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TR-04-94
Mobile Computer Workstation
Common Police Requirements

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TECHNICAL REPORT

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NOTE: Further information
about this report can be
obtained by calling the
CPRC information number
(613) 998-6342

SUMMARY

The company of Fraser, Popovski & Associates Inc. was contracted to develop a common set of requirements for public safety agencies, in combination with a thorough industry review of current and emerging technologies. In order to accomplish this task, a survey of a large segment of the police and security community was conducted. The ensuing Standard(TR-03-94) is intended to define the elements and performance of the equipment in order to facilitate compatibility and standardization without limiting the design approach of individual suppliers.

This Standard defines the requirements for a mobile workstation from a hardware perspective. The requirements for application software, wireless communication and connectivity through radio systems are considered to a limited extend.

This Standard defines a mobile workstation device as an MS-DOS compatible computer, for installation in a vehicle, with a primary function of being a mobile data communications device. Even though the main function of the workstation is to serve as an integral part of the vehicle's radio communications system, it must be removable as well as capable for use as a personal computer.

In addition to this Technical Report are three others resulting from the contract work:

- . Common Requirements for a Police Specific Enhanced Mobile Workstation(TR-04-94)
- . Technology Developments and Industry Product Reviews for a Police Specific Enhanced Mobile Workstation(TR-05-94)
- . Future Trends and Technology Developments for Police Mobile Workstations(TR-06-94)

The Canadian Police Research Centre would like to thank Mr. Robert Fraser, Mr. George Popovski, and Mr. David Burns of Fraser, Popovski & Associates Inc., the Committee members, Ms. Francine Boucher of the Royal Canadian Mounted Police, Mr. Peter Ungar of Peel Regional Police, and Constable Grydon Patterson of Ottawa Police, and finally, all those police and security agencies that participated in this very worthwhile project.

SOMMAIRE

Une entente a été conclue avec la compagnie Fraser, Popovski & Associates Inc. en vue de l'élaboration d'une série commune d'exigences pour les organismes de sécurité publique, en plus d'un examen approfondi des technologies actuelles et naissantes offertes par l'industrie. Afin de réaliser ce projet, on a fait un sondage auprès d'une grande partie de la communauté policière et des organismes chargés de la sécurité. La norme qui suit(TR-03-94) vise à définir les éléments et les caractéristiques du matériel afin de faciliter la compatibilité et la normalisation sans imposer de limites aux conceptions des fournisseurs individuels.

La présente norme définit les exigences d'un poste de travail mobile du point de vue du matériel. On y traite dans une certaine mesure des exigences reliées aux logiciels d'application, à la communication sans fil et à la connectivité par des liaisons radioélectriques.

La norme définit un poste de travail mobile comme étant un ordinateur compatible avec le MS-DOS pouvant être installé dans un véhicule et servant avant tout de dispositif mobile pour la transmission des données. Même si la première fonction du poste de travail est de servir de partie intégrante du système de radiocommunications du véhicule, il doit être amovible et utilisable comme ordinateur personnel.

À cause des travaux de ce contrat trois autres rapports en résultent en plus du Rapport technique:

- . Exigences communes reliées à un poste de travail mobile amélioré destiné à la police(TR-04-94)
- . Mises au point et examens des produits de l'industrie pour un poste de travail amélioré destinés à la police(TR-05-94)
- . Tendances futures et développements technologiques pour des postes de travail mobile destinés à la police(TR-06-94)

Le Centre canadien de recherches policières aimerait remercier MM. Robert Fraser, George Popovski et David Burns de la compagnie Fraser, Popovski & Associates Inc., les membres du comité, Mme Francine Boucher de la GRC, M. Peter Ungar du Service de police régional de Peel et l'agent Graydon Patterson de la Police d'Ottawa et, finalement, tous les services de police et de sécurité publique qui ont participé à ce projet intéressant

**REPORT ON
COMMON REQUIREMENTS FOR
A POLICE SPECIFIC
ENHANCED MOBILE WORKSTATION**

November 8th, 1993

Prepared

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2. EXECUTIVE OVERVIEW

2.1. Objective

The objective of this study is to identify common requirements for an enhance mobile workstation device (MWS), among the wide variety of public safety operational environments in Canada.

This objective is the first milestone of a program to develop a set of recommended standards for a vehicular/ portable workstation to support public safety operational and administrative field applications.

In addition, this document will provide support to the next program milestone which is an industry review of current product offerings and future product developments, with the further objective to define the unique requirements of the public safety market.

The results of this program are to be provided to the police community in order to assist them with the acquisition of new technology and to industry to aid with the specification and development of new products.

2.2. Scope

The primary focus of the survey questionnaire was to derive opinion, obtain information and document the following topics:

- 1) ergonomic parameters of the keyboard, display, and sub-system components of the MWS
- 2) environmental considerations
- 3) general information regarding the size and level of computer automation of each agency
- 4) investigation of current data communication applications and uses
- 5) deriving general opinions of future application and uses for a MWS

Many of the envisioned future applications of a MWS involve wireless data communication. The technical feasibility of these potential applications is in a large part dependent upon the sophistication of the supporting radio communication infrastructure and not directly related to MWS parameters. As a result, the questionnaire has not addressed in detail, issues relating to communication interface, protocol, or content.

Furthermore, applications such as pen based computing, handwriting recognition, and speech recognition are believed by the authors to be either cost prohibitive, lacking standards or are not envisioned to be common requirements. Consequently, details of applications based upon these technologies were not fully investigated within the survey.

2.3. Methodology

The report presents the results of a survey of police agencies of various size, jurisdiction, and operational environments. Every attempt was made to include national, provincial and municipal agencies from all regions of Canada.

The following sections summarize the results of the survey. Detailed survey data has not been included in this publication for reasons of confidentiality, although the data can be made available from the CPRC to agencies with special interests.

3. ACKNOWLEDGMENTS

Fraser, Popovski & Associates, along with the Canadian Police Research Centre wishes to thank the following agencies for their participation in the survey.

Amherst Police Department	Durham Regional Police
Barrie Police Service	Service de Police de Boucherville
Brandon Police Service	Service de Police de Brossard
Calgary Police Service	Waterloo Regional Police
RCMP, Charlottetown	Charlottetown Police Department
Cornwall Police	Delta Municipal Police Department
Edmonton Police Service	Fredericton Police Department
Halifax Police Department	Ville De Hull Police
RCMP, Halifax	Hamilton-Wentworth Regional Police
Securite Publique de Gatineau	Service de Police, Laval
Lethbridge City Police	London Police Force
Moncton Police	Communaute urbaine de Montreal
C.P. Police, Montreal	Nepean Police Service
RCMP Ottawa	Ottawa Police Service
Niagara Regional Police	Peterborough Police
Regina Police Service	Service de Police, Ville de Quebec
Saint John Police	Service de Police de Rouyn-Noranda
Saskatoon Police Service	Sudbury Regional Police
RCMP, Yellowknife	RCMP, St. John's
Service de Police de Sainte-Foy	Metropolitan Toronto Police
RCMP, Vancouver	Service de Police, Trois-Rivieres
Vancouver Police Department	Service de Police, Victoriaville
RCMP, Westmount	Windsor Police
RCMP, Winnipeg	Winnipeg Police Department

4. POLICE AGENCY QUESTIONNAIRE

OBJECTIVE

Fraser, Popovski and Associates Inc. has been commissioned by the Canadian Police Research Centre to conduct a survey of Police Agencies across Canada to assist with the development of a police specification for Mobile Workstations (MWS). The resulting specification and final report will be made available to all agencies. Please answer all questions in the following survey as they apply to your operational requirements. It is important to obtain information relating to your agency even if you do not currently have Mobile Data Terminals, Mobile Workstations, or anticipate purchasing them in the future.

1.0 GENERAL INFORMATION

We require answers to the following questions to establish a general profile of your Agency. Since every Police Agency is similar, yet different, a model of yours is necessary to properly complete our survey. Your cooperation is required and greatly appreciated.

Your Name & Position : _____ Phone # _____
Best Time to call: _____
Alternative contact : _____ Fax # _____
Agency : _____

- 1.1) How many police officers are there currently in your agency?
authorized strength _____
currently on staff _____
- 1.2) How many dispatch positions are there in your Communication Centre? _____
- 1.3) Is your Communication Centre equipped for data communication with vehicles? _____
- 1.4) How many marked vehicles in your fleet? _____
- 1.5) How many unmarked vehicles? _____
- 1.6) What percentage of the vehicles in your fleet are two-way voice radio equipped? _____
- 1.7) For your fleet, please list all major types of patrol vehicles by make, model and quantity. If your agency operates a significant quantity of other specialized vehicles such as motorcycles, boats, command vehicles, emergency response vehicles, etc., please include these also.

2.0 CURRENT AGENCY AUTOMATION

In this section we require information on any automation / computerization that may currently exist in your agency. This might consist of a single computer with a limited database or a large computer system with many integrated software applications and databases. If your agency has a local Records Management System (RMS), please answer the following questions.

- 2.1) Who was the supplier of the RMS system? _____
- 2.2) When was it implemented? _____
- 2.3) Does it run on a single computer or is it part of a multi-computer or main-frame system?
- 2.4) List the locations, user groups and number of access points allowed to query the database contained in your RMS system?

2.5) If your agency currently has a Computer Aided Dispatch System:

Who was the supplier? _____
 When was it implemented? _____
 Is it part of an integrated system with local records? _____
 Are you using the CAD system for 911, complaint taking, etc.? - please list.

2.6) Has your agency standardized on off-the-shelf office software, such as:

____ WordPerfect; Release? _____
 ____ Lotus 123; Release? _____
 ____ Microsoft Word;
 ____ Microsoft Excel;
 ____ Microsoft Windows;
 Other _____

2.7) If your agency currently uses standard applications, such as the above, on portable computers in the field, what applications are in use and by which user groups?

3.0 MOBILE DATA TERMINALS

A Mobile Data Terminal (MDT) primarily provides vehicular data communication functionality. Alternatively, a Mobile Workstation is a fully functional stand-alone computer which can be configured to accommodate internal databases and application software, as well as emulate a MDT. In this section, our objective is to gain insight into existing MDT systems used by your agency.

If your agency currently has no field data communication capabilities or requirements, please answer question 3.1 only.

3.1) If you have no requirement for field data communication, please provide us with a short explanation of why.

3.2) What make and model of MDT does your agency currently use?

3.3) How many are in use? _____

3.4) When were they purchased ? _____

3.5) If your MDTs are used for dispatching, what is the percentage of MDT vs. voice dispatch? _____

3.6) In your opinion, are dispatch communication better served by an MDT or by voice? _____

3.7) What functions are performed by your MDTs:

____ Access to local RMS information?
 ____ Access to CPIC information?
 ____ Report writing?
 ____ Notebook entries?
 ____ RMS database entries?
 ____ Status / message updates?
 Others? _____

3.8) If operating a CAD system, are the MDTs integrated within it? _____

3.9) Does your current MDT system meet all of your needs? If not, please explain.

3.10) If your agency has developed future expansion plans for field data communication, please list the major requirements and capabilities of the envisioned system. Also, can you indicate the expected time frame for such a system implementation?

4.0 MOBILE WORKSTATIONS

Since the objective of this investigation is to obtain information which will assist with the definition of a police specific Mobile Workstation, we can offer no current definition. However, many agencies have initiated independent studies and some pilot programs using commercially available laptop or notebook personal computers. In this section we wish to determine your opinion of the suitability of these MWSs, and examine the functional and environmental requirements for police operations.

4.1) Have you seen literature, displays, or demonstrations of MWS; what makes and models?

4.2) If your agency is considering the purchase of MWS; what will influence your choice of product?

4.3) Has your agency initiated any field trials of MWS? If so, when, what model, and can you make available to this survey the requirements document and trial results?

4.4) Are you using / planning to use MWS with standard off-the-shelf software applications such as:

- Report writing?, (specify type of word processor) _____
- Notebook entries?
- Generating and filling in standardized forms?
- Filling in standard spreadsheets?
- Accessing / updating databases resident in the MWS?
- Scheduling information?
- Personal information management?
- Other _____

4.5) Do you envision any specialized applications for a MWS such as:

- Electronic Mail?
 - Drawing of accident diagrams / occurrence information at a crime scene?
 - Global Positioning System (GPS) Information?
 - Presentation or transmission of graphics, maps or photographs?
- Please** list other potential applications.

4.6) Do you consider it essential that a MWS emulate all the communication functionality of a Mobile Data Terminal thus replacing it, or, in your view, can there be sufficient benefit from a "stand alone" MWS to justify its general use in the field. Please comment.

4.7) Given a MWS with full communication and administrative functionality, please prioritize (1st, 2nd or 3rd) the importance to the users in the field the following potential uses.

- "On line" communication with various databases
- Real time communication with dispatch
- Paperless mobile office for as many as possible administrative activities

4.8) Considering the above MWS, indicate which mode of operation would best suit the majority of the requirements of your field users. Check only one.

permanent in-vehicle mounting of the MWS with continuous real-time communication -connectivity.

removable MWS with temporary loss of communication functionality while in use outside the vehicle at an occurrence scene or investigation.

_____ the above two options are unacceptable. They provide only marginal enhancement to existing operations. It is an essential requirement of our agency, that a MWS be both mounted in-vehicle and transportable without any loss of communication functionality.

4.9) Assuming transportability, would an out-of-vehicle battery life of 3 hours for portable operations be acceptable? The current standard battery life for most portable computers is approximately this capacity. Also, what would be an acceptable recharge time for your agency?

5.0 MOBILE WORKSTATION PHYSICAL ATTRIBUTES

In this section we present questions related to the physical characteristics of a MWS as required by the police operating environment. Your answers may be based on your current experience with MWS, either in operation or in demonstrations/trials, studies or any literature and articles you may be familiar with. The physical size of a MWS is an important factor. One factor not under an agency's control is the inclusion of airbags in all new vehicles. This is why the specific make and model of vehicles you operate was asked in the General Information section. Other factors of interest are:

5.1) What is the percentage of vehicles operating with one officer vs. two? _____

5.2) Do the vehicles have separate control heads for lights, sirens and radios, or are they integrated into one or two units?

5.3) Is there other equipment permanently or semi-permanently mounted in the front seat area of the cruiser? If so, please elaborate.

5.4) Do you think the MWS should swivel when mounted in the cruiser for use from either the front seat passenger or driver position?

5.5) Do you consider a detachable keyboard as necessary, preferred, or unnecessary?

5.6) Are parameters of screen viewing angle and resulting displayed information security an important consideration of your agency? Please comment.

5.7) Is there any reason why a color display would not be preferred to a monochrome (B&W) display?

5.8) Do you consider the standard size keyboard keys available on most portable computers sufficient for police field operations?

5.9) Is it necessary, preferable, or unnecessary for keyboard keys to be illuminated or backlit?

5.10) Does your operational environment of dust, dirt, rain and humidity necessitate the requirement for a membrane type keyboard, or, do you believe a key-cap type keyboard with sufficient environmental safeguards may be sufficient?

5.11) What temperature range will the MWS be required to operate in and what would be an acceptable warm-up time?

5.12) Given the extensive use of graphical user interfaces such as Windows which require a screen pointing device, please indicate the device you believe to be most acceptable for a MWS.

Pen Trackball Mouse Arrow keys Touch screen

5.13) Is (or will) the in-vehicle printing of hard copy information be a requirement of a MWS. If yes, what information would be printed?

5.14) A MWS has the capability to capture and store large amounts of data internally. If this information must be off loaded to a database, how do you see this information being transferred? (i.e. floppy, removable hard drive, flash memory cards, etc.)

5.15) Security of the MWS and the information contained within is of high importance. Do you have any suggestions as to how you view this topic and how it might be handled at your location?

6.0 COMMENTS

If you have any further comments or observations which you believe may be of assistance, please enter them below. Thank you for your assistance.

5. SUMMARY OF RESULTS

5.1. Overview

The workstation survey was sent to 72 police agencies across Canada. A total of 48 agencies returned completed survey questionnaires, with some responding to late for inclusion into the study. Only one agency indicated, for economic reasons, they were not interested in participating.

Of the 48 agencies that did respond, they employ over 30,000 staff, and operate over 12,000 vehicles including trucks, boats and ATV's. Of these vehicles, 94% are equipped with two-way voice radio communication and 13% with two-way vehicular data communication.

The following sections indicate the major topics of investigation covered by the survey. Each section summarize the results of questions addressing the topic.

5.2. Patrol Vehicle Information

52.1. Total unmarked and marked

A Total of 39 agencies responded to questions 1.4 and 1.5 which requested total quantities for marked and unmarked fleet vehicles, summarized as follows:

	<u>Marked</u>	<u>Unmarked</u>
Total	7,996	6442
Median	43	30
Average	281	165
Less than 20	9 agencies	14
20 to 49	13	10
50 to 99	6	5
over 100	11	10

52.2. Vehicle Types

A total of 29 of 40 responded to question 1.7 requesting major types of patrol vehicles along with other vehicle quantities such as motorcycles, ATV's, boats and leased automobiles. An accurate count of vehicle types was not obtained because of the variety of ways in which the information

was reported. In addition, in hind-sight, an indication if bucket seating is in use would have been useful. The question did establish that the Chevrolet Caprice (total 1240) was more prevalent than the Ford Crown Victoria (683) and bucket seats are standard. Other vehicle types totaled 1564.

52.3. One Officer vs. Two Officer Patrols

Question 5.1 established the percentage of 1 officer vs. 2 officer vehicle patrols. If the agency operated 1 officer during the day and 2 officer at night they answered 50%. A total of 36 responded with the following result:

100% 1 officer	8	50%	6
90% to 99%	10	Less than 50%	5
51% to 89%	7		

5.2.4. Vehicular Equipment Console

Question 5.2 asks if vehicles have a control console for lights, sirens, or radios, and if they are separate or integrated into one unit. A total of 37 responded with 15 (40%) indicating integrated units while 24 (65%) indicating separate units. Two stating their fleet was mixed and indicated both.

5.2.5. Other Equipment

Other equipment permanently or semi-permanently mounted in the front seat area of the cruiser includes spot lights, batons, MDT's, and flash lights. A total of 37 with 15 indicating radar equipment, 17 a weapon mount, 18 communication equipment, and 21 Other.

5.3. Use of standard software

5.3.1. In The Office

The quantity and type of in-office standard software was asked in question 2.6. A total of 38 responded. The request for "other" software used was predominantly answered by an indication that a data base package such as Fox Pro or DBase was being used. Totals for the following standard packages were obtained as follows:

WordPerfect	35	92%
Lotus 123	17	45%
MS Word	6	16%
MS Excel	7	18%
MS Windows	2.5	66%
Other	24	63%

5.3.2. In The Field

Questioned whether or not the above software was used in the field on portable computers, 13 responded "YES". The majority stated use by field investigations staff.

5.4. Local Records Management Systems

5.4.1. Size, Complexity and Quantity

Questions 2.1, 2.2, 2.3 and 2.4 were included in the survey to gain an appreciation for the size and complexity of existing local records management systems. It was anticipated a MWS requirement would be query of, or direct entry to this database. This information will be useful in future investigations.

The RMS supplier, date of installation, number terminals and departments connected, and, what type of computer architecture was asked and can be obtained from the CPRC if required. Two agencies indicated they have no local records computer system. The wide variety of system architectures varied from a single desk-top PC to a large VAX cluster running 800 terminals.

The result shows 18 or 47% of the installations have been installed since 1989, indicating a significant percentage of new "Open Systems" architectures.

5.5. Voice Communication Operations

5.5.1. Quantity of Vehicles

A total 38 responded with 21 (55%) indicating voice communication capability with all vehicles, 33 (87%) with over 90% of vehicles, and 5

(13%) with less than 90% the lowest being 40% of all vehicles. Vehicles of all types such as boats, ATV's, motorcycles, and 4X4's, were included.

5.5.2. Dispatch Positions

The number of dispatch positions reported are as follows:

<u>Positions</u>	<u>Agencies</u>	<u>Percent</u>	<u>Positions</u>	<u>Agencies</u>	<u>Percent</u>
1	3	7.5%	4-5	6	15%
2	11	27.5%	6-10	4	10%
3	7	17.5%	11+	8	20%

5.6. Data Communication Capability

All agencies responded whether or not they use vehicular data communication, with 17 or 43% indicating they do.

5.6.1. Requirement for

Only one agency reported they have no requirement to incorporate vehicular data communication in operations. All 18 others who answered question 3.1 and do not have MDT's stated they have the requirement, and are either planning or purchasing.

5.6.2. Future Plans

Of the '21 who answered if they have future plans or not, 2 stated "not right now", and 19 answered yes with comments such as:

- ⇒ "OMPPAC to decide next year"
- ⇒ "AVL 1997, graphics 96/97, report writing 1997"
- ⇒ "1998 complete CAD update, want MWS"
- ⇒ "digital dispatch of 911, PIRS, CPIC, etc."
- ⇒ "at scene data entry, FAX, local filed CPIC & RMS"
- ⇒ "graphics for mug shots and building layouts"

5.6.3. Current Needs Met

Of the 17 who currently use data communication, 15 use data for vehicular dispatch. Six stated their current needs are met with their existing installations, 11 with needs not met. On the other hand, all of the above 6

further indicated a future desire for more advanced features which could not be met with existing equipment.

The 11 others whose current needs are not met with existing equipment stated deficiencies such as:

- ⇒ “require RMS query and entry”
- ⇒ “report writing and notebook entry required”
- ⇒ “no, need computer for further expansion”

5.7. Mobile Data Terminal Installations

5.7.1. MDT Quantities

Of the above 17 users, the reported quantities of mobile data terminals in use totals 1617. The most popular manufacturer of MDT's installed is MDI, with Motorola, Kustom, Grid, Compact, and IBM following respectively. Thirteen or 77% have installed terminals since 1989.

5.7.2. Voice or Data Dispatch

Sixteen responded to question 3.5 indicating a percentage of data vs. voice dispatch. Four answered 50% commenting simultaneous dispatch. Three answered 0% indicating no use of data dispatch, while six others answered above 90% data. The remaining three answered 60% 60% and 75%.

Questioned whether dispatch communication is better served by data or by voice, 25% stated both, 56% data, and 19% voice.

5.7.3. MDT functionality

The following list summarizes the response to question 3.7, asking what functions are performed by the MDT's¹.

local RMS query	12
CPIC query	16 out of 17
Report writing	4
Notebook entries	3 (these 3 use PCs)
RMS database entry	3

¹three of the MDTs included in this group are portable computers.

Status or messaging	14
Other	2

“Other” answers were - pending calls - unit assignment - call details - HAZMAT.

5.8. Computer-Aided-Dispatch Operations

58.1. CAD Systems

Out of 35 who responded to question 2.5 - who was their CAD supplier ? - 6 indicated they have no CAD system. Twenty-eight or 70% have CAD systems supplied from in-house developments or various System Integrators. Over 58% have had their system installed since 1989.

5.8.2. RMS Integration

Twenty-two or 76% have integrated CAD and RMS systems, with 18 having 911 capabilities and 24 answering yes to complaint taking features.

5.8.3. CAD MDT Integration

Fourteen agencies reported their MDT's are fully integrated with their CAD systems. Only two MDT users with CAD systems do not have them integrated.

5.9. Mobile Work Station

5.9.1. Knowledge of Products

When asked if any MWS product literature had been reviewed, 26 out of 36 replied Yes.

5.9.2. Influence Purchase

When asked what major issues will influence your choice of product if purchased², a total of 28 responded as follows:

²some answered even if they have no future plans to purchase

Cost	18
Ruggedized	17
Flexibility	20
Other	22

The 22 Other, included parameters such as, memory capacity, communications interface, size, serviceability, standards, possible elimination of other equipment, "open" product, radio modem, pen-windows capable, AVL, GUI, GIS, and, results of this survey.

5.9.3. Field Trials

Surprisingly, out of the 34 agencies that answered question 4.3, - have they done any field trials ?- only 5 answered yes.

5.9.4. Use of Standard Software

When asked what standard off-the-shelf software applications are envisioned for use on a MWS the following replies were given from the 25 agencies who answered:

Report writing	21	Local database	20
Notebook entries	15	Scheduler	15
Filling forms	22	PIM	10
Spreadsheets	7	Other	9

Answers to Other include, WAN for Email and document transfer, and complete mobile office software.

5.9.5. Use of Specialized Software

When asked what specialized software applications are envisioned for use on a MWS the following replies were given from the 32 agencies who answered:

Email	29
Pen Drawing	23
GPS, AVL	20
Graphics, pictures	26
Other	7

Answers to Other include, bar code reader, mug shot database, magnetic strip reader, FAX, on the spot live video feed from car to communications centre.

5.9.6. Standalone MWS

Question 4.6 attempted to establish if a MWS must emulate all the tasks of a MDT, thus replacing it, or could the addition of a MWS complement existing MDT's and be used for advanced and administrative applications without the necessity for wireless connectivity.

The response was an overwhelming NO! Of the 30 who responded, only one answered Yes. The one agency who answered Yes is currently operating in this fashion. They claim the only cost justifiable solution currently available, is not to upgrade the MDT computing power but to provide field staff with a ruggedized laptop PC in order to expand the functionality of mobile computing.

5.9.7. Functional Priority

Question 4.7 attempted to derive which primary function of a MWS was most significant to the field user. The question requested a prioritized answer to on-line connectivity, real-time dispatch communication, and paperless mobile office functionality. The results are as follows:

Function	First	Second	Third
on-line database	4	27	5
real-time dispatch	29	4	3
paperless office	3	5	28

5.9.8. Portability with Communication

Question 4.8 forces the choice of one of the following scenarios. Should the MWS be permanently mounted in-vehicle with continuous communication, transportable with temporary loss of communication while removed from the vehicle, or the previous options are unacceptable and provide only marginal productivity enhancement -- the MWS must be transportable with an in-vehicle docking station without any loss of communication connectivity. The response is as follows:

permanent in-vehicle	5
portable with comm loss	9
both	20

5.9.9. Battery Life and Recharge

Question 4.9 asked if a 3 hour battery life was acceptable when removing the MWS from the vehicle for portable operation. Twenty-five out of thirty responded yes, with others being 4, 5, and 6 hours. Two others suggested replaceable batteries would increase portability. Also, most required a one hour recharge time.

5.9.10. Pointing Device

Windowing type software applications require a pointing device for optimum operation. Question 5.12 offers a selection of devices to choose from if this style of user interface is to be used on a MWS. Thirty-two responded to this question with the following results.

Pen	11
Track Ball	10
Mouse	0
Arrow Keys	7
Touch Screen	16

5.9.11. Mobile Printer

Of the 36 who responded to question 5.13, thirteen indicated they will require an in-vehicle printer for applications such as: offense notices, CPIC reports, and mug shots.

5.9.12. Data Off-load

Given the likelihood the MWS may accumulate local data or files which will require transfer to an office system, question 5.14 asked how this may be accomplished. Thirty-five responded, some with more than one solution. The results are as follows :

floppy disk	14
removable memory card	13
removable hard drive	3
radio link	6
remove MWS	5

5.9.13. Security

Certain potential application of a MWS may result in sensitive information being stored within the workstation. Question 5.15 asked for suggestions of what security measures could be imposed. Thirty-two responded with 16 suggesting a password, and 7 suggesting log-in procedures to prevent unauthorized access. Another 10 indicated a physical “key” with 7 more suggesting complete removal of the MWS from the vehicle at the end of each shift.

One commented, since the MWS would be in radio contact with dispatch, a self-destruct message could be sent destroying all data and disabling the unit.

5.9.14. Keyboard

Question 5.8 asked if the standard size keyboard keys typically found on current notebook computers are of sufficient size for police operations. Thirty-three responded yes, while only three responded no.

Question 5.5 asked if a detachable keyboard is necessary, preferred, or unnecessary. Thirty-four replied as follows:

necessary	3
preferable	16
unnecessary	15

Question 5.10 asked if a membrane keyboard is necessary. Thirty-four replied, with 22 stating “no” and 12 stating “yes”.

Question 5.9 asked if the keyboard should be illuminated or backlit. Thirty-six replied as follows:

necessary	15
preferable	19
unnecessary	1

5.9.15. Screen

Question 5.7 asked if there was any reason why a colour screen would not be preferred to a monochrome screen. Thirty-five responded “no reason” while only one believed a colour screen may not be as clear.

Question 5.4 asked if the MWS should have a swivel mount for viewing from either front seat in the vehicle. Thirty-seven unanimously answered "Yes".

When asked if the screen angle of viewing could cause security problems, 31 responded "yes", indicating that viewing from the back seat could compromise the safety of the officer. Only 5 answered "no". Comments included; - hotkey screen blanker - swivel mount - password screen activation after timeout or hotkey blanking.

5.9.16. Temperature

Question 5.11 asked for an acceptable operating temperature range and warm-up time for the MWS. Twenty-seven answered the question with the following low temperature and warm-up results:

<u>low operating temp</u>		<u>warm up time</u>	
-10 to 0°C	3	less than 1	2
-20 to -11	4	1 or 2 min.	7
-30 to -21	9	3 to 5 min.	7
less than -30	8	more than 5	5

6. LIST OF COMMON REQUIREMENTS

The following list of common requirements for a Police MWS is derived from evaluation of the information obtained from the police survey and interviews. The list is not exhaustive, nor are some of the conclusions final. Some issues briefly examined by the survey should be further researched in order to draw definitive conclusions.

- 1) The MWS is to be used both in and out of the vehicle
- 2) The MWS should retain wireless communication connectivity when removed from the vehicle.
- 3) Careful consideration must be given to the MWS in-vehicle mounting - space is a premium.
- 4) Vehicular docking station or single docking connector for quick disconnect is required if the workstation will be frequently removed from the mobile installation.
- 5) A swivel mount is required
- 6) The MWS must operate standard DOS based software
- 7) A high resolution (VGA or SVGA) display is desirable
- 8) Local mass storage is a requirement with easily configurable expansion
- 9) Mass storage capacity, access time, and CPU power must be sufficient for future fast graphical display.
- 10) A minimum of three hours of portable battery life, with a one hour recharge time is required.
- 11) A touch screen is the most desired pointing device option. Pen, Trackball, or arrow keys are less desirable.
- 12) Multiple RS232 ports are required to accommodate peripherals, such as printers, magnetic readers, trackball, modems, bar code readers etc.
- 13) A screen blanker hotkey is required
- 14) A detachable keyboard is desired
- 15) Full travel keys with tactile response are required

- 16) Spill proof keyboard is very important
- 17) An illuminated keyboard is desired
- 18) A colour screen is preferred
- 19) Adjustable screen angle is preferred
- 20) Minimum permitted storage temperature cannot be greater than -25° (-40° in some cases)
- 21) less than 5 min. warm-up period before reaching full functionality after prolonged cold storage, is required by majority of the users