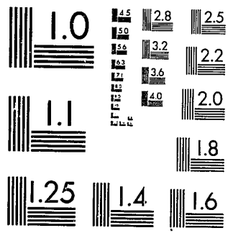

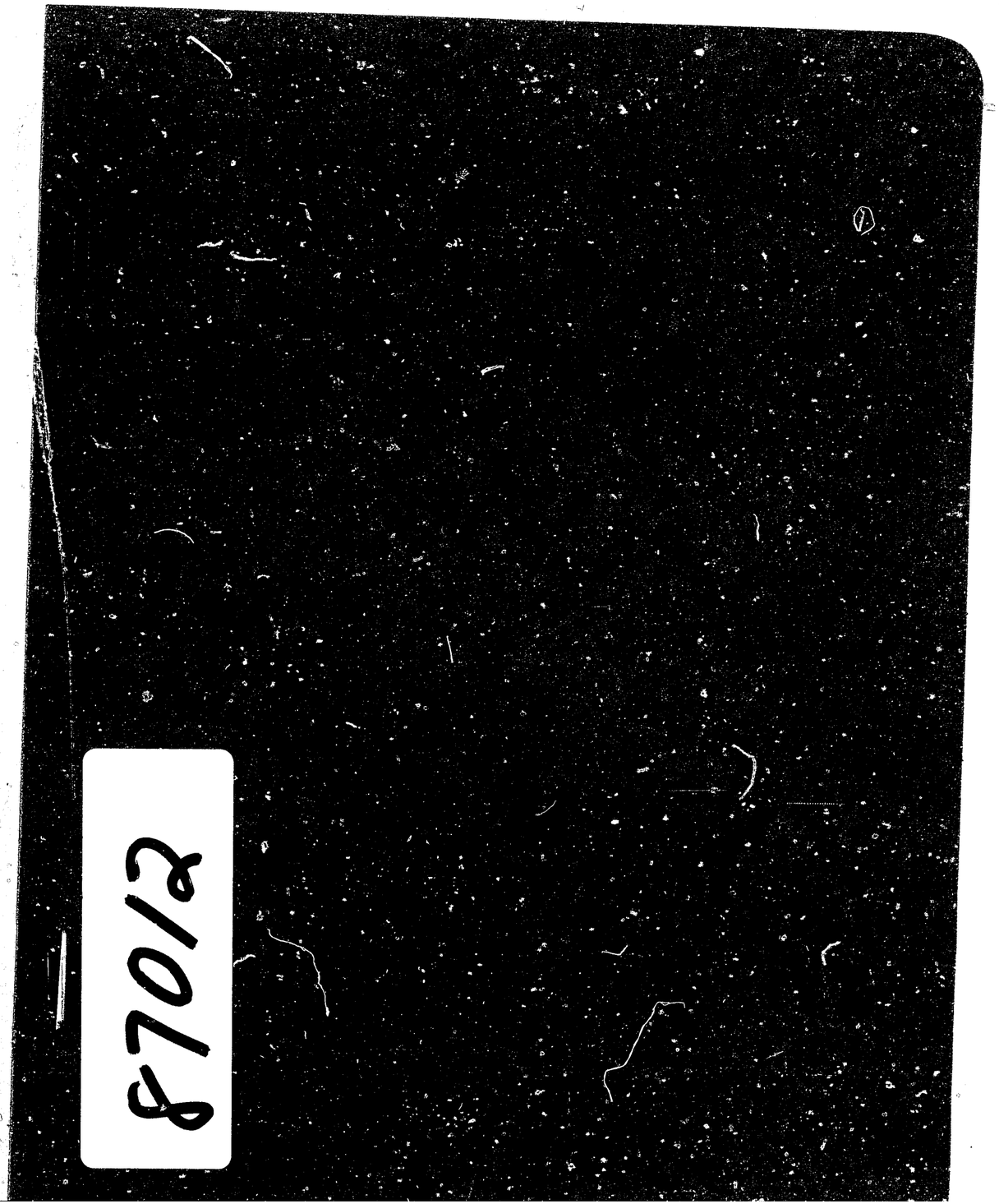

Associated Public-Safety Communications Officers, Inc.

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11 October 1979

Mr. John Ferry
National Criminal Justice Reference Service
Box 6000
Rockville, MD 20850

Dear Mr. Ferry:

Enclosed are copies of 62 advisory reports developed and furnished to the agencies indicated as part of APCO's Technical Assistance Project. This program was funded by Grant No. 78 TA AX 0036 from the Law Enforcement Assistance Administration.

Under this grant program, APCO provided short term advisory assistance in law enforcement communications to requesting agencies. APCO members across the country, who are fulltime employees of state and local governmental agencies, acted as the advisors. In most cases their reports were based on an intensive, one-or two-day visit to the agency, the total task involving not more than five man-days.

We believe these reports will provide other law enforcement agencies with useful information concerning telecommunications problems and solutions.

Sincerely,

Donal D. Kavanagh

Donal D. Kavanagh
Director of Projects

Attachments

cc: Mr. William H. Bailey
Mr. Alvin Ash
SDD/NCJISS-LEAA/DOJ
(excluding reports)

COMMUNICATIONS SYSTEM REVIEW

FOR

CITY OF CLINTON, NORTH CAROLINA

POLICE DEPARTMENT

APCO PROJECT 17

TASK NO. 7801801

APCO Advisor: Richard G. Roley

Date of Visit: December 8, 1978

Date of Report: December 21, 1978

Richard G. Roley

APCO Advisor

COMMUNICATIONS SYSTEM REVIEW

for

CLINTON, NORTH CAROLINA

TASK # 7801801

I. INTRODUCTION

The North Carolina Department of Crime Control and Public Safety requested technical assistance from the LEAA to investigate the communications system problems in the Clinton, NC Police Department. These were identified primarily as equipment problems including the reliability of the equipment and the adaptibility of the HT-220 handie-talkie units for mobile vehicular units when in the car.

The Clinton Police Department was visited by JPL and it was recommended that APCO assist the department in solving their problem. This is the report from the APCO technical assistance advisor.

II. PROBLEM IDENTIFICATION

The several problems found were equipment-related. These, in turn, led to some operational deficiencies which will be described.

Equipment problems involve:

1. personal portable radio chargers;
2. adapting personal portable radios for in-vehicle use; and
3. a dispatch console backup.

Operational problems involve interagency radio coordination and dispatcher workload.

III. PROBLEM ANALYSIS

The primary equipment problem concerns the portable units. There is considerable difficulty keeping the radio battery charger units operational. The problem has been identified in the area of the charger contact prongs. When a portable is placed into the charger unit these prongs flex and over a period of time tend to fatigue. The units are continually being repaired. Experience in the State of Georgia indicates that some of the fatigue problem may be caused by excessive heat generation from the charging operation itself.

Vendor comments regarding this problem were not available.

The charging equipment is out of warranty due to age.

This problem will continue as long as these particular models of personal portables and chargers are in use.

Personal portables are being adapted for use in vehicles not otherwise equipped with mobile radios.

Portable radios do not work from inside a vehicle as well as from outside the vehicle due to the shielding effects of the vehicle body. Better range is obtained if the portable can be plugged into a permanently mounted vehicular antenna. Similarly, the portable should be set in a vehicular charger so as to use the battery power of the vehicle rather than that of the radio.

The HT-220 personal portables owned by the city must have an adapter placed on them to accept the vehicular antenna connection. This modification is being made on the city's radios. Although this adapts the radios for a more flexible utilization, there are some drawbacks, all relating to the model radio used.

When the radio is placed into the vehicular charger, the regular antenna must be unscrewed and removed and the vehicular antenna connection screwed on in its place. To remove the radio from the vehicle, the reverse of this procedure is followed. Operationally, this is time consuming and frustrating to the officers involved. An additional drawback for this model radio is that the vehicular radio charger does not provide an external microphone for use when in the charger. This necessitates the officer pulling the radio out of the charger to transmit.

Later model HT-220 radios designed for vehicular chargers make all connections to the antenna and external microphone automatically, eliminating these cited drawbacks.

The dispatcher console is a late model (MODCOM) all solid state design. It appears to be very susceptible to power line surges and to transient pulses on the control lines - generally created by lightening storms.

With a transient pulse on the control line (station to base transmitter), the circuit card in the console is damaged, effectively rendering the channel control useless. The circuit card must be repaired or replaced.

Lightning protection of communication facilities is a serious problem, requiring careful design consideration. This is particularly apparent where

the console is furnished by Motorola, the control lines are furnished by the telephone company, and there is no resident technical expertise available to the city for overall problem investigation, fault location, and supervision of corrective measures. Under these circumstances the city must deal with the telephone company engineering to insure all protective measures available have been applied to the circuits and they remain effective, as well as contacting the equipment vendor through warranty or complaint to insure the latest techniques are applied to the console equipment.

Console standby equipment in the form of a remote control desk set is available in-house, and with minor modification it could be used as backup to the console. The modifications would involve applying standard plugs and sockets to the dispatcher console, the remote control desk set and the control circuits for control circuit termination.

In the event the console is disabled, it would only be necessary to move the remote desk unit from the adjacent room to the dispatch position, using the console control circuit, and plug it into the remote control desk set. The dispatcher could continue to function with the remote desk set until appropriate repairs are made to the console.

An additional backup to the console could be made available by utilizing one of the personal portable radios in a desk charger, adapting the radio to an external antenna (as is being done for the mobile installation), and running an antenna feed line from the dispatch room to a "new" antenna on the roof.

Coordination between city and county units appears to be a problem under certain conditions. City units cannot talk directly with county elements.

Coordination is handled by the dispatcher of one agency talking to the dispatcher of the other agency. This situation can be ameliorated in several ways:

1. by adding full transmit and receive capability of county channels on to city mobiles;
   a) applicable to radios having room for the channel;
   b) requires written permission of county and modification of city radio licenses;
   c) could be further improved by including priority scanning function to mobile radio;

2. by adding receive only capability to mobile receivers;
   a) does not require license change;
   b) allows mobiles to receive when necessary;
   c) with scanning function would permit city units to remain on city channel and still receive most of the county radio traffic;

3. by adding a separate scanner receiver in the vehicle;
   a) does not require license change;
   b) will monitor all radio traffic of county;
   c) provide receive only function.

NOTE: Methods 2 and 3 provide a receive only function. Information from city units to county units must be passed through the city dispatcher.

It is noted that the dispatcher acts as a receptionist for the department. Current plans call for the addition of a receptionist to relieve the dispatcher

of this task. This proposed action is to be commended. The dispatch function is highly critical. Officer safety is directly keyed to the dispatcher's ability to stay on top of field situations, maintaining continuity of effort, passing appropriate information, and being watchful for the needs of the field officer. These characteristics and requirements should not be subordinated to unrelated tasks.

IV. FINDINGS

1. Battery charger contacts are a significant problem and may result from high use and age of equipment, excessive heat generation, poor design, or a combination thereof. The vendor may be able to provide some relief. New model personal portables and chargers should not suffer from these problems.

2. Existing portable radios must be modified for vehicular antenna connected for use in a vehicle.

3. Existing portable radios, when mounted in a vehicle, do not provide an external microphone and must be removed from the charger to transmit.

4. New model personal portables with vehicular chargers are capable of use from the charger with an external microphone and a built-in automatic antenna connection.

5. Lightning is a serious problem to the dispatcher console. Remedies should be sought from the vendor and the telephone company.

6. Backup console operation can be provided by modifying the console, an existing remote control unit, and the control line terminations.

The modification involves installing standard keyed plugs and sockets on the equipment for easy chaneover, one to the other.

7. An additional backup could be provided by installing an antenna on the roof, with appropriate feed line to a desk charger mounted personal portable adapted to the feedline connector.

8. Coordination between city and county currently is accomplished through the agency dispatchers. A direct communication capability can be established by adding the county channel to existing mobile equipment. This addition would require purchase of additional channel elements, permission from the county, and a modification of the mobile license.

9. Current plans to add a receptionist and relieve the dispatcher of this task are commendable and will increase the efficiency of the communication operation.

Although not a current problem, our experience would indicate that if new radio equipments are purchased they should be capable of operation on a minimum of four channels to allow for future channel arrangements. Consideration should be given to installation of the National Law Enforcement Emergency Channel 155.475 MHz, as developed in a North Carolina State Plan. Also, all radios should be equipped with tone coded squelch to minimize the effect of future interference problems.

V. RECOMMENDATIONS

It is recommended that:

1. the Motorola vendor be contacted and a formal complaint be initiated concerning the battery charger contact problem - the goal of this

complaint to be an extension of warranty period on the faulty devices or other satisfactory solution be provided by the vendor;

2. modification to existing HT-220 personal portables be continued towards adapting them for vehicular antenna connections;

3. replacement personal portable radios, when acquired, be initially purchased for use with vehicular chargers which make antenna and external microphone connections automatically;

4. the telephone company be required to establish and maintain the highest degree practical of lightning protection on the base station control lines;

5. the dispatch console vendor be contacted for all aid and assistance in reducing the susceptability of the console to pulses and transients on the control lines;

6. the dispatch console and the remote desk console be modified to accept standard keyed phone jack connection for control lines, and the control lines be similarly modified to permit changeover in the event of console failure;

7. additional dispatch console backup be provided by installing an antenna on the roof and extending the feedline into the dispatch center where it can be mated with a personal portable in a desk charger. The portable must be adapted to the external antenna feedline connector;

8. requirements for direct coordination between city field units and county units be determined. This determination should lead to the consideration of one of the solutions discussed under the problem analysis section. At this time no further recommendation is offered

pending a determination of requirements.

9. Current plans for a receptionist should be instituted as soon as possible so as to relieve the dispatcher of this burden.

10. The police department should investigate the status of statewide planning for implementation of the National Law Enforcement Emergency Channel (NLEEC) 155.475 MHz and consider the implementation in all future communication planning.

11. Future acquisition of radio equipments should consider the following minimum capabilities and characteristics:

    a) all radio equipments to be configured for operation on a minimum of four channels to allow for future expansion;

    b) all radio equipments to be configured for tone coded squelch operation to minimize potential interference problems;

    c) all portable equipments to be capable of operating through mobile vehicular chargers which make antenna and external microphone connections automatically;

    d) all base station control facilities be configured for tone control rather than DC control.

END