QUARTERLY TECHNICAL PROGRESS REPORT
1 February 1971 - 30 April 1971

Technical progress in this period was as follows:
1) Submission of possible schematics for a typo device.
2) Evaluation of a patent of an electrified projectile.
3) Completion of literature search of the following libraries:
   Document collection
   Document Library
   Medical Library
   Library
   Medical Library
   Police Academy Library
4) Presentation of a group of status reports to the Project Monitor during his visit on 20 April 1971. The items presented were:
   a) a general outline of the Behavioral Control Support programs to date.
   b) a summary of the Behavioral Control literature review
   c) Brief descriptions of several real-life situations and possible incapacitating agents applicable to each (preliminary only)
   d) Suggestions for future activities under Behavioral Control Support Project.

1. This report was submitted on 12 February 1971. The possible schematics for the
   are essentially:
   a) an auto ignition system and
   b) a DC to DC converter

   An output voltage of only 4000 volts is specified in the postulated system (as opposed to 20 Kv for the system) because of the extremely short battery
life and arcing problems that would exist with the higher voltage system.

2. U.S. Patent 3,523,538 describes an electrical shock-producing projectile. The projectile would be incapable of producing the "false epilepsy," as claimed by the inventor, would have a limited range, and besides being ineffective it could possibly harm the victim.

3. A description of the literature search is given under 4(B).

4. The status reports presented to the Project Monitor will be found in attachments A, B, C and D.
BEHAVIORAL CONTROL SUPPORT

General Outline of Program

1. Review Literature

   a) Police and criminology
   b) Medical and scientific
   c) Military
   d) International
   e) Patents and proposals
   f) Science fiction, comics, etc.
   g) Other

2. Describe the factors which constitute the generalized conflict/control situations of interest:

   a) number of antagonists
   b) number of protagonists
   c) intensity range of hostilities (actual or predicted)
   d) time scale
   e) location/mobility/environmental factors
   f) availability of additional support
   g) effects desired
      i) offensive (calm, disperse, arrest, subdue, incapacitate, immobilize)
      ii) defensive (avoid hostilities, self-protection, escape/flight)

3. Prepare brief, representative real-life situations to serve as examples and help generate ideas:

   a) Surrounded automobile
   b) Lone individual
   c) The snatch
   d) the crowd
   e) Pursuit
   f) Protection of individuals and property

4. Study available and proposed weapons/devices and strategies in light of desired effects and user-criteria dictated by various situations.

5. Compile lists of as yet undeveloped devices/weapons and recommend design and bench testing of those judged most valuable. Some possible examples:

   a) or similar agent for rapid, transcutaneous administration of drugs
   b) Synchronized strobe lights and sound stimuli at critical frequencies
   c) Various undetectable (or subthreshold) physiological insults
   d) Low-velocity, high-mass, low psi projectiles: "jet-propelled medicine ball"

6. Respond to ad hoc requests for evaluation of concepts, proposals, patents, etc.

   a) Japanese patent
   b) Others
BEHAVIORAL CONTROL LITERATURE REVIEW

To date, our search for behavioral control literature has included the following local libraries, all of which yielded some information:

- Department
  - document library
  - medical library
- general library
  - medical library
  - Police Academy

The original 50 documents received at the start of the contract have been thoroughly reviewed by Drs. Those publications, by nature of their pre-selection, pertinence and variety, are still the core of our incapacitation literature. Several of them were used in a pilot run in order to devise the evaluation form, shown in Attachment A. This form will be used later to provide quick reference to factors from selected proposals and techniques.

In February 1971, all the literature then in our possession was screened for bibliographic references to other works. A master list was made, from which library searches were conducted. By March it had become obvious which material was not available locally, and those items remaining on the list were then ordered through the (28 unclassified documents) or through Washington (26 classified items). As of April 19, sixteen unclassified documents were still on order, along with the classified material.

The library work also included a search of card catalogs and indices of abstracts for 25-40 pertinent topics, as well as a search of recent volumes of approximately 15 journals. All of the locally available literature has been procured, cross-indexed, screened and filed (the cross-index categories are given in Attachment B). The collection consists of 133 items at this time.
Conclusions

Our literature search has been comprehensive enough to draw the following conclusions:

1. As expected, the open literature does not mention any innovative hardware which could be easily adapted to our purposes.

2. The greatest concentration of published material has been in the categories of light (flashblindness), sound (all frequencies), electricity (shock, electronarcosis, electromagnetic radiation) and chemicals (drugs and gases). Very little open literature is available on biological weapons, odor, temperature, vibration or applicable psychological methods of incapacitation.

3. It appears that certain gaps in the literature can be filled only by obtaining classified documents through Washington.

4. The police literature is mainly concerned with riot control. The police appear to be the recipients rather than the initiators of research into new techniques of behavioral control.

5. Our group now has a broad and general conception of current incapacitation devices and techniques. The most profitable course for further search of the literature would be to narrow our fields of interest (as proposed in the program for the coming months), and collect information in those specialized areas.

6. An ongoing, general survey of published material concerning personnel incapacitation will be maintained regardless of the focus or direction taken in our future program.
<table>
<thead>
<tr>
<th>Incapacitation</th>
<th>Remarks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>degree of</td>
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<tr>
<td>length of</td>
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<tr>
<td>Speed of Action</td>
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<tr>
<td>Residual Effects</td>
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<td>Lethality Risk</td>
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<td>Dependability</td>
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<tr>
<td>Countermeasures</td>
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<tr>
<td>Range</td>
<td></td>
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<tr>
<td>Delivery System</td>
<td></td>
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<tr>
<td>Size/Weight</td>
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<tr>
<td>Covertness</td>
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<tr>
<td>Shelf Life</td>
<td></td>
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<tr>
<td>Safety/Training</td>
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<tr>
<td>of User</td>
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<tr>
<td>Individual vs.</td>
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<tr>
<td>Group</td>
<td></td>
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<tr>
<td>Environmental</td>
<td></td>
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<tr>
<td>Dependence</td>
<td></td>
</tr>
<tr>
<td>Public Image</td>
<td></td>
</tr>
</tbody>
</table>
CROSS-INDEX CATEGORIES

AD number
Authors
Bibliography
Biological
Central Nervous System
Chemical
drugs
gases
Electrical
Facilities
History
Impact
PI- number
Proposal
Psychological
Restraining
Sensory
light
odor
pressure
shock
sound
temperature
vibration
Theory -
Titles
Tolerance/Antidote
REAL-LIFE SITUATIONS

Surrounded Automobile
(Diplomat; Police; Stop and Search)

This situation entails one or two individuals inside their car, surrounded and outnumbered by a hostile group, in a potentially unfriendly environment such as a foreign country, riot area or inspection checkpoint. The confined space of the automobile can be an asset and must not become a trap. Pre-installed incapacitation equipment can be utilized providing the individuals remain in their own car, otherwise portable equipment would be required. The least amount of force needed, either to calm the hostile group or to make a "getaway," would be highly desirable from the standpoint of good will; trying to calm the group can be expected to consume more time than getting away by car from a group which is on foot. Safety for innocent bystanders may be of limited concern.

<table>
<thead>
<tr>
<th>Incapacitators</th>
<th>Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>persuasion (loudhailer)</td>
<td>bullet proofing</td>
</tr>
<tr>
<td>lures (hand-outs etc.)</td>
<td>ear defenders</td>
</tr>
<tr>
<td>dyes</td>
<td>electric ground</td>
</tr>
<tr>
<td>stench</td>
<td>gas mask</td>
</tr>
<tr>
<td>tear gas;</td>
<td>goggles</td>
</tr>
<tr>
<td>aerosols; skin penetrants</td>
<td>independent air supply</td>
</tr>
<tr>
<td>car-top sprinkler</td>
<td>sealed car</td>
</tr>
<tr>
<td>fire extinguisher</td>
<td></td>
</tr>
<tr>
<td>blown sand, heat or smoke</td>
<td></td>
</tr>
<tr>
<td>marshmallow barrage</td>
<td></td>
</tr>
<tr>
<td>extendable booms: with oil, foam,</td>
<td></td>
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<tr>
<td>...</td>
<td></td>
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<tr>
<td>bubbles, chemicals, smoke</td>
<td></td>
</tr>
<tr>
<td>extendable rotating sticks</td>
<td></td>
</tr>
<tr>
<td>car-top light</td>
<td></td>
</tr>
<tr>
<td>loud sound</td>
<td></td>
</tr>
<tr>
<td>insects (released outside car)</td>
<td></td>
</tr>
<tr>
<td>slick ground surface</td>
<td></td>
</tr>
<tr>
<td>electrified car</td>
<td></td>
</tr>
</tbody>
</table>

* Protection is for the operators; some items listed could also be used by antagonists as countermoves.
Lone Individual

Perhaps the most vulnerable situation is that of a single person who may have numerical odds against him, with no vehicle nor any other source of aid, who must protect himself outdoors. His immediate need is for small, unobtrusive equipment (and possibly protective gear) which he can instantly utilize and rely on for complete incapacitation of his assailant(s). If the general environment is unfriendly, he may need to re-use the equipment in order to reach safety.

**Incapacitators**

- stench
- smoke screen
- combined smoke and gas tear gas
- aerosols; skin irritants
- impact balls that break smoke, stench, Mace
- darts with drugs
- marshmallow barrage
- taffy pellets
- night stick/baton
- shock
- karate/judo
- stun gun
- big net
- adhesives
- bolas
- slick foam (sprayed or hurled)
- heat-seeking device to trip, tackle
- sound
- light
- instant barrier
- radio-controlled barriers

**Protection**

- bullet-proof vest
- ear defenders
- gas mask
- goggles
- inflatable plastic helmet
- inflatable plastic shield
- pocket bicycle
The Snatch

In this situation the advantage is with several persons who wish to incapacitate one or two others, in an outdoor environment such as a war zone. Because the operation must be swift and perhaps surreptitious, it may well be nocturnal. Protection of bystanders or property is probably unnecessary. Incapacitation techniques must be fast-acting, may require protection for the operators, and should leave the victim in a subdued but moveable condition. Any devices used should be portable or -- if the location is known beforehand -- deployable.

Incapacitators

- instant barrier fence
- radio-controlled barrier with heat, light, smoke, stench
- plastic cocoon
- taffy pellets
- nets, snares, adhesives
- darts with drugs
- water hose
- karate/judo dogs
- night stick/baton
dyes (including infrared)
- chemicals/smoke
- tear gas
- Mace aerosols
- blown sand, dust
- swarm of insects
- sound
- light

Protection

- beekeeper's suits
- camouflage suits
- ear defenders
- gas masks
- goggles
The Crowd

Behavioral control of a crowd is probably the most complex situation to be considered. Many individuals, potentially hostile as a "mob", must be controlled but not particularly harmed. In addition, fringe participants and adjacent property should be protected. A primary method of control is through dispersal of the crowd, which means they must retain their mobility to some degree. Techniques of control which allow gradations of intensity of action and an expandable time frame are recommended. Methods of control are more limited if the crowd is gathered indoors. Devices should be portable although their deployment beforehand may, in some cases, be possible, and pre-installed devices on official vehicles may be available. Overt techniques have positive and negative aspects: they may intimidate the crowd or they may become targets for the crowd's hostility. Selective incapacitation of the crowd's leaders is an effective technique. The operators in this situation often consist of a large, trained group such as the police; in any case, safety of the operators may depend on their protective gear.

Incapacitators

lures (spectacle elsewhere etc.)
rumor control/oratory
loudhailer (persuasion - drowning
noise - synchronized sound)
synchronized strobe + sound, pulses
robot rovers that emit flashes, heat,
chemicals, smoke, stench, or
broadcast
extendable beams that emit same
light
foam; foam grenades
bubbles
slick surface/oil
stanch
dye
smoke
chemicals: tear gas, Mace
balls that break, emitting chemicals
aerosols
drug darts for ring leaders
car-top sprinkler
night sticks/batons

marshmallow barrage
nets/snakes
barricades
dogs/horses
insects

Protection

beekeeper's helmet
ear defenders
earphones
gas masks
goggles
rubber boots
Pursuit

This situation may follow that of the "Surrounded Automobile:" one or two persons in a car are being pursued by the occupants of another car, in what must be considered an unfriendly environment. The advantages to be exploited are: maneuverability of the vehicle (to utilize wind direction, for example); pre-installation of devices; protection afforded by the car's own shielding. Devices should be covert when not in use, quick acting because the pursuers may have lethal weapons, and capable of stopping the chase. This may be accomplished by: incapacitating the following driver, immobilizing the pursuit car, obscuring its path, barring its path, or disguising the operators' car or occupants. Re-use of the chosen techniques may be required if more than one vehicle joins the pursuit.

<table>
<thead>
<tr>
<th>Incapacitators</th>
<th>Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>license-plate change</td>
<td>bullet proofing</td>
</tr>
<tr>
<td>external change in car's color, etc.</td>
<td>goggles</td>
</tr>
<tr>
<td>pop-up people in lead car</td>
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<tr>
<td>smoke screen</td>
<td></td>
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<tr>
<td>blown sand</td>
<td></td>
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<tr>
<td>paint on windshield</td>
<td></td>
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<tr>
<td>foam (on road or windshield)</td>
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<tr>
<td>oil slick</td>
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<tr>
<td>light beam (nighttime)</td>
<td></td>
</tr>
<tr>
<td>instant barrier</td>
<td></td>
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<tr>
<td>wire across road, about 48&quot; high</td>
<td></td>
</tr>
<tr>
<td>extendable boom (if close behind)</td>
<td></td>
</tr>
<tr>
<td>pop-up deterrent shapes</td>
<td></td>
</tr>
<tr>
<td>tetrahedrons</td>
<td></td>
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<tr>
<td>nails strewn on road</td>
<td></td>
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<tr>
<td>rolling shapes strewn on road</td>
<td></td>
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<tr>
<td>rolling barrier attached by wires</td>
<td></td>
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<tr>
<td>to lead car</td>
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<tr>
<td>explosion under car</td>
<td></td>
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<tr>
<td>gas grenade</td>
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</table>
Protection of Individuals and Property

A preventive and defensive situation occurs when the locale of a person (public speaker) or a piece of property (store subject to looting) must be protected. Assaults can approach from any direction but the protected object remains stationary. One or more "bodyguards" provide the defense against one or more assailants. A reasonably friendly environment can be supposed, which limits the usable techniques to those which will not seriously affect bystanders (nor the operators, the protected individual or the property). The devices should be aimed directly at the offenders only, and should reliably incapacitate them. The degree of incapacitation can depend on the severity of the attackers' intended crime. In all cases it seems desirable that the devices be quick-acting, portable and covert, so that they can be used in a variety of "stay-put" circumstances.

<table>
<thead>
<tr>
<th>Incapacitators</th>
<th>Protection</th>
</tr>
</thead>
<tbody>
<tr>
<td>rhetoric</td>
<td>instant plastic shield</td>
</tr>
<tr>
<td>electrical shield</td>
<td></td>
</tr>
<tr>
<td>light beam</td>
<td></td>
</tr>
<tr>
<td>taffy pellets</td>
<td></td>
</tr>
<tr>
<td>hurled foam, smoke</td>
<td></td>
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<tr>
<td>Mace</td>
<td></td>
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<tr>
<td>dart with drug</td>
<td></td>
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<tr>
<td>jet-propelled medicine ball</td>
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<tr>
<td>bola</td>
<td></td>
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<tr>
<td>karate/judo</td>
<td></td>
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<tr>
<td>night stick/baton</td>
<td></td>
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<tr>
<td>stun gun</td>
<td></td>
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<tr>
<td>balance disruption</td>
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BEHAVIORAL CONTROL SUPPORT

Proposed Program for Continuation of Work

1. Consider overall goals and strategy. Our inclination is to pursue an innovative or creative approach to the problem rather than to devote our energies to compiling yet another systematic review of currently available incapacitation and behavioral control techniques. There is, of course, a possibility that no useful new ideas would be produced, but a systematic approach, it would seem, would practically guarantee that result.

2. Proceed with further literature review. It appears that something like 90% of the information to be had in the ordinary literature is now in hand. Rather than waste much more time in assembling and screening masses of literature for a diminishing yield, the following steps are proposed:
   a) continue general screening and search on a maintenance or low-effort basis.
   b) spend a week browsing through allied fields: anesthesiology, psychology, psychiatry, physiology, optics, etc. for fresh ideas.
   c) consider spending several days to a week of intensive research at one or two of the best criminology or medical-legal collections or libraries available (FBI? Harvard? Justice? LEAA?).
   d) consider examination of far-out literature: occult, science fiction, comic books, etc. on a low-effort basis.
   e) consider foreign sources of information.

3. Approach people with expertise and/or talent if feasible, e.g.
   Authorities on pertinent subjects
   (Lt. Col.; Riot Control Specialist)
   (self defense)
   Army Research Centers, such as Edgewood Arsenal (projectiles)

4. Consider holding an interdisciplinary workshop with individuals having technical expertise in appropriate areas such as criminology, weapons, psychol etc.
5. Conduct feasibility studies of promising new approaches. For example, one potentially fruitful research area, probably worth evaluating, involves chemicals such as \( \text{[ ]} \) which rapidly penetrate the skin and may serve as carrier vehicles for chemical agents for behavioral control. The control agent (e.g., irritant, anesthetic, synaptic blocker, etc) could be mixed with the skin penetrant and delivered in liquid, gel or aerosol form via projectiles, for accurate delivery to individuals, or via sprayers, for group administration. Other techniques, such as \( \text{[ ]} \) could also be evaluated.

6. Exploratory animal studies. Brief, preliminary studies with promising chemical or physical techniques may be attempted if time permits and conditions justify such an effort.