAME OF ORGANIZATION	COUNTY
3 Alpha 30	Salt Lake City Police	Salt Lake
3 Alpha 31	Salt Lake City Police	Salt Lake
3 Alpha 32	Salt Lake City Police	Salt Lake
3 Alpha 580	Salt Lake County Fire	Salt Lake
3 Alpha 581	Salt Lake County Fire	Salt Lake
3 Alpha 582	Salt Lake County Fire	Salt Lake
3 Alpha 583	Salt Lake County Fire	Salt Lake

PLANNING DISTRICT 4

CALL NUMBER	NAME OF ORGANIZATION	COUNTY
4 Alpha 1	Walker Mortuary	Summit
4 Alpha 2	South Summit Ambulance Service	Summit
4 Alpha 3	Park City Ambulance	Summit
4 Alpha 4	Provo Ambulance Service	Utah
4 Alpha 5	Provo Ambulance Service	Utah
4 Alpha 6	Provo Ambulance Service	Utah
4 Alpha 7	Jolley Mortuary	Utah
4 Alpha 8	Rigby Mortuary	Utah
4 Alpha 9	Lehi Civil Defense Auxiliary	Utah
4 Alpha 10	Jim Christensen Ambulance Service	Utah
4 Alpha 11	Pleas. Grove Vol. Group Aux. Police	Utah
4 Alpha 12	Orem Emergency Service	Utah
4 Alpha 13	Orem Emergency Service	Utah
4 Alpha 14	Wasatch Co & Heber City Ambu. Ser.	Utah

PLANNING DISTRICT 5

CALL NUMBER	NAME OF ORGANIZATION	COUNTY
5 Alpha 1	Olpin Mortuary	Millard
5 Alpha 2	Nickle Mortuary	Millard
5 Alpha 3	Gunnison Hospital Ambulance	Sanpete
5 Alpha 4	Buchanan Mortuary	Sanpete
5 Alpha 5	Ursenbach Mortuary	Sanpete
5 Alpha 6	Ursenbach Mortuary	Sanpete
5 Alpha 7	Jacobs Mortuary	Sanpete
5 Alpha 8	Springer Funeral Home	Sevier
5 Alpha 9	Magleby Mortuary	Sevier
5 Alpha 10	Peterson Mortuary	Sevier
5 Alpha 11	Jensen Funeral Home	Sevier
5 Alpha 12	Loa Vol. Ambulance Service	Wayne

PLANNING DISTRICT 6

CALL NUMBER	NAME OF ORGANIZATION	COUNTY
6 Alpha 1	Beaver Volunteer Fire Group	Beaver
6 Alpha 2	Southern Utah Mortuary	Iron
6 Alpha 3	Spilsbury Funeral Home	Iron
6 Alpha 4	Escalante Volunteer Police	Garfield
6 Alpha 5	Panguitch Volunteer Police	Garfield
6 Alpha 6	Kane County Ambulance Police	Kane
6 Alpha 7	Cannon Metcalf Mortuary	Washington
6 Alpha 8	Spilsbury Mortuary	Washington

PLANNING DISTRICT 7

CALL NUMBER	NAME OF ORGANIZATION	COUNTY
7 Alpha 1	Duchesne Co. Volunteer Ambulance	Duchesne
7 Alpha 2	Vernal Ambulance Service	Uintah

PLANNING DISTRICT 8

CALL NUMBER	NAME OF ORGANIZATION	COUNTY
8 Alpha 1	Green River Vol. Fire Group	Emery
8 Alpha 2	Grand Valley Mortuary	Grand
8 Alpha 3	Turner Funeral Home	Grand
8 Alpha 4	San Juan Sheriff Patrol	San Juan
8 Alpha 5	San Juan Hospital	San Juan
8 Alpha 6	San Juan Hospital	San Juan
8 Alpha 7	Faucette Mortuary	Carbon
8 Alpha 8	Faucette Mortuary	Carbon
8 Alpha 9	R. T. Mitchell Mortuary	Carbon

Hospital Tone Assignments

	<u>Name of Hospital</u>	<u>City</u>	<u>Number Code</u>
<u>District 1</u>			
Box Elder County-	Cooley Memorial Hospital	Brigham City	161
	Valley Hospital	Tremonton	162
Cache County-	Logan LDS Hospital	Logan	163
Rich County-			
<u>District 2</u>			
Weber County-	Weber Memorial Hospital	Roy	261
	McKay Hospital	Ogden	262
	St. Benedicts Hospital	Ogden	263
	Thomas Dee Memorial	Ogden	264
	Weber Memorial Hospital	Roy	265
Davis County-	South Davis Hospital	Bountiful	266
Morgan County-			
<u>District 3</u>			
Tooele County-	Tooele Valley Hospital	Tooele	361
Salt Lake County-	Cottonwood Hospital	Murray	362
	Latter-Day Saint	Salt Lake City	363
	Holy Cross	Salt Lake City	364
	St. Mark's Hospital	Salt Lake City	365
	Valley West	Granger	366
	University of Utah		
	Medical Center	Salt Lake City	367
	Veteran's Adm.	Salt Lake City	368
	Primary Children's Hospital	Salt Lake City	369
	Utah State Prison Hospital	Draper	370
	Shriner's Hospital for		
	Crippled Children	Salt Lake City	371

	<u>Name of Hospital</u>	<u>City</u>	<u>Number Code</u>
<u>District 4</u>			
Summit County-	Summit County Hospital	Coalville	461
Wasatch County-	Heber Hospital	Heber	462
Utah County-	Utah State Hospital	Provo	463
	American Fork Hospital	American Fork	464
	BYU Student Health Cntr.	Provo-BYU Campus	465
	Hughes Memorial Hospital	Spanish Fork	466
	Payson City Hospital	Payson	467
	Utah Valley Hospital	Provo	468
<u>District 5</u>			
Juab County-	Juab County Hospital	Nephi	561
Millard County-	Fillmore LDS Hospital	Fillmore	562
	West Millard Hospital	Delta	563
Sanpete County-	Gunnison Valley Hospital	Gunnison	564
	Sanpete LDS Hospital	Mt. Pleasant	565
Sevier County-	Salina Hospital	Salina	566
	Sevier Valley LDS	Richfield	567
Piute County-			
Wayne County-			
<u>District 6</u>			
Beaver County-	Beaver Valley Hospital	Beaver	661
	Milford Valley Memorial	Milford	662
Iron County-	Valley View Medical Cntr.	Cedar City	663
Washington County-	Dixie Hospital	St. George	664
Garfield County-	Panguitch LDS Hospital	Panguitch	665
Kane County-	Kane County Hospital	Kanab	666

	<u>Name of Hospital</u>	<u>City</u>	<u>Number Code</u>
<u>District 7</u>			
Daggett County-			
Duchesne County-	Duchesne County Hospital	Roosevelt	761
Uintah County-	Uintah County Hospital	Vernal	762
<u>District 8</u>			
Carbon County-	Carbon Hospital	Price	861
Emery County-			
Grand County-	Allen Memorial Hospital	Moab	862
San Juan County-	Monument Valley Hospital	Mexican Hat	863
	San Juan County Hospital	Monticello	864

APPENDIX G

VHF OPERATING PROCEDURES

The Public Safety Communications Standard Operating Procedure Manual has been adopted by this Study as a standard VHF Operating Procedure. This manual was written and published by the Associated Public Safety Communications Officers, Inc., (abbreviated APCO) with a grant from the U. S. Department of Justice, Office of Law Enforcement Assistance. The manual is designed as a standard operating procedure for the Police Radio Service, Fire, Forestry and Conservation, Special Emergency, Highway Maintenance, Local Government and State Guard.

The intent of the manual is to furnish a basic operating guide for those persons inexperienced in the fundamentals of proper communications procedures, to provide a reference manual for the veteran operator, and for those whose responsibility includes that of training. Topics covered by this manual are: Section 1 - The Operator, Section 2 - Telephone Techniques, Section 3 - Radio-Telephone Voice Procedure Techniques. Section 4 exhibits the Ten Signals, The Phonetic Alphabet, as shown on the following pages. The Twenty-Four Hour Time, Greenwich Mean Time, Standard Format of Personal Description and Log Forms are also included. Section 5 contains information regarding the Federal Communications Commission. Section 6 - Law Enforcement Communications: Part A - Radio Voice, Part B - Teletypewriter (the LETS System). Section 7 includes information about the Civil Defense

Communications.

Most of the State's Law Enforcement agencies have accepted the APCO Operating Procedure Manual as a standard, with the possible exception of two cities. Utah Highway Patrol Chief Dispatchers, Ralph Dart and Ned Warenski led the procedures sub-committee in this successful program. The only exception to the APCO Manual is the Phonetic Alphabet. The International Phonetic Alphabet is used in its place.

The Ten Signals described in the Manual are not intended to be a method of incrypting security information, but as a means of reducing on-the-air time. At the time the Telecommunications Study began many Ten Signals were being used and were developed to each department's desires. Much confusion existed between city to city, city to county communications. Law Enforcement Communications between states was a problem due to different meanings of the Ten Signals. The operating procedure sub-committee implemented the standardized APCO Ten Signals for use in Utah. Our adjacent states have also adopted the same standardization.

The procedures sub-committee found



DEPARTMENT OF PUBLIC SAFETY

THE STATE OF UTAH
OFFICIAL ASSOCIATED PUBLIC SAFETY
COMMUNICATIONS OFFICERS "TEN SIGNALS"



Office of Civil Defense and Emergency Preparedness

10-0 -Caution	10-25 -Report in person (meet)....	10-50 -Accident (F, PI, PD)	10-75 -In contact with....
10-1 -Unable copy-change location	10-26 -Detaining subject, expedite	10-51 -Wrecker needed	10-76 -En route
10-2 -Signal good	10-27 -(Drivers) license information	10-52 -Ambulance needed	10-77 -ETA (Estimated Time Arrival)
10-3 -Stop transmitting	10-28 -Vehicle registration information	10-53 -Road blocked at.....	10-78 -Need assistance
10-4 -Acknowledgment (OK)	10-29 -Check for wanted	10-54 -Livestock on highway	10-79 -Notify coroner
10-5 -Relay	10-30 -Unnecessary use of radio	10-55 -Intoxicated driver	10-80 -Chase in progress
10-6 -Busy-unless urgent	10-31 -Crime in progress	10-56 -Intoxicated pedestrian	10-81 -Breathalyzer report
10-7 -Out of service	10-32 -Man with gun	10-57 -Hit and run (F, PI, PD)	10-82 -Reserve lodging
10-8 -In service	10-33 -EMERGENCY	10-58 -Direct traffic	10-83 -Work school xing at....
10-9 -Repeat	10-34 -Riot	10-59 -Convoy or escort	10-84 -If meeting...advise ETA
10-10 -Fight in progress	10-35 -Major crime alert	10-60 -Squad in vicinity	10-85 -Delayed due to.....
10-11 -Dog case	10-36 -Correct time	10-61 -Personnel in area	10-86 -Officer/operator on duty
10-12 -Standby be (stop)	10-37 -(Investigate suspicious vehicle	10-62 -Reply to message	10-87 -Pickup/distribute checks
10-13 -Weather-road report	10-38 -Stopping suspicious vehicle	10-63 -Prepare make written copy	10-88 -Present telephone # of
10-14 -Prowler report	10-39 -Urgent-use light, siren	10-64 -Message for local delivery	10-89 -Bomb threat
10-15 -Civil disturbance	10-40 -Silent run-no light, siren	10-65 -Net message assignment	10-90 -Bank alarm at.....
10-16 -Domestic problem	10-41 -Beginning tour of duty	10-66 -Message cancellation	10-91 -Pick up prisoner/subject
10-17 -Meet complainant	10-42 -Ending tour of duty	10-67 -Clear for net message	10-92 -Improperly parked vehicle
10-18 -Quickly	10-43 -Information	10-68 -Dispatch information	10-93 -Blockade
10-19 -Return to.....	10-44 -Permission to leave....for....	10-69 -Message received	10-94 -Drag racing
10-20 -Location	10-45 -Animal carcass at.....	10-70 -Fire alarm	10-95 -Prisoner/subject in custody
10-21 -Call...by telephone	10-46 -Assist motorist	10-71 -Advise nature of fire	10-96 -Mental subject
10-22 -Disregard	10-47 -Emergency road repair at....	10-72 -Report progress on fire	10-97 -Check (test) signal
10-23 -Arrived at scene	10-48 -Traffic standard repair at....	10-73 -Smoke report	10-98 -Prison/jail break
10-24 -Assignment completed	10-49 -Traffic light out at.....	10-74 -Negative	10-99 -Wanted/stolen indicated

Ten Signals

in the standardization program that there were agency requirement's not covered in the APCO Ten Signals. A Nine Code list was developed to cover those additional requirements. Therefore, a Nine Code is defined as a State of Utah standardized special assignment. Together the Nine Code and the Ten Signals provide a list from which each agency using FM can draw signals necessary for their operation.

STANDARD "NINE CODE"			ROAD and WEATHER	
9-1	Officer needs help urgently at ____	9-27	Vandalism	CODE 1 Clear
9-2	Prisoner in custody	9-28	Juvenile problem	CODE 2 Overcast
9-3	Confidential information	9-29	Runaway juvenile	CODE 3 Wind
9-4	Visitors present	9-30	Missing person	CODE 4 Fog
9-5	Victims condition:	9-31	Disturbing the peace	CODE 5 Dust
	A, fair	9-32	Indecent exposure	CODE 6 Poor visibility
	B, poor	9-33	Shooting in area	CODE 7 Rain
	C, critical	9-34	Drowning	CODE 8 Hail
9-6	Holding surveillance at ____ stay away	9-35	Airplane crash	CODE 9 Light snow
9-7	Shake down at ____	9-36	Reckless driver	CODE 10 Heavy snow
9-8	Out on violator at ____	9-37		CODE 11 Ground blizzard
9-9	Out of car on follow up at ____	9-38		CODE 12 Snowslide
9-10	Out of car at home	9-39		CODE 13 Road closed
9-11	Pick up reserve	9-40		CODE 14 Wet
9-12	Motor inspection	9-41		CODE 15 Dry
9-13	Damage release sticker	9-42		CODE 16 Ice
9-14	Open door or window	9-43		CODE 17 Ice in spots
9-15	Contact your home	9-44		CODE 18 Snowpacked
9-16	Call the dispatcher	9-45		CODE 19 Snowpacked in spots
9-17	Do you have contact with ____	9-46		CODE 20 Sanded
9-18	Request permission car to car with ____	9-47		CODE 21 Slushy
9-19	Make phone call yourself	9-48		CODE 22 Slushy in spots
9-20	Stolen car	9-49		
9-21	Abandoned car	9-50	Change to channel ____	PHONETIC ALPHABET
9-22	Stolen bicycle	9-51	Request telephone patch with ____	A ALPHA N NOVEMBER
9-23	Burglary	9-52	Use (am using) repeater	B BRAVO O OSCAR
9-24	Theft	9-53	Use full assigned call number	C CHARLIE P PAPA
9-25	Shoplifting	9-54	Stand by for data traffic	D DELTA Q QUEBEC
9-26	Car prowl			E ECHO R ROMEO
				F FOXTROT S SIERRA
				G GOLF T TANGO
				H HOTEL U UNIFORM
				I INDIA V VICTOR
				J JULIET W WHISKEY
				K KILO X X RAY
				L LIMA Y YANKEE
				M MIKE Z ZULU

The Twelve Signals List is a list of operating signals to be originated by the local entity. These can be used as incrypted information is placed over the air, it is subject to compromise even if it is through a scrambler or other coding device. Day-to-day security is dependent upon the amount of "caused effort" required to break the incrypting device or procedure.

As an example all scramblers can be broken, but not normally by the average criminal. As radar monitors appeared on the market, so will equipment to break scramblers. It will only take a few months or years for these codes to be broken.

It is recommended that a set of codes be kept in the safe until needed. Below is a suggested example of two incripting codes. Key Lima would be different from Key Kilo and used during another time when Key Kilo has been compromised.

SAMPLE OF PUBLIC SAFETY INCRIPING SHEET

C O N F I D E N T I A L

"KEY KILO"

12-1	Fight in Progress (10-10)	12-13	Stopping Suspicious Vehicle (10-38)
12-2	Airplane Crash (9-35)	12-14	Accident (10-50)
12-3	Civil Disturbance (10-15)	12-15	Ambulance Needed (10-52)
12-4	Domestic Problem (10-16)	12-16	Squad in Vicinity (10-60)
12-5	Meet Complainant (10-17)	12-17	Notify Coroner (10-79)
12-6	Arrived at Scene (10-23)	12-18	Riot (10-34)
12-7	Check for Wanted (10-29)	12-19	Bank Alarm at(10-90)
12-8	Blockade (10-93)	12-20	Crime in Progress (10-31)
12-9	Man with Gun (10-32)	12-21	Prisoner/Subject in Custody
12-10	Bomb Threat (10-89)	12-22	Mental Subject (10-96)
12-11	Major Crime Alert (10-35)	12-23	Prison/Jail Break (10-98)
12-12	(Investigate) Suspicious Vehicle (10-37)	12-24	Request Assistance of National Guard

<u>PLAIN</u>	<u>ENCODED</u>	<u>PLAIN</u>	<u>ENCODED</u>
1	D	8	B
2	F	9	P
3	T	0	R
4	M	North	18
5	Z	East	19
6	A	South	20
7	L	West	21

SAMPLE

PLAIN 1435 South Mountain View 10-89
 ENCODED DELTA MIKE TANGO ZULU 20 MOUNTAIN VIEW KILO 12-10
 PLAIN 285 South 2nd West 10-15
 ENCODED FOXTROT BRAVO ZULU 20 FOXTROT 21 KILO 12-3

SAMPLE OF PUBLIC SAFETY INCRIPING SHEET

C O N F I D E N T I A L

"KEY LIMA"

12-1	Request Assistance of National Guard	12-13	Suspicious Vehicle (10-37)
12-2	Civil Disturbance (10-15)	12-14	Ambulance Needed (10-52)
12-3	Airplane Crash (9-35)	12-15	Accident (10-50)
12-4	Bomb Threat (10-89)	12-16	Mental Subject (10-96)
12-5	Domestic Problem (10-16)	12-17	Squad in Vicinity (10-60)
12-6	Meet Complainant (10-17)	12-18	Notify Coroner (10-79)
12-7	Major Crime Alert (10-35)	12-19	Prison/Jail Break (10-98)
12-8	Man with Gun (10-89)	12-20	Prisoner/Subject in Custody
12-9	Check for Wanted (10-29)	12-21	Bank Alarm(10-90)
12-10	Arrived at Scene (10-23)	12-22	Riot (10-34)
12-11	Blockade (10-93)	12-23	Crime in Progress (10-31)
12-12	Fight in Progress (10-10)	12-24	Stopping Suspicious Vehicle (10-38)

<u>PLAIN</u>	<u>ENCODED</u>	<u>PLAIN</u>	<u>ENCODED</u>
1	L	8	D
2	E	9	F
3	M	0	A
4	R	North	20
5	Z	East	19
6	B	South	15
7	C	West	13

Copies of the APCO Manual are available @\$1.25 from:

Major J. Raett McMillian, Jr.
Administrative Assistant
Associated Public Safety Communications Officers, Inc.
Municipal Airport
P.O. Box 306
New Smyrna Beach, Florida 32069

APPENDIX H

STANDARD RADIOTELEPHONE (HIGH FREQUENCY) PROCEDURE

The purpose of this area is to prescribe the basic radiotelephone procedure that shall be used for radiotelephone communications.

Operating signals (Q Codes) are not designed for transmission of radiotelephone traffic. In radiotelephone procedure the traffic will normally be conveyed in concise phrases. Operating signals may be employed to correct circuit deficiencies and the handling of service messages between operators.

Transmission on radiotelephone circuits should be in moderate tone of voice and natural emphasis on each word. Fast, excited or loud speech will require repetition, and therefore waste time. Transmissions will be as brief as possible consistent with clearness. Transmissions of lengthy messages shall be broken periodically in order that high priority traffic may enter the net, the operator may do so by saying "break for higher priority traffic," if no response is received he may continue with the next portion of his message. Special effort should be made at all times to enunciate distinctly.

When it becomes necessary to spell difficult words or to identify any letter of the alphabet the standard international phonetic alphabet will be used. This alphabet is listed as follows:

PHONETIC ALPHABET

<u>Letter</u>	<u>Spoken As</u>	<u>Letter</u>	<u>Spoken As</u>
A	ALFA	N	NOVEMBER
B	BRAVO	O	OSCAR
C	CHARLIE	P	PAPA
D	DELTA	Q	QUEBEC
E	ECHO	R	ROMEO
F	FOXTROT	S	SIERRA
G	GOLF	T	TANGO
H	HOTEL	U	UNIFORM
I	INDIA	V	VICTOR
J	JULIETT	W	WHISKEY
K	KILO	X	XRAY
L	LIMA	Y	YANKEE
M	MIKE	Z	ZULU

Difficult words or groups within the text of plain messages may be spelled using the phonetic alphabet and preceded by the words "I SPELL. " If the operator can pronounce the word to be spelled, he will do so before and after the spelling, to identify the word.

Example: "Hertz--I spell--HOTEL ECHO ROMEO TANGO
ZULU--Hertz. "

To distinguish numerals from words similarly pronounced, the proword "FIGURES" may be used preceding such numbers.

When numerals are transmitted by radiotelephone, the following rules for their pronunciation will be observed;

PRONUNCIATION OF NUMERALS

<u>Numeral</u>	<u>Spoken As</u>	<u>Numeral</u>	<u>Spoken As</u>
Ø	ZERO	5	FI-YIV
1	WUN	6	SIX
2	TOO	7	SEVEN
3	THUH-REE	8	ATE
4	FO-WER	9	NINER

Numbers will be transmitted digit by digit except that exact multiples of hundreds and thousands may be spoken as such. However, there are special cases when the normal pronunciation of numerals is prescribed and this rule does not apply (17 would then be "seventeen").

The decimal point is simply spoken as "point."

Example: "144.5 is to be spoken as "WUN FO-WER FO-WER POINT FI-YIV."

The figure zero is to be written "Ø".

Prowords are pronounced words or phrases which have been assigned meanings for the purpose of expediting message handling on circuits where radiotelephone procedure is employed. In no case shall a proword or a combination of prowords be substituted for the textual component of a message.

The following prowords are authorized for general use:

<u>Proword</u>	<u>Explanation</u>
Affirmative:	"Yes" or "Permission granted."
All After:	"Say again all your transmission after the word (s)...."

<u>Proword</u>	<u>Explanation</u>
Break	"I hereby indicate the separation of the text from other part of the message." or "I desire you to stop your transmission."
Correction:	"I just made an error in transmission. The transmission will continue, beginning with the last word correctly sent." or "What follows is a corrected version in answer to your request for verification."
Figures:	"The numbers which follow are to be copied as numerals, rather than words."
From:	"From originator of message."
Go Ahead:	"Begin sending. Over"
Incorrect:	"That is not correct." "Not right."
I Read Back:	"I will re-transmit the message I have just sent."
I Say Again:	"I repeat the transmission (or the portion indicated)."
I Spell:	"I will spell the next word."
I Verify:	"What follows has been verified with the sender at your request and is repeated."
Message Follows:	"A message which requires recording (copying) follows immediately."
Negative:	"Not received." "No."
Out:	"This is the end of my transmission. No response is expected or desired."
Over:	"This is the end of transmission. A response is expected. Go ahead."
Read Back:	"Repeat the entire transmission back to me exactly as received."
Say Again:	"Repeat all your last transmission (or the indicated portion of it)."

<u>Proword</u>	<u>Explanation</u>
Speak Faster:	"Your transmission is too slow. Increase your speed."
Speak Slower:	"Your transmission is too fast. Decrease your speed."
This is:	"The call sign which follows is assigned to my station."
Unknown:	"I do not know the identity of the station, please transmit your call sign."
Verify:	"Verify the entire message (or portion indicated) with the originator and send the correct version." Use only at the request of the originator of the message.
Wait:	"I must pause for a few seconds." (Not more than thirty seconds.)
Wait Out:	"I must pause for a few seconds." (Longer than thirty seconds.)
Word After:	"Repeat the word after..."
Word Before:	"Repeat the word before..."
Word Twice:	"Communication is difficult. I will transmit each word or phrase twice."; or "Please transmit each word or phrase twice."
Zulu:	Phonetic for Z, hence time zone designator for Greenwich Mean Time (GMT).

Calling Proword "This is" - The preliminary call transmitted to establish communications may be a single, net, or multiple call as outlined below. Under difficult conditions the call signs in a call may be transmitted twice. Two or more call signs transmitted as part of the call or appearing in message components will normally be arranged in numerical and/or alphabetical order. Before transmitting, an

operator will listen long enough to insure that his transmission will not cause interference to transmission in progress.

A single call consists of the call sign of the called station, the proword "This is, " the call sign of the calling station and the proword "Over. "

Example: Major Toot This Is Major Toot 2 Over

A net call consists of a call sign which represents all the stations in the Net, the proword "This Is", the call sign of the Net control station and the proword "Over".

Example: "Salt Lake County Civil Defense Net "This Is WA7A1A Over".

Example: "District Five Net "This Is W7VXV Over. "

Answering a preliminary call consists of the call sign of the calling station, the proword "This Is, " the call sign of the answering station and the proword "Over. " When answering in response to a Net or Multiple call, stations shall answer in numerical and alphabetical order, in other prearranged order or in the order indicated in the multiple call.

Example: Net Control Station (NCS) transmitting: (Prearranged Order) "Utah State Civil Defense Net "This Is Smoke Lobby 3 Over"

Net Stations Answering: Smoke Lobby 3 "This Is 2 Bravo Over"

Smoke Lobby 3 This is 3 LIMA Over"

"Smoke Lobby 3 This Is 8 ALFA Over"

When no confusion will result the answer may be abbreviated by omitting the call sign of the calling station.

Example: "This Is Uncle Mike 200 Over"

If any station fails to answer in proper sequence to a Net or Multiple call he must wait until all other stations have answered or have had time to answer.

When a station is called, but is uncertain of the call sign of the calling station, it shall answer immediately by transmitting the proword "Unknown Station" followed by "This Is", its own call sign and the proword "Over".

Example: "Unknown Station This Is KOF429 (say again) Over"

Transmission ending after contact has been established, an exchange of transmissions can take place without further identification provided that each transmission is not more than three minutes in length and that identification signs are transmitted at least every ten minutes. Every transmission will end with either "Over" and "Out". When an answer is expected at the end of a transmission the proword "Over" will be used. Under no circumstances will the prowords "Over" and "Out" be used together to end a transmission.

Example: "W7OCX This Is WA7GTU I Have No Further Traffic
Out"

Signal strength and readability. It is sometimes necessary to determine how well a receiving station is able to hear and understand

a transmission. Such signal reports are to be used only when necessary to establish or improve communications and must be kept as brief as possible.

A station that wishes to inform another of his signal strength and readability will do so by means of a short and concise report of actual reception such as "Weak But Readable", "Strong But Distorted", and "Loud and Clear", etc.

Example: "Major Toot 7 This Is Major Toot How Do You
Receive Me Over"

"Major Toot This Is Major Toot 7 I Receive You
Weak But Clear Over"

When it is necessary for a station to initiate test signals for the adjustment of a transmitter before making a call, for the adjustment of a receiver or for frequency measurements such signals will not continue for more than ten seconds and will be composed of spoken numerals (1, 2, 3, etc.), followed by the call sign of the transmitting station and the proword "Over" or "Out".

Example: "Smoke Lobby 3 This Is Smoke Lobby 8 Delta Transmit
A Short Count For Receiver Adjustment Over"

"This Is Smoke Lobby 3 Transmitting A Short Count
For 8 Delta

Wun Too Thuh-ree Fo-wer Fi-yiv (short pause)

Fi-yiv Fo-wer Thuh-ree Too Wun How Do You Receive
Me Over"

TIME STANDARD

The Twenty-Four Hour Time is used in many foreign countries and many agencies within our government such as FAA, military and public safety agencies. With computer area, the 24-hour day is more compatible than the two 12-hour periods. It is not too far away when all communications' systems will standardize on the single time base for use over the entire world.

<u>12-hour Time Local</u>	<u>24-hour Time (Tango)</u>	<u>Greenwich Mean Time</u> <u>(Zulu)</u>
12:01 a.m.	0001T	0701Z
12:15 a.m.	0015T	0715Z
12:45 a.m.	0045T	0745Z
1:00 a.m.	0100T	0800Z
1:30 a.m.	0130T	0830Z
2:00 a.m.	0200T	0900Z
3:00 a.m.	0300T	1000Z
4:00 a.m.	0400T	1100Z
5:00 a.m.	0500T	1200Z
6:00 a.m.	0600T	1300Z
7:00 a.m.	0700T	1400Z
8:00 a.m.	0800T	1500Z
9:00 a.m.	0900T	1600Z
10:00 a.m.	1000T	1700Z
11:00 a.m.	1100T	1800Z
12:00 a.m.	1200T	1900Z
12:01 p.m.	1201T	1901Z
1:00 p.m.	1300T	2000Z
2:00 p.m.	1400T	2100Z
3:00 p.m.	1500T	2200Z
4:00 p.m.	1600T	2300Z
5:00 p.m.	1700T	2400Z
6:00 p.m.	1800T	0100Z
7:00 p.m.	1900T	0200Z
8:00 p.m.	2000T	0300Z
9:00 p.m.	2100T	0400Z
10:00 p.m.	2200T	0500Z
11:00 p.m.	2300T	0600Z
12:00 p.m.	2400T	0700Z

APPENDIX I

REPORT OF TELEPHONE UNITS PER DEPARTMENT

<u>Department</u>	<u>Employees</u>	<u>Main Sta.</u>	<u>Ext.</u>	<u>Total</u>
Agriculture	163	8	19	27
Apprenticeship Council	3	1	2	3
Attorney General	50	44	-	44
Board of Corrections	39	1	1	2
Board of Pardons		2	1	3
Adult Probation & Parole	204	8	12	20
Business Regulation	62	26	29	55
Coord. Council Development Services	3	3	-	3
Coord. Council Health & Welfare	3	3	1	4
State Board of Higher Education	16	4	13	10
Coord. Natural Resources	5	2	1	3
Council on Aging	4	3	1	4
Council of Defense	12	6	7	13
Department of Finance	148	57	19	76
Department of Financial Institutions	17	4	5	9
Expositions	32	4	3	7
Institute of Fine Arts	5	5	6	11
Fish and Game	239	54	6	60
Forestry & Fire Control	19	1	2	3
Governor	6	7	3	10
Health	222	71	89	160
Industrial Commission	30	13	9	22
Industrial Promotion	7	4	5	9
Industrial School Placement Office	144	2	2	4
Insurance Department	11	4	7	11
Juvenile Court	85	2	-	2
Legislature	14	7	8	15
Library Commission	58	15	8	23
Liquor Control Commission	214	15	9	24
Medical Examiner	2	1	-	1
Mental Health	6	4	2	6
Oil & Gas Conservation	7	3	2	5
Parks & Recreation	102	4	9	13
Public Safety	400	37	37	74
Secretary of State	83	20	13	33
State Auditor	18	5	6	11
State Board of Education	330	86	147	233
Building Board	35	9	10	19
Fire Marshal	2	1	1	2
State History	12	2	8	10
Insurance Fund	29	10	9	19
State Lands	12	3	5	8
State Planning	15	3	4	7

Office of Economic Opportunity	8	4	2	6
Retirement System	21	4	9	13
Road Commission	2,423	163	118	281
Treasurer	9	3	2	5
Supreme Court	18	10	9	19
Tax Commission	326	73	50	123
Travel Development	15	16	-	16
National Guard	46	16	29	45
Water Resources	27	4	10	14
Water Rights	58	5	28	33
Welfare	687	31	75	106
Credit Union - D. P. W.		2	1	3
American Legion		2	2	4
Children's Aid Society of Utah		1	1	2
Gift Shop		<u>1</u>	<u>1</u>	<u>2</u>
		899	857	1,756

STATE EDUCATIONAL PBX SYSTEMS

Deaf and Blind School	Ogden	22
Utah Technical College	Provo	36
Utah Technical College	Salt Lake	37
Utah Technical College	Salt Lake	9
Dixie College	St. George	101
College of Eastern Utah	Price	54
Snow College	Ephraim	51
Southern Utah State College	Cedar City	193
University of Utah	Salt Lake	3,156
University Hospital	Salt Lake	481
Utah State University	Logan	1,081
Weber State College	Ogden	<u>390</u>
		5,611

The State's annual billing for approximately 10,000 telephones is 1.7 million dollars.

UTAH STATE GOVERNMENT - CAPITOL CENTREX BILLING

May 16, 1969	2006 billing	\$28,751.90
June 16, 1969	2006 billing	28,445.80
Includes monthly order activity		
Decrease		<u>306.10</u>

Total Billing Items

Total telephones	2056	-----
Main telephones	841	8,726.50
Extension telephones	973	3,892.00
AUX PBX main telephones	219**	602.25
AUX PBX extension telephones	23*	51.75
Combination tie trunks	52	1,820.00
Mileage for combination tie trunks		177.00
PBX equipment		657.00
Supplemental equipment, listing, AUX PBX common equipment		11,919.30
Tie line terminations and local mileage	35	<u>600.00</u>
		\$28,445.80

Common Equipment Items

Main telephones	841	8,726.50
AUX main telephones	219**	602.25
Combination tie trunks	52	1,820.00
Mileage for intra exchange combination tie trunks		177.00
PBX common equipment		657.00
		<u>\$11,982.75</u>
<u>\$11,982.75</u>	=	
1060		11.31

1060 telephones x \$12.00=

Operating revenue

*Operating revenue

Total operating

\$12,720.00
737.25
<u>40.25</u>
\$ 777.50

**Minimum of 20 main telephones
Applicable to Travel Council AUX

Auxiliary PBX Systems

Agency	Mains	Ext.	Mileage Trunks	Cost
1 Finance	32	1	10	0
2 Travel Council	20*	0	6	9.00
3 Blind Center	21	1	6	18.00
4 Attorney General	46	2	10	0
5 Fish and Game	56	4	10	90.00
6 Highways Materials & Testing	44	15	10	60.00

GLOSSARY OF TERMS

AM--amplitude modulation

ANTENNA--a metal structure for sending or receiving radio waves.

ANTENNA ARRAY--two or more antenna elements arranged to form a system that operates as a single unit.

AREC--Amateur Radio Emergency Corps, an emergency radio organization sponsored by the American Radio Relay League.

AUDIO--sound discernable to the human ear.

AUTOVON--Automatic Voice Network of Federal Government.

BACKBONE SYSTEM--primary multi-channel communications network.

BAND-RADIO--a range of radio frequencies within definite limits and used for a definite purpose. For example, the two bands of VHF (very high frequency) television extend from 54 to 88 megahertz, and from 174 to 218 megahertz for channels 2 through 6, and 7 through 13 respectively.

BAND-TOLL--an area established by tariff rates for wide area calling for a basic rate.

BANDWIDTH--the range of frequencies used to transmit a specific signal. The bandwidth of a television channel in the United States is 6 megahertz. For example, a channel 2 extends from 54 megahertz to 60 megahertz.

BASE STATION--fixed-point, land based radio station primarily used to provide communication with mobile units.

BASEBAND--in a microwave system, a "package" of intelligence--such as telephone, teletype and facsimile--which may send and receive simultaneously.

BIT--binary digit.

CAP--Civil Air Patrol, auxiliary organization of the U. S. Air Force.

CARRIER--the transmitted electrical wave that carries intelligence, such as picture and sound impressed upon it.

CENTREX--automatic switchboard system of direct dialing and other automatic special features.

CHANNEL--a range of frequencies used for transmission of communication signals. For example, in television it is the group of frequencies comprising the transmitted picture and sound signals.

CHANNELIZING EQUIPMENT--microwave system accessory required to process intelligence prior to microwave transmission at the transmitter, and after microwave reception at the receiver.

CITIZEN BAND--United States Citizen Personal Radio Service operating between 26.965 and 27.225 megahertz.

CLOSED CIRCUIT TELEVISION--a wire circuit used to carry specialized audience television programs.

COAXIAL CABLE--a transmission line consisting of a pair of concentric conductors separated by a suitable non-conductor.

CRYSTAL--an electro-mechanical frequency control for oscillators.

DATA PROCESSING--see EDP

DECIBEL--unit of measure of the gain or loss of signal energy. In sound measurement, 3 decibel gain means the doubling of loudness.

DEMODULATION--the process of removing the intelligence, such as picture and sound, from the carrier wave.

DIRECTIONAL ANTENNA--an antenna which is more effective in certain directions than in others.

DUPLEX OPERATION--two-way radio system which permits two parties to talk at the same time. Two frequencies are required for duplex.

EBS--Emergency Broadcast System for AM, FM and TV broadcast stations.

EDP--Electronic Data Processing

EDUCATIONAL TELEVISION (ETV)--general educational and cultural programs presented over television.

EMS--Emergency Medical Service.

EOC--Emergency Operating Center.

FACSIMILE--a process of electronically transmitting a printed copy of printed matter, drawings, pictures or photographs.

FOREIGN EXCHANGE LINE--a dedicated circuit to obtain local calling privileges at a distant city.

FRONT END--a radio-frequency circuit immediately after the antenna in a receiver. The primary purpose of these circuits is to select the desired frequency.

FSK--Frequency Shift Keying

FULL PERIOD LINE--a circuit leased from a common carrier for the state's dedicated use.

GRADE OF SERVICE--rating based on expected number of busy signals per 100 calls during busy hour of the day.

HF--abbreviation of High Frequency, 3 to 30 megahertz.

HAM--slang name for amateur radio operator.

HIGH BAND--150 to 165 megahertz band which is often called 150 megahertz band. High band is characterized by less noise problem than low band.

HIGH-SPEED DATA--data speeds exceeding bandwidth capabilities of voice-grade circuits.

INSTRUCTIONAL TELEVISION(ITV)--use of television for presentation of formal classroom instruction for credit or some type of reward.

INTERFERENCE--disturbance in signal caused by reception of undesirable signals.

IN WATS--incoming calls on Wide Area Telephone Service.

KILOBITS--one thousand bits.

KINESCOPE RECORDING--a sound motion picture made on film by photography of a special picture tube.

LEN--Law Enforcement Network.

LETS--Law Enforcement Teletype.

- LOCAL CONTROL--control of base station from equipment location.
- LOW BAND--35 to 54 megahertz band.
- LOW-SPEED DATA--data speeds within bandwidth capabilities of voice-grade circuits.
- MARS--Military Affiliate Radio Service, a military sponsored radio network.
- MEGAHERTZ--unit of measure of frequency equal to one million cycles per second.
- MICROWAVES--radio waves less than one meter (about 39 inches) in length. Because of their short wavelength, microwaves act similar to light in that they may be focused into a narrow beam.
- MICROWAVE SYSTEM--system used for transmission of intelligence by highly directional radio beams at frequencies between 2,000 megahertz and 15,000 megahertz. Distances of roughly 50 miles may be spanned by a single transmitter-receiver link. Longer distances may be spanned by a series of links transmitting the original intelligence.
- MOBILE DATA TERMINAL--equipment located in a mobile unit that has capability of direct access to computer information utilizing the Mobile FM Radio Network.
- MOBILE UNIT--radio station designed to be operated while in motion or at rest at unspecified points.
- MODULATION--process of impressing intelligence on the carrier wave for transmission purposes.
- MODULE--electronic components grouped into a single replaceable unit.
- MULTIPLEXER--a device for transmitting multiple intelligence on a single carrier wave.
- NACOM I--National Communications System using common carrier circuits
- NACOM II--National Communications System radio back up for common carrier circuits.
- NARROW BAND--type of frequency modulation limited to plus or minus 5 kilohertz.

NAWAS--National Warning System. This system allows instantaneous warning to any area of the United States during emergencies.

OCD--Office of Civil Defense.

PBX--Private Branch Exchange, a telephone system operating within a single organization or agency with outside telephone lines.

PCM--Pulse Code Modulation.

PROTECTED POWER--a generator system which automatically assumes the A.C. power load upon failure of the commercial power.

RACES--Radio Amateur Civil Emergency Service.

RADIOLOGICAL INFORMATION--information which deals primarily with metered levels of fallout radiation.

RATT--Radio Teletype, a method of transmitting typed messages by means of radio.

RELAY STATION--an intermediate station to enable transmission of radio waves between two other stations.

REMOTE CONTROL--control of base station at a location removed from equipment site.

REPEATER--device for receiving and retransmitting a signal, mountain top repeaters enable signal transmission beyond line-of-sight barriers to the originator of the signal.

SSB--Single side band communication.

SIMPLEX OPERATION--two-way radio system designed so only one person talks at a time by pressing a pushbutton to turn on his transmitter. To listen, the person simply releases the pushbutton. Only one frequency is required for Simplex.

STACOM I--an integrated system in the State of Utah utilizing common carrier, state owned or leased inter-and intradistrict communications.

STACOM II--an integrated radio backup of various services of HF radio back for STACOM I

TELEMETRY--the use of coded electromagnetic signals to convey information. Examples would be the reporting of pressure flow of gas, road icing, temperature, etc.

TELETYPE--electronically transmitted typed messages. The message may be transmitted directly (on line), or the message may be placed on a punched paper tape for later transmission. Thus a day's collection of business data may be accumulated until a convenient time for transmission. The main advantage is that although the paper tape may be punched at normal typing speeds, the punched paper tape may be read in and transmitted at the teletype speeds in excess of 100 words per minute.

TIE LINE--circuit between two Private Branch Exchanges (PBX).

TONE SQUELCH--means of eliminating annoying receiver noise during periods of no communications.

TOWER LOADING--design factor based on ability of tower to withstand wind forces.

TRAFFIC--the volume of communications in a system, messages, telephone calls, transmissions, etc.

TRANSLATOR STATION--station which receives television signals on one channel and retransmits the same signals on another channel to allow quality television reception in areas remote from the originating station.

TTY--teletype.

TWO-WAY RADIO--radio communication system which permits two or more persons to talk to each other point-to-point.

UHF--Ultra High Frequency, 300 through 3,000 megahertz.

ULETN--Utah Law Enforcement Network.

UTROLS--Utah Telecommunication Rapid On Line System.

VHF--Very High Frequency, 30 through 300 megahertz.

WATS--Wide Area Telephone Service, telephone service allowing extensive intrastate calls and charged on a flat rate monthly basis.

WESTCARS--West Coast Amateur Radio Service.