# ARMOURED DEPARTMENT


# SEMI ANNUAL BULLETIN

**Vol 2** **Jan 74**

This Bulletin is published by authority of Colonel C.H. Belzile, Commandant The Combat Arms School. Views expressed are those of the writers and do not necessarily reflect official opinion or policy unless expressly stated as such.

January 1974

## FOREWORD

The first issue of the Bulletin was a success, judging by the favourable comments received from many, particularly the Combat Groups and Regional Support Staffs.

Format has been improved and the distribution list expanded for this issue. It is my hope that the information contained in this publication will update the reader and, hopefully, further cement the bonds between CAS and the units, both regular and militia.

Once again, your comments and suggestions will be most welcome.

P.H.C. Carew
Lieutenant-Colonel
Chief Instructor Combat Arms School

## INTRODUCTION

This Bulletin is being produced as implementation plans for the re-organization of the Combat Arms School are being finalized. For nearly two years now, the School has been operating on the Branch/Departmental system. This period of stability has allowed the Armoured Department to improve its courses. Minor changes as a result of end course reviews usually take into consideration the proposed new standards recommended by recent writing boards. The CAS reorganization will not greatly affect the internal operation of the Department, but will ease the problem of resources and support.

While on the subject of support, I would like to thank the Branch as a whole, and in particular our masters, the Regiments, for the excellent calibre of instructors. Both the personnel posted in, and the incremental staff, have been outstanding.

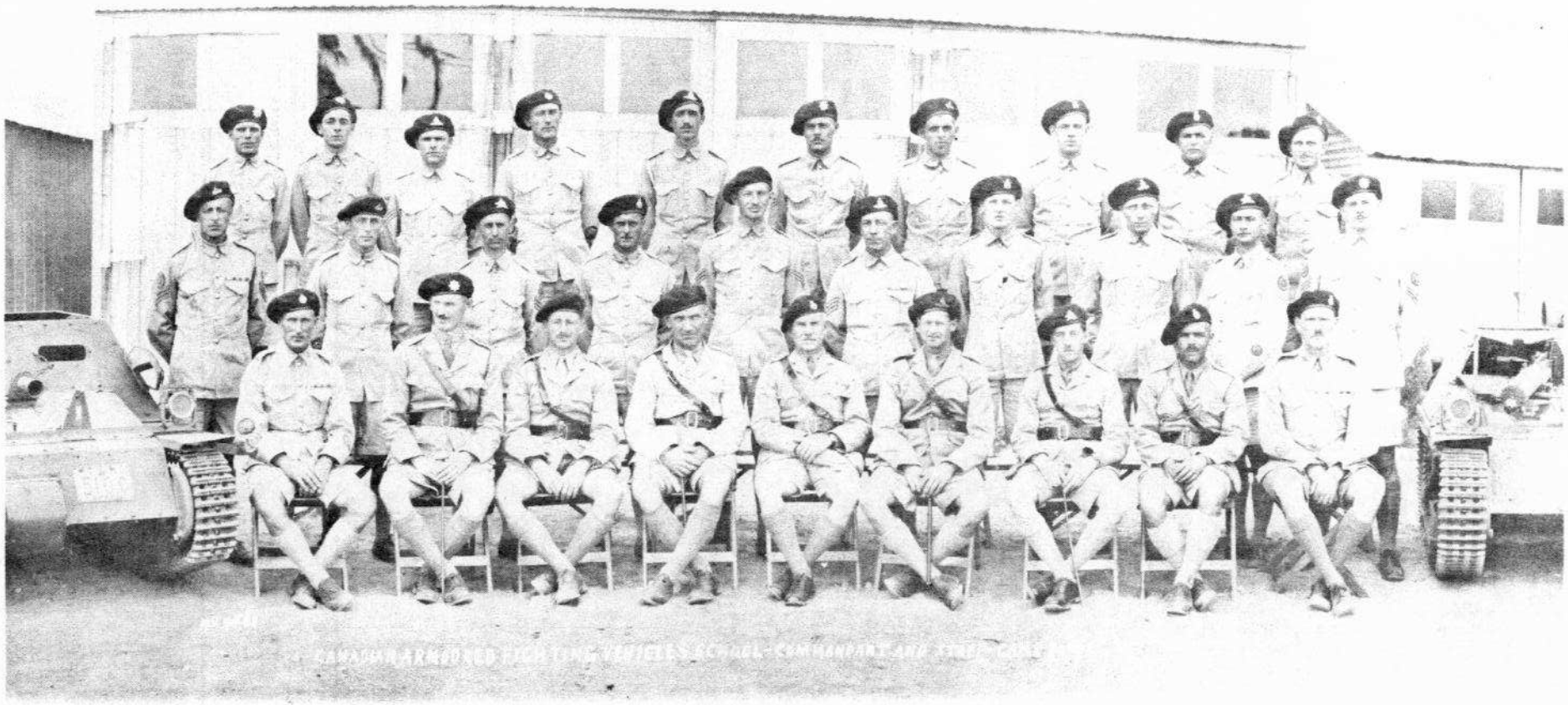
We, in the Department, feel that this Bulletin is one good means of communication which is so necessary if we are to serve the Regiments. Comments are solicited, not only on this publication, but on any phase of the training we conduct. My local is 494, please use it.

C.A. Conway
Major
Officer Commanding Armoured Department

TABLE OF CONTENTS

# SECTION 1

FLASHBACK NO. 1



CANADIAN ARMOURED FIGHTING VEHICLES SCHOOL - COMMANDANT AND STAFF
CAMP BORDEN, ONTARIO, JULY 1938

It is interesting to note the varied hat badges worn by the members of the School (particularly that of the founder of the Corps). The equipments shown were the sum total of the vehicles available at that time.

(Our readers are requested to advise CAS if they can identify the other officers and NCOs in the photograph).

# CAS/ARMOURED DEPARTMENT ORGANIZATION

by

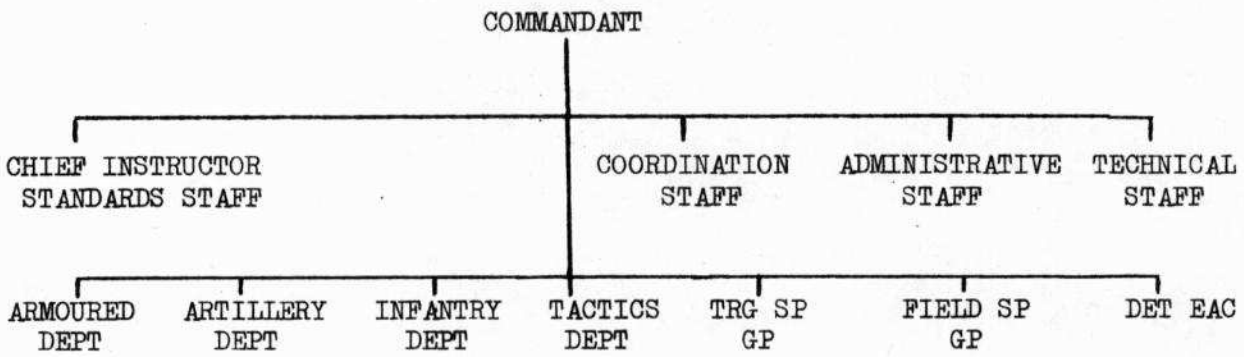
CAPTAIN W.E. CUTHBERTSON

"We trained very hard .... but it seemed that every time we were beginning to form up into teams we would be reorganized. I was to learn late in life that we tend to meet any new situation by reorganizing; and a wonderful method it can be for creating the illusion of progress while producing confusion, inefficiency and demoralization"[1].

This quotation from a wise old soldier, however true, cannot justly be applied to Armoured Department or the Combat Arms School. True, it seems that we are constantly reorganizing and many people might say, at a cursory glance, that we have gone the complete circle back to three independent schools of Armour, Artillery and Infantry. Looking closely one must agree that the miriad of organizational changes have always been progressive in some ways, though perhaps regressive in others. No doubt we have lost many of the close relationships which once existed between Armour, Artillery and Infantry when all arms were housed together as Leadership Company of Command Division. We have lost at least some of the spirit of cooperation and most of the combined armour/infantry traces that were cooked up by officers while sharing the same offices. Departmental rivalry and physical separation has ended that.

We have gained in other ways. Now units have a corps/branch school which hopefully can attempt to standardize and centralize doctrine and philosophy. In this way tactics can be taught more consistent with corps policy and the development of specialist projects and expertise can be encouraged.

Enough philosophy. The Combat Training Centre, the Combat Arms School and with it, to some extent, Armoured Department, are about to begin another round of organizational changes towards centralizing all training resources in the support of CAS courses. Briefly, the end result will be an organization based on the present Combat Arms School and should look like this:




1 Petronius Arbiter, 210 BC

Specifically, you may notice that a training support group will be added as well as a field support group. The training support group will be comprised of a detachment of each arm and a communications detachment. These dets will be formed using most of the manpower from each of C Sqn 8 CH, E Bty 2 RCHA, 2 RCR and 3 Sigs Sqn. Each det will be commanded by a captain. The Armoured det should look like this:

ARMOURED DET

CAPT ARMD

C - LT ARMD

MWO CRMN

| TK TP | TK TP | TK TP | TK TP | HQ TP | GNRY TP |
|---|---|---|---|---|---|
| C-LT Armd | C-LT Armd | C-LT Armd | WO Crmn | WO Crmn | WO Crmn |
| Sgt Crmn | Sgt Crmn | Sgt Crmn | Sgt Crmn | MCpl Crmn | MCpl Crmn 2 |
| MCpl Crmn 2 | MCpl Crmn 2 | MCpl Crmn 2 | MCpl Crmn 2 | C-P Crmn 2 | C-P Crmn 10 |
| C-P Crmn 8 | C-P Crmn 8 | C-P Crmn 8 | C-P Crmn 8 | | |

Armoured Department itself is a relatively new organization, born in Sept 72 and fortunately we have been shielded from major changes. It still consists of a headquarters and four training wings which are relatively autonomous and responsible for running courses assigned to them within their own resources.

As a result of the overall development plan for the Combat Training Centre, some minor changes will be made to Armoured Department within the next year. First, the position of OC Armd Dept will become a lieutenant-colonel's vacancy, and the 2IC position will become a major's vacancy. This will make the present captain's position into that of Department Adm Officer. In addition an extra officer and one warrant officer will be added. Pictorially it will be approximately as shown here

ARMOURED DEPT

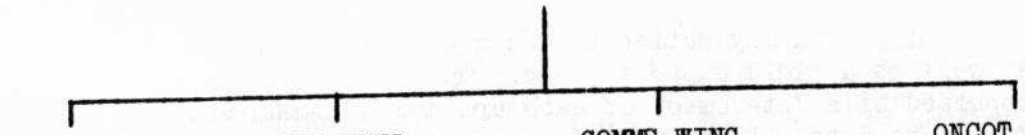
LCOL ARMD

MAJ ARMD

CAPT ARMD

CWO CRMN

WO CRMN



| GNRY WING | | D&M WING | | COMMS WING | | ONCOT WING | |
|---|---|---|---|---|---|---|---|
| CAPT | Armd 3 | CAPT | Armd | CAPT | Armd 2 | CAPT | Armd 5 |
| CWO | Crmn | MWO | Crmn | WO | Crmn | MWO | Crmn |
| WO | Crmn 5 | WO | Crmn | Sgt | Crmn 3 | WO | Crmn 4 |
| Sgt | Crmn 5 | Sgt | Crmn 7 | Sgt | Artymn | Sgt | Crmn 6 |
| | | Sgt | Artymn | Sgt | Infmn | | |
| | | Sgt | Infmn | | | | |

In summary, most of us really feel that we are headed in the right direction and that for the Combat Arms School and for Armoured Department, in particular, we are not reorganizing to create the illusion of progress while producing confusion, inefficiency and demoralization.

2
10

## ARMOURED DEPARTMENT TODAY - ANON

Just in case one of your old Armoured war comrades has been banished to the Combat Arms School and you have not heard from his since, you may find him in our headquarters or tucked away in one of our instructional wings. If not, then he is truly lost in Co-ord or even Standards Company. The Chief Instructor for CAS is LCol P.H.C. Carew.

## ARMD DEPT LIST OF DETAINEES

### HEADQUARTERS

| | | | |
|---|---|---|---|
| OC | Maj | CA | CONWAY |
| 2IC | Capt | CW | CATHCART |
| DCWO | CWO | EE | EROS |
| TRG COORD | WO | AV | HALEY |
| CLERK | MCpl | WRG | BUTLER |

### OFFICER/NCO TRAINING (ONCOT) WING

| | | | |
|---|---|---|---|
| OIC | Capt | AR | ROBERTSON |
| INSTR | Capt | LJ | GWIAZDA |
| | Capt | WH | LOGAN |
| | Capt | KT | EDDY |
| WMWO | MWO | DOWNEY | JC |
| | WO | CHESTERMAN | GE |
| | WO | ENGYEL | E |
| | WO | MARTIN | GE |
| | SGT | BARNES | CD |
| | SGT | BARSBY | BP |
| | SGT | BRANJE | NAMG |
| | SGT | HALFKENNY | GA |
| | SGT | OAKLEY | CW |
| | SGT | WARNOCK | F |

### GUNNERY WING

| | | | |
|---|---|---|---|
| OIC | CAPT | JC | HOWANS |
| 2IC | CAPT | BL | GRIFFIN |
| WCWO | CWO | V | GELDART |
| INSTR | WO | DOREY | CV |
| | WO | MURRIN | DF |
| | WO | MARRIOTT | RJ |
| | WO | SAMPSON | HC |
| | WO | WADSWORTH | LE |
| | WO | CADY | PE |
| | WO | BALDWIN | JE |
| | WO | BARIL | JA |
| | SGT | DARRAH | BL |
| | SGT | TURPLE | ER |
| | SGT | WARD | RB |

## COMMUNICATIONS WING

| | | | |
|---|---|---|---|
| OIC | CAPT | P | LEENTJES |
| 2IC | CAPT | TG | JOSEPH |
| WWO | WO | MACDOUGAL | TT |
| INSTR | SGT | ALLINGHAM | GW |
| | SGT | CUNNINGHAM | LB |
| | SGT | MCALLISTER | BJ |
| | SGT | MUNRO | JAG |
| | SGT | AVERY | JL |

## DRIVING AND MAINTENANCE WING

| | | | |
|---|---|---|---|
| OIC | CAPT | PC | MERCEREAU |
| WMWO | MWO | PATTERSON | SL |
| | WO | HUTCHINSON | HW |
| | SGT | DUFFNEY | JK |
| | SGT | DEMERS | JAC |
| | SGT | GEORGESON | WC |
| | SGT | BOUDREAU | JE |
| | SGT | ROSS | EH |
| | SGT | SANTER | RH |
| | SGT | ST HILAIRE | JRR |
| | SGT | SEARS | RT |
| | SGT | RICHES | GJ |

## SERVICE SECTION

| | | |
|---|---|---|
| SGT | RITCHIE | DA |
| MCPL | EGAN | JF |
| CPL | EDWARDS | WL |
| CPL | HANKINS | CB |
| CPL | SHUTE | PM |
| CPL | MORRISON | HB |

## COORDINATION STAFF

| | | |
|---|---|---|
| MAJ | GJ | O'CONNOR |
| CAPT | JB | BOILEAU |
| WO | CONRAD | RE |
| SGT | SULLIVAN | VJ |
| CPL | MARTIN | BF |
| CPL | LAMBE | MT |
| CPL | LEBLANC | JE |
| CPL | TAYLOR | JS |
| CPL | TOBIN | E |
| CPL | WALSH | MT |
| WO | PIERCE | JR |
| WO | MCMAHON | RH |
| SGT | KINGWELL | OB |
| CPL | DOUCETTE | PEA |

## TRANSPORTATION COMPANY

| | | |
|---|---|---|
| MCPL | FOSTON | RL |
| MCPL | GRANDY | L |
| MCPL | CLEVELAND | WG |
| CPL | BOSH | LW |
| CPL | CHISHOLM | RM |
| CPL | DAMERY | CW |
| CPL | ERVIN | RW |
| CPL | ESTABROOKS | OG |
| CPL | FITZPATRICK | GD |
| CPL | FORBES | LJ |
| CPL | MINER | EA |
| CPL | MURPHY | LL |
| CPL | STEWART | BG |
| CPL | ZINCK | LG |

## STANDARDS STAFF

| | | |
|---|---|---|
| MAJ | KLM | BARNABY |
| CAPT | EP | CAREY |
| CAPT | LJ | SKINNER |
| CAPT | RC | MACDONALD |
| MWO | MESSER | RG |

## TACTICS DEPARTMENT

| | | |
|---|---|---|
| MAJ | JK | MARTEINSON |
| MAJ | EJ | WESSON |
| CAPT | JA | DALTON |

## TRIALS AND EVALUATION

| | | |
|---|---|---|
| CAPT | CJN | SPROULE |

# THE ARMOURED STANDARDS CELL

by

CAPTAIN E.P. CAREY, CD

The Armoured Standards Cell is a component of the Combat Arms School Standards Staff. This staff is commanded by the SO2 Standards, Major K.L.M. Barnaby. He is responsible to the Commandant, through the CI, for all matters relating to the production of training standards, the evaluation of training and the development of training literature.

Each of the Combat Arms is represented by a Standards and Evaluation cell. The Armoured representation is Captain L.J. Skinner, Captain E.P. Carey, Captain R.C. McDonald and MWO Messer R.G. The Artillery and Infantry School Standards Staff also includes the FMC Writing Team, the Standards Publication Section and the Administrative Section.

A major role of a Standards and Evaluation cell is to convert a training specification and the various trade specialty specifications into tasks and statements that can be used in the preparation of Course Training Standards and Course Training Plans. The following sub-roles are steps in this function:

a. selection of training tasks from the trade specifications and analysis of data;

b. description of tasks for which training is required; and

c. determining Performance Objectives.

Other major roles of the Armoured Standards and Evaluation cell are to provide assistance and supervision in developing Course Training Plans, and to conduct reviews of Course Training Standard and Course Training Plan.

These have in fact been the major tasks of the section since the Combat Arms School re-organized in Gagetown. Now that sufficient serials for each course have been run for the courses to become stabilized, rewriting of Course Training Plans will be greatly reduced. Reviewing Course Training Standards and Course Training Plans will however, continue to be a prime responsibility and major activity.

On-Job-Training Standards are also a responsibility of the Standards and Evaluation cell. Tasking for these standards comes from Headquarters Mobile Command or from Training Command. OJT Standards have been issued for some time now, and will shortly be reviewed.

It was mentioned earlier that courses have become stabilized and little time is now being devoted to rewriting of training plans. The cell is now able to devote an increasing amount of time to evaluation. CFP 9000 states that the purpose of evaluation is to ensure that only those trainees who meet Performance Objectives are allowed to graduate. More

important, evaluation provides a means for continuous monitoring of the quality of instruction and for improving the training when it does not achieve the desired results. Evaluation has several elements, these are:

a. assistance and supervision in the development and administration of performance checks;

b. analysis and interpretation of test results;

c. ensuring that there is an effective reporting program that shows trainee performance;

d. ensuring that corrective actions are taken as required; and

e. co-ordinating reviews of training methodology, training aids and equipment and assisting in making recommendations for improvements.

All members of the Armoured Standards and Evaluation Cell become involved in all of the courses conducted by Armoured Department. Each cell member, however, has prime responsibility for six courses, which includes course evaluation.

Members of the Standards Staff recently visited 1 Combat Group. The purpose of the visit was to brief commanders on the organization of CTC and CAS and present an outline of courses run at CAS. The visit to 1 Combat Group was the last in a cycle which included all Combat Groups and 4 CMBG starting earlier this year. Reliable feedback was obtained from CO's and unit training officers on the validity of courses run by the School.

The Armoured Standards and Evaluation Section has responsibilities other than courses that are run by Armoured Department. Certain courses conducted by the Combat Arms School identify with more than one of the three Branch cells. These courses are shared among the Branch cells. Armoured Standards is responsible for the co-ordination of all training conducted by the Tactical Air Operations Wing. Every fall the School, like other establishments, is faced with an influx of new personnel. Instructor Indoctrination Courses are conducted each September by the Standards Staff to familiarize incoming personnel with the Combat Arms School Organization and the Canadian Forces Training System.

At the time of writing the Armoured Trades Specifications and Standards Writing Board is meeting. This board is being chaired by Capt R.C. McDonald and has representatives from each of the Armoured Regiments. It is intended that a complete review of crewman trades progression and courses will be undertaken.

In summary, the Armoured Standards and Evaluation Cell is responsible for providing assistance in writing Course Training Plans; it is responsible for reviewing Course Training Standards and Course

Training Plans. A role which is taking up increasingly more time is evaluation. The latter role is especially productive for Armour Department through the early identification of problem areas and by the certification from an independent source that trainees do meet the required standards.

SECTION 2

# OFFICER AND NCO TRAINING (ONCOT)

by

CAPTAIN A.R. ROBERTSON

One of the most often asked questions by the students in ONCOT is "Why do you teach Light Armour?" This is a good question but the answer is one that requires explanation. By mentally reviewing the regular armoured regiments one is struck with the variations in organization, equipment scales and their operational employment. "Neither fish nor fowl" may well be an apt description. Seeking a reasonable middle ground position between tank regiments and recce regiments, we, at the School, have adopted as our training vehicle the Light Armoured Regiment. With the presence of scout, DFSV, mortar and assault elements within the troop or higher formations it is intended that the student will master the necessary command skills for all elements. He then should be able to adjust to the equipment and organization as required on arrival at his regiment.

As is the military nature, change is not uncommon and ONCOT courses are not spared:

Pay Level 6A - Course length increased from 73 to 78 training days to provide additional time for tactics.

Pay Level 6B - Course length increased from 25 to 36 training days to provide additional time for tactics and range work.

Phase 4 - Course length increased from 45 to 53 training days to provide additional time for tactics.

Even the most cursory glance at the CAS course schedule will emphasize the high density of ONCOT courses slated Jan - May 74. This bottlenecking creates scarcity of equipment/instructor/support resources which has reached a crisis stage. The short term solution under consideration is, of course, increment instructors/equipments. We are also seeking permission to move the Pay Level 7 course, slated for Jan 75, and perhaps some other courses back into the fall of 1974.

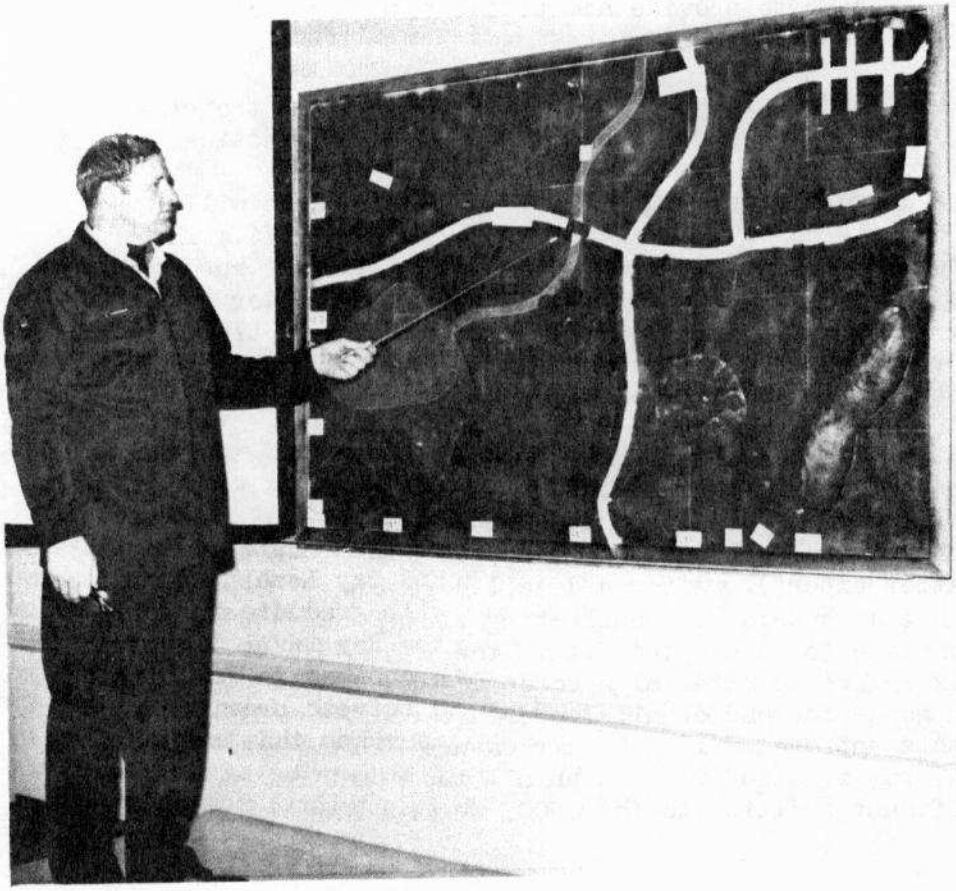
Ensuring the training criteria remains constant from one year to the next is a major concern within ONCOT. To overcome this we have adopted a bi-annual program of standardization lectures for all wing instructors, with the various subjects, e.g., Recce Ops, presented by the SME (subject matter expert). After a detailed review of the current teaching points, and a discussion of conflicting views, the Department OC confirms the technique to be adopted within the wing. The SME is then tasked to update his reference material accordingly and produce an instructors' lesson guide for use on all leadership courses within the wing. Hopefully, this approach will not only ensure all instructors follow the same party line, but it also provides an all important review/revision mechanism. A significant addition to the ONCOT workload is the addition

of ROUTP (Reserve Officer University Training Plan). We anticipate courses of 60 training days duration each, to be run in spring 74. The course is intended to fill the void left by the termination of the old COTC program. The mission of the course is to train reserve officers capable of performing the duties of troop officers in a light armoured unit.

The expected course load of the other courses we are tasked with conducting is as follows:

| | | |
|---|---|---|
| Pay Level 6A | - | 18 students |
| Pay Level 6B | - | 20 students |
| Pay Level 7 | - | 12 students |
| Crewman Pay Level 3 | - | 20 students on each of three courses |
| Phase Two | - | 18 students on each of two courses |
| Phase Three | - | 24 students on each of two courses |
| Phase Four | - | 24 students |
| Sr NCO Militia | - | 12 students |
| ROUTP Phase Two | - | 15 students |

In conclusion ONCOT is anticipating a busy but rewarding spring and summer training period.



WO Chesterman instructing OPs on relief map

# ARMOURED GUNNERY WING

by

CAPTAIN J.C.S. GOWANS

In the period since the last Armoured Department Bulletin was published in June 72, Armoured Gunnery Wing has had to accelerate its normal energetic pace. The decision of the Cabinet to retain the venerable centurion tank in active service until 1976, and the changes in the Basic Officer and Crewman Trade Specification, have had a very marked effect on the operation of the Wing. All efforts are being made to institute the necessary changes as quickly as possible.

Prior to 1973, the training conducted by Gunnery Wing was almost equally divided between Lynx and Centurion 105mm gunnery. However, the new trade specifications placed more emphasis on tank gunnery. The end result is that two tank gunnery courses and one Lynx course are now conducted. In addition, Gunnery training on most courses has been expanded and open range firing is getting more emphasis. Firing practices have been revised and significant increases in ammunition scales have been approved. Mortar or artillery illuminating ammunition is now also provided, permitting each course two nights of firing.

In addition to the major revisions already outlined, two completely new courses have now been authorized. These are the Advanced Armoured Gunner Course, described in a previous Bulletin; and the Crewman Pay Level 3 course, of completely new dimensions.

The aim of the Advanced Armoured Gunner Course is to train selected unit personnel as instructors in the complete spectrum of AFV gunnery. The course is designed to replace the former Advanced Tank Gunnery Course, which has not been conducted for the past five years. One course serial per year of 20 students will be conducted with each course of 70 training days duration. The Course Training Plan (CTP) has recently been developed and includes new material not previously taught on Advanced Courses. Students on the first serial of the new course commenced training on 19 Sep and finished on 21 Dec 73. In all, the course is extremely challenging and should be of great assistance to both the individual soldiers and their units.

During the summer, a new CTP was also developed for the Gunnery Portion of the Crewman Pay Level 3 Course. Training in both 105mm tank gunnery and Lynx gunnery has now been incorporated into one package of 38 training days. One course of 25 crewman has been completed and the second course serial is now in progress. A third Pay Level 3 serial of 25 crewman has just begun trades training and will graduate in April 74. The aim of including tank gunnery training in the Pay Level 3 crewman Course was to provide a backlog of trained tank crewman to facilitate future postings to Europe; the time required to refresh previously trained gunners and loaders is significantly less than that required

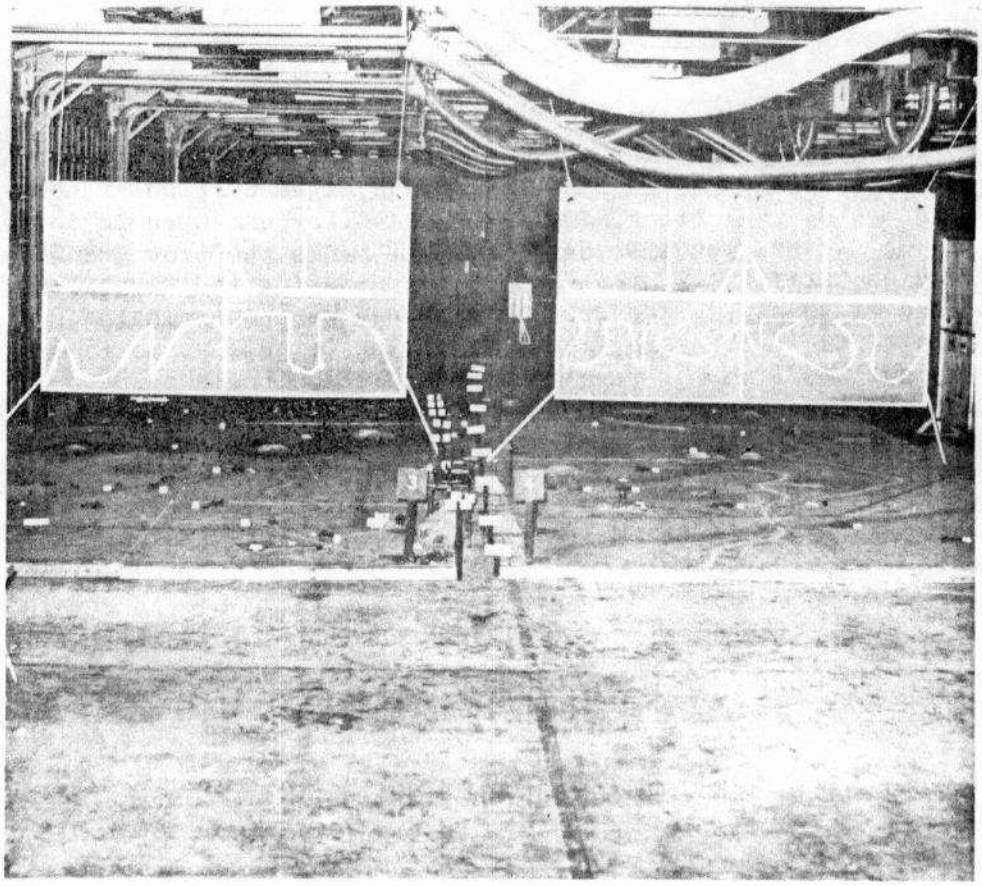
to provide complete conversion training to crewmen trained only in reconnaissance or light armoured trades. The first serial conducted using the new CTP was a complete success. Open range firing counted for 70% of the students' final grading and a specific grading system based on targets hit or destroyed was used for the first time. In all phases of shooting, the results attained were outstanding. For example, while firing SABOT engagements at moving targets up to 1600 metres, 58 hits out of 71 rounds were recorded by actual hole count. In anyone's language that is called, "good shooting". The second Pay Level 3 serial, now at Gunnery Wing, has all the indications of being every bit as successful as the first.

In addition to the activities outlined in the preceding paragraphs, Gunnery Wing personnel have been involved in a multitude of other tasks. We have also been closely involved in several projects within the last six months which have improved armoured training facilities in CFB Gagetown. Financing for an extension of the battle run lanes on tank range four, was authorized and Wing personnel laid out and supervised the construction of four new battle run lanes each 1900 metres long. The total battle run distance now available is 3,800 metres and can be used by all types of armoured vehicles. Although moving target facilities are not yet available on the new battle run, development plans for these and additional pop-up target facilities will be submitted in the near future.

A second new battle run has also been laid out and used for light armoured patrols. The new battle run commences at the Lawfield Road and construction has been carried out to improve the single road used for this battle run, however, the ground available for use is a significant improvement over the former location. It is anticipated that all future crewman Pay Level 6A and Armoured Officer Classification Phase 3 Courses will use this challenging battle run.

Another significant improvement in Wing facilities has been the addition of four more 105mm gun tanks. A total of nine 105mm tanks are now in use permitting the conduct of two tank gunnery courses simultaneously. Commencing on 8 Jan 74, all of the available tanks will be fully committed for the entire training year. The new tanks provide a very significant increase in the flexibility of the Wing.

During 1974, Gunnery Wing has been fully tasked and will conduct more courses than ever. All of the Canada based regiments have indicated their intention to participate in the DFSV Refresher firing periods scheduled from Jan - May 74. Each of the refresher periods are conducted for 15 commanders and 15 gunners and consists of an eight day refresher period and six days range firing on the 105mm centurions. The aim of the refresher period is to maintain the expertise of unit personnel in the handling and firing of DFSV weapons. In the past year, LdSH (RC) were the only unit to use the firing period allocated to them. The excellent training they received prior to arriving in Gagetown contributed in no small way to the high standard of gunnery achieved. The entire staff of Gunnery Wing are looking forward to working once again with all units to ensure that the maximum possible training value is achieved from the firing periods.



Gunnery Wing, re-arranged to allow
two courses to be run concurrently


THE LARRY GWIAZDA TROPHY

It can be seen that all members of Gunnery Wing have had a very busy schedule in the past six months. However, we have also managed to participate with some success in various extra curricular activities, such as range targetting, ammunition handling and weekend demonstrations. One service of particular pride for all ranks was provided when Captains I.R. Monro and G.R. MacLean won the first annual "LARRY GWIAZDA CHALLENGE TROPHY" for superior dartery. The trophy has been placed in a most reverent location to await the 1974 competition.

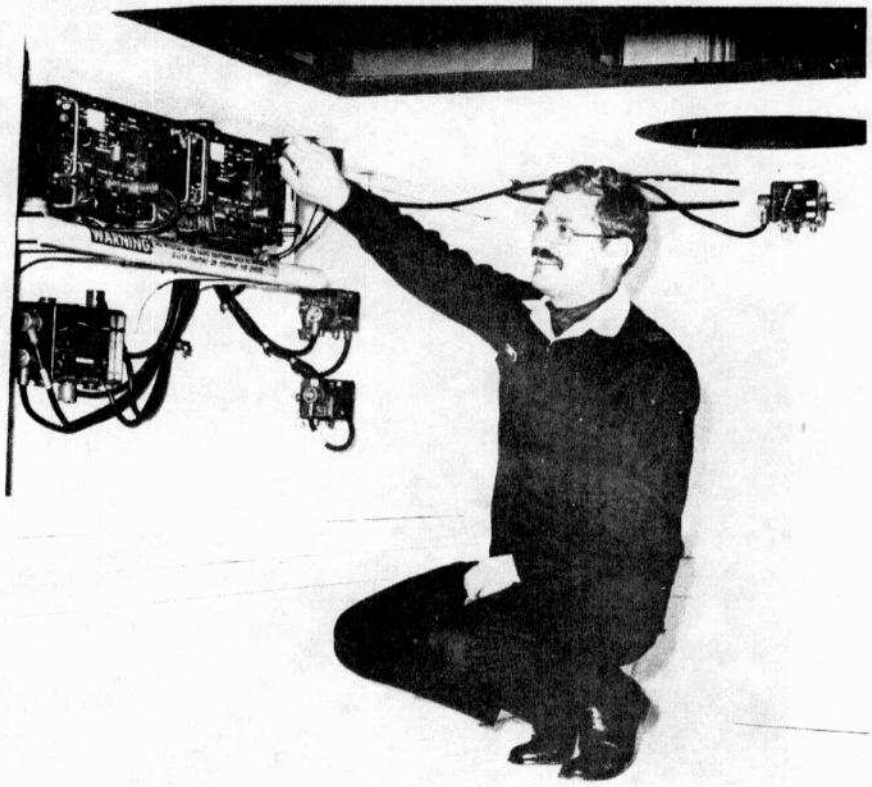
## COMMUNICATIONS WING UPDATE

by

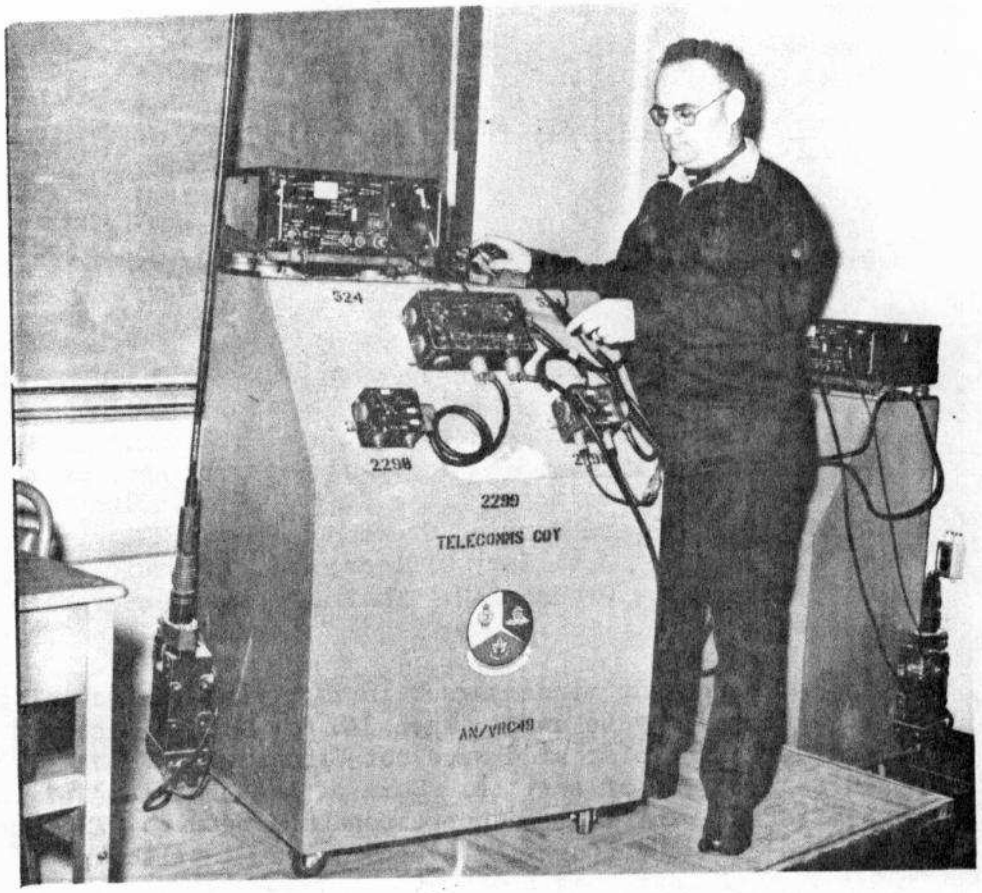
CAPTAIN P. LEENTJES

By the time this publication reaches you the fourth Advanced Communicator Course will have ended and a Crewman PL 3 course will be in the mill. By February 74, we will be into one of the heaviest training sections of the year for communications, with our instructors involved in everything from CRMN Pay Level 3, 6A, 7, Arty Pay Level 3, Arty Offr Ph 2, Inf Offr Ph 2, Armd Offr Ph 2, and the Air Support Officers Course. Not bad for a 8 member staff.

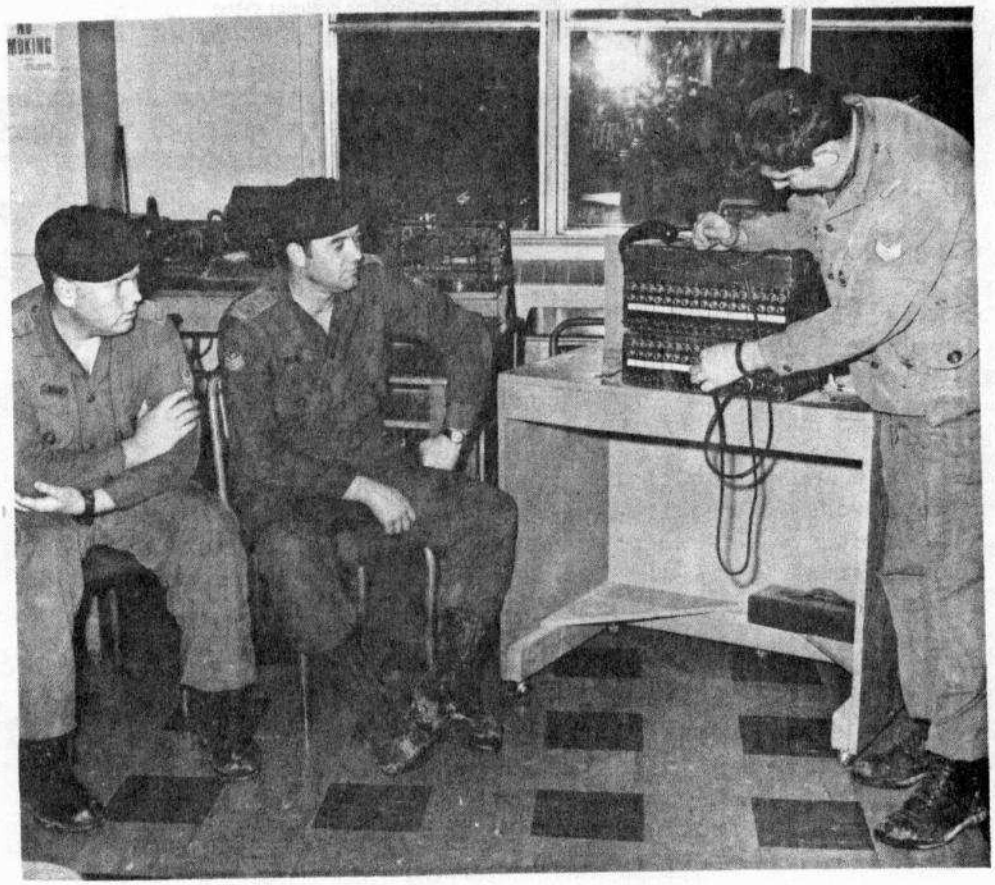
The end course review from the Crewman PL 3 courses have been completed and we are instituting changes recommended. The emphasis for the communications is interest and variety. The recruit who has just left Cornwallis is used to plenty of physical exercise and the outdoor life. For him the adjustment to an almost completely classroom environment is hard to take. Communications, by its very nature, has spent a great deal of time in the classroom and can quickly become dry and boring. This leads to lack of attention and a loss of learning efficiency. Ah ha, you say!! It took them this long to realize this. Not true! We have always known it and are finally able to do something about it. As a result, the next PL 3 Comms Course contains 20 periods of recreational training, drill and other subjects to break up the monotony. Also, as many VP exercises as possible have been scheduled on vehicles, as opposed to the classroom. By this means, we hope to get to you the best product available in the time we have for training.




Captain P. Leentjes in the Communication Wing Command post Mock-up




WO MacDougal instructing ANVRC 12
family radio harness




Sgt Cunningham instructing the
Advanced Communication Course
on the SB-22/PT Switchboard

## DRIVING AND MAINTENANCE WING

by

CAPTAIN P.C. MERCEREAU

Set off in the corner of the K lines is a GP Hut. This Hut houses D&M Wing of Armoured Department. Although the facilities are small and the instructors are somewhat cramped for space, a great deal of instruction is produced here. During the period September to December, better than 80 students have passed through the Wing. This included students on Combat Advanced Drivers Course, Crewman Pay Level 3, Artillery Pay Level 6A, Advanced Artillery Officers Course, Basic Arty Tech, Advanced Arty Tech and Pre Ground FAC. Their stay with us varied from 2 days to 51 days.

Some headway has been made since August in improving the training in D&M Wing. As some of you may be aware, when CAS moved from Borden to Gagetown, the centurion training aids were not brought, thinking that the tank would soon be out of service. Some of the training aids were finally moved after a great deal of correspondence between CAS, FMC and Borden, but many had unfortunately been discarded. Although a lot of work is required to get them back into good working condition, they will be very valuable for centurion training. We are also working on acquiring and making better training aids for basic mechanics. If all goes well, it now looks as if we may soon have sufficient aids to cover all types of D&M training. Some of our training aids are shown on the facing page.

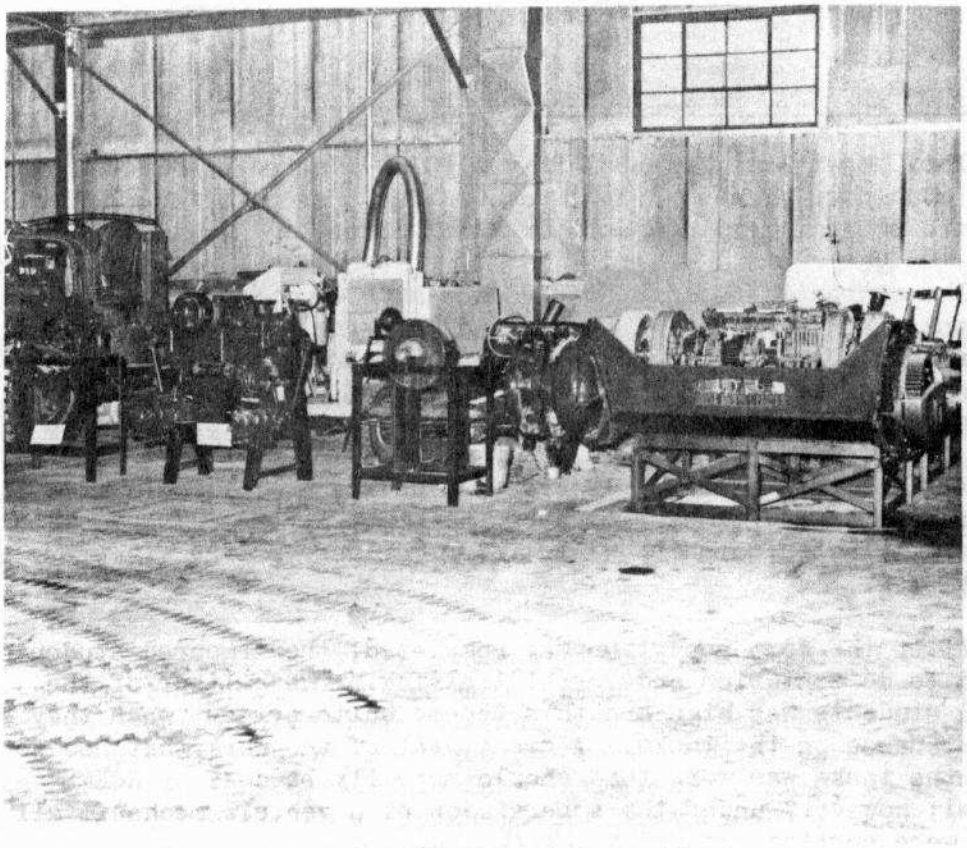
Attempts are being made to acquire permanent training facilities for D&M Wing. It is hoped that with restructuring we will get a hangar and a relatively quiet area to teach in, particularly when it comes to centurion training.

Looking ahead to courses coming up in the new year, it looks as if we are going to be kept quite busy, particularly during March and April, when we will be running a Combat Arms Advanced Drivers Course and a Pay Level 3 course concurrently.

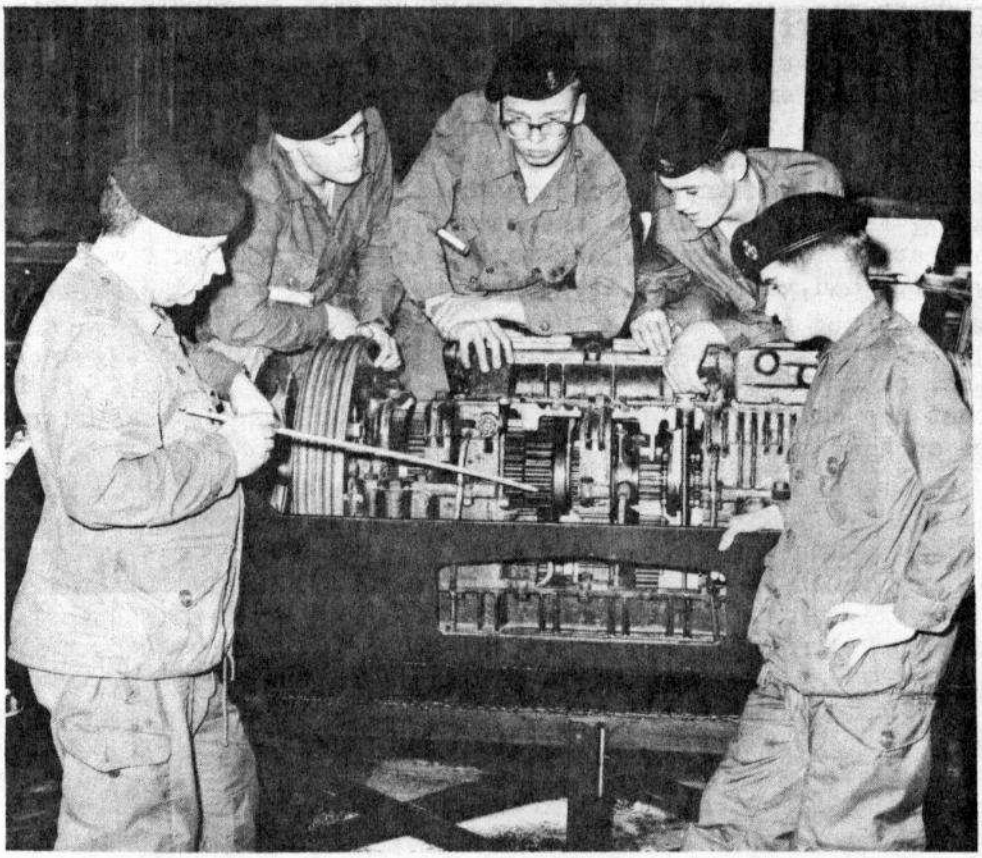
### PERSONNEL IN D&M WING

Most of the D&M instructors are new at the school and have learned quickly how much work is required to run a course. Our heaviest training period was the month of November when we produced better than 1200 hours of instructional time. This was the actual time of instruction and does not include administration or preparation time.

The old hands in D&M Wing include, WO Pierce who is leaving us shortly to go to Coord, Sgt Sears, our token gunner, Sgt Demers, our token Van Doo, Sgt Ross and Sgt Georgeson. The new faces are - Capt Mercereau, MWO Patterson, WO Hutchinson, Sgt Boudreau, Sgt Duffney, Sgt St Hilaire and Sgt Santer. During the PL 3 training we were augmented by Sgt Wallace from C Sqn 8 CH, Sgt Barsby and Sgt Halfkenny from ONCOT Wing.



Some of the D&M Wing training aids



Sgt Barsby instructing on the
Centurion transmission compartment

COMBAT ARMS ADVANCED DRIVER COURSE

The Combat Arms Advanced Driver (CAAD) Course started on 25 September with 23 students. The student breakdown was 5 Armoured and 18 Infantry. There were no Artillery students on this course.

The course is designed to produce NCOs who can perform transport duties and train personnel to drive and maintain vehicles organic to their branch. Training got off to a quick start and the students were busy from the day of their arrival preparing lessons on wheeled and light tracked vehicles.

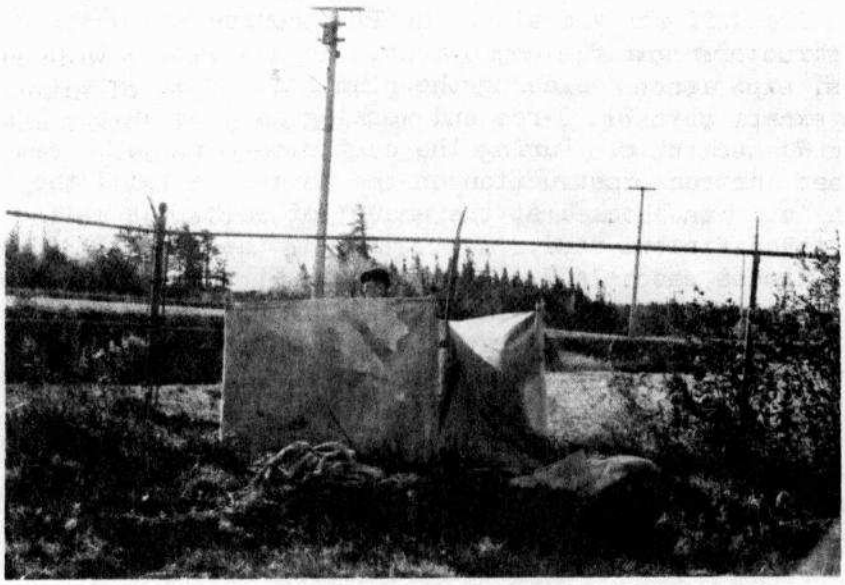
All students received instruction on the M113A1 Dozer and spent approximately thirty minutes each behind the controls. Instruction was also given on 5 ton, amphibious training, driver testing, recovery and documentation.

After the common portion was completed, the Armoured students remained to do centurion and ferret training. The caliber of the Armoured students was high and this became quite evident when they started the maintenance on the tanks. A great deal of the work that had to be done on the tanks was work that should normally be done by RCEME personnel; however, under the supervision of a vehicle mechanic all repairs were carried out and on most days we were able to go to the field with two roadworthy tanks.

During most of the advanced course we were fortunate to have a "Go For". Pte Duff arrived after the PL 3 course was under way and was given to us for gainful employment. He was very helpful and among the tasks he did were; replacing the plumbing (as illustrated), delivering meals with WO Pierce and working as part of the boat crew for amphibious training. During the centurion portion he sat in as a class member and took instruction on the tank. He found the tank fascinating and was shocked at the amount of work that had to be done in its preparation for the road. As to driving the tank, Duff was able to drive, but had, as he put it, "problems getting from 3rd to 4th gear".

Our next advanced course will be run from 26 Feb to 10 May 74. Some minor changes have been made to make it a better course. It is hoped that the calibre of students is as high or higher than the group who were on this course.

The Combat Arms Advanced Driver
Course inspecting a dozer blade



Pte Duff installs new plumbing

# LA DIVISION BLINDEE

## DET EAC

by

MAJOR J. BOURDEAU, COMDT DET EAC

This Division, better known as "LA DIVISION BLINDEE, DETACHMENT DE L'ECOLE DES ARMES DE COMBAT" is a small instructional unit consisting of a Captain, a Warrant Officer, four Sergeant Instructors, a Sergeant Administrator and a Master Corporal assistant-instructor.

The Division was formed in September 1969, its aim being to instruct Francophone candidates in Basic Armoured Corps Trade, Crewman PL 3. The candidates arriving here are mainly coming from the Recruit Training School at CFB St-Jean and from CFB Borden. They are all qualified PL 2 and a few have other military trades. Since our formation, we have trained an average of two courses a year, producing 20 to 25 crewmen per course. Most of these crewmen went to the 12e RBC, although some have joined the ranks of the LdSH(RC).

It is of interest that on most courses we gave instruction to a small number of officers in Basic Crewman Training. This is before they go on with their officer Phase II and III training.

The instructors now employed by the Division have a wide range of qualifications, experiences and abilities in all aspects of armoured corps trades, except perhaps, in the important phase of tank gunnery where only the WO has the Centurion Advanced Gunnery Course. However, all the Sergeant Instructors are qualified to instruct basic tank gunnery, which is in fact the only gunnery that is planned to be instructed at the division. Our instructors are covering all other armoured corps trades specialities, such as; advanced communications, advanced D&M, advanced mine warfare, demolitions and booby traps, combat intelligence, combat small arms, armoured tactics and administration up to and including PL 6B, plus a number of miscellaneous subjects.

On the other hand, our training equipments are not quite up to par, as far as our instructional needs are concerned. To be more specific, for the communications phase, we are well equipped except for radio equipments related to the M577, such as R/S and 4.2 KW generator.

For the D&M phase we have a certain shortage of vehicles, as all we have are a number of $\frac{1}{4}$ Ton and M113A1. To complete the proper training we have to coordinate logistical support from the units of the 5e Combat Group and Base Valcartier. This is for Ferrets, Lynx CR 2 and M577.

As far as gunnery is concerned, we have been able to complete all PL 3 training as per the old CTP, which deals mainly with the GPMG 7.62MM C1 and the HMG .50 CAL HB M2, Lynx mounted. But since the new CTP requires also Centurion tank gunnery, this causes a problem as we do not have the tanks nor related training equipments.

For the basic portion, the equipments we have are satisfactory.

Since the Detachment was formed, the standard of instruction and of training we have been aiming for and indeed are still aiming for, is the highest possible that can be achieved with the equipments and instructors available.

Our future plans are really quite simple. We are planning and coordinating the Centurion Tank Gunnery Training and will be ready as soon as the equipments become available. Also, we are hoping to get all our instructors qualified in Advanced Gunnery.

Therefore we shall carry on training Francophone crewmen.

"If you pick up a starving dog and make him prosperous, he will not bite you. This is the principle difference between a dog and a man".[1]

1. Samuel Langhorne Clemens (Mark Twain)

# SECTION 3

"PREMIÈRES IMPRESSIONS"

(SOUS FORME DE LETTRE DE L'OFFICIER D'ÉXCHANGE FRANÇAIS
À UN AMI IMAGINAIRE, LE CAPITAINE H. CHOKER)

Mon vieux Herringe:

Comme tu le sais, je viens d'être affecté à l'Ecole des Armes de Combat dans la Base des Forces Canadiennes de GAGETOWN, au NOUVEAU BRUNSWICK. Lorsque j'ai quitté VERDUN en Septembre dernier, tout le monde m'enviait d'être désigné pour effectuer un stage de deux ans au CANADA. C'est vrai, c'est un joli pays. Je ne te le décrirai pas, mais sache qu'il est immense, recouvert de forêts merveilleusement belles en automne, et habité par des gens particuliérement sympathiques.

Tu sais que ma mission ici est de me familiariser avec les méthods, les équipements, les traditions et tous les aspects de la vie militaire des forces canadiennes en participant à l'instruction des officiers et des sous-officiers de l'école. C'est la première fois qu'un officier Français est affecté en poste à Gagetown.

Je me familiarise d'abord avec l'anglais: c'est diablement différent de ce que l'on apprend à l'école et, tu sais, si nous survivons ma famille et moi, c'est que de nombreux canadiens connaissent le français et que tous font beaucoup d'efforts pour comprendre mon mauvais anglais!

La "COMBAT ARMS SCHOOL" correspond à l'ensemble de nos écoles de SAUMUR, de MONTPELLIER, et de CHALONS:(1) cavaliers, fantassins et artilleurs travaillent ici sur le même terrain, se rencontrent tous les jours au mess en salle de sport ou au club; c'est épatant pour la coopération interarmes.

L'école est installée sur une base immense: imagine un camp de 42 sur 36 kilomètres, soit environ cinq fois la surface de notre camp de MAILLY, avec ce que nous aimerions avoir dans tous nos camps: des rivières, des ponts, d'anciens villages abandonnés, des forêts, de larges terrains à chars; on peut s'y entraîner à toutes les formes du combat et je suis sûr que tu rèverais d'avoir autant d'espace pour ton escadron.

---

(1) les écoles de SAUMUR, MONTPELLIER et CHALONS sont les écoles d'application français de l'arme blindée cavalerie, de l'infanterie et de l'artillerie.

Acutellement je travaille à l'"ARMOUR DEPARTMENT", la division de l'arme blindée. C'est un plaisir de se retremper dans l'ambiance de la caisse à sable, du commandement du peloton de CLB, (2) de l'école d'équipage ... Au cours TAM, (3) il y a un système de tir sous tourelle simulé par laser qui est fort ingénieux.

Nous buvons du café dix fois par jour, terminons de travailler à $16^{H}30$(4) et nous sommes libres le samedi matin.

J'habite une maison comfortable et ne manque pas trop de meubles: les miens sont arrivés au moment où l'armée canadienne terminait de meubler la maison! Mon chien est là lui aussi: il a fait le jeune-homme pendant un mois (en quarantaine) à QUEBEC, dépensant une fortune, puis nous a rejoint en avion, non sans l'aide obligeante d'un certain adjudant MAYBEE du 12e RBC à VALCARTIER.

Tu vois ce qu'il te reste à faire (surtout avec un nom comme le tiens): pose ta candidature pour me remplacer dans deux ans! Mais d'ici là je te conseille de t'entraîner à manger en dix minutes à midi, à boire du lait aux repas, à conduire une voiture de 10 metres de long et à prendre des cours d'argot militaire canadien!

Bien à toi

M. DOYON

---

(2) CLB = cavalerie légère blindée, correspondant au "light armoured regiments".

(3) TAM = Tir, armements, munition, correspondant à l'Ecole de SAUMUR à "Gunnery Wing".

(4) la fin du travail est généralement à $18^{H}00$ en France.

# THE RAM'S HEAD TROPHY

by

CAPTAIN B.L. GRIFFIN

In 1964 an Inter-Regimental Open Range Tank Gunnery Competition was initiated, to be competed for annually by the Regular RCAC Regiments serving in Canada.

The aim of the competition was to encourage a higher standard of gunnery training within the Regiments of the Corps.

The competition was based on the accumulated results of a pre-firing check of all tanks taking part, together with a written report on the regiments firing programme and the results of all troop battle runs as conducted at annual gun camps. The assessment and scoring was carried out by members of the Instructor Tank Gunnery Team.

The competition was divided into two categories. Firstly, The Best Regiment, was the regiment with the highest gunnery standard overall, as decided by the ITG Team. It was rewarded by having its Regimental pennant flown over Gunnery Squadron of the RCAC School.

The Best Squadron, was the squadron having the highest overall score based solely on the troop battle run competitions. For this competition Major-General F.F. Worthington, CBE, MC, MM, CD, Commandant, The Royal Canadian Armoured Corps, donated a trophy, "The Ram's Head Trophy".

The Ram's Head was the insignia of the first Armoured formation, the 1st Armoured Tank Brigade, formed in Canada. Thus the Ram's Head Trophy, donated by "The Tanker" became the symbol of tank gunnery excellence.

The results of the annual competitions were as follows:

1. 1964

   a. Best Regiment - Lord Strathcona's Horse (Royal Canadians)

   b. Best Squadron - B Squadron - The Royal Canadian Dragoons.

2. 1965

   a. Best Regiment - The Royal Canadian Dragoons

   b. Best Squadron - B Squadron - Lord Strathcona's Horse (Royal Canadians)

3. 1966

   a. Best Regiment - The Fort Garry Horse

   b. Best Squadron - C Squadron - The Royal Canadian Dragoons

4. 1967

a. Best Regiment - The Royal Canadian Dragoons

b. Best Squadron - C Squadron - The Royal Canadian Dragoons.

In 1968 with the reorganization of the Canadian Armed Forces and the redesignation of all but one of the Regular RCAC Regiments in Canada, from tank regiments to light armoured (reconnaissance) regiments, the competition was not conducted and appeared to have suffered a natural death.

Early in 1973 it was felt that the Ram's Head Trophy should be re-introduced for competition within the Armoured Branch and that it should remain a gunnery type competition. Gunnery Wing CAS was tasked to investigate the possibilities of a competition and to propose a format. Several factors came into consideration:

1. Since 1970 Canadians have not competed for the Canadian Army trophy, and are not likely to in the near future; therefore any Armoured Branch competition should also include the Royal Canadian Dragoons.

2. The present organizations of the regiments and squadrons within the Branch gives rise to a wide range of vehicles and weapons, not all of which are organic to all regiments.

3. Range facilities and training resources available to units are not comparable across the Branch. However, all units are presently being provided with two centurion tanks, number 30 sights and laser fire simulators for conducting DFSV gunnery training.

4. Each Canada based unit is allocated at least one fifteen day block a year at the Combat Arms School, during which a DFSV refresher and annual classification on the 105mm gun is conducted. With the introduction of the Advanced Armoured Gunner Course it is hoped that units will have a sufficient number of IG's to conduct this training employing their own instructors using Combat Arms School resources and assistance.

5. To ensure fairness, it would be desirable that each unit be assessed by the same team of judges. However, the ITG Team no longer exists and members of the CAS Gunnery Wing are not invited to attend gun camps by all units.

Overshadowing all considerations was the fact that The Ram's Head Trophy was donated by a tanker for tankers.

After due consideration it was felt that a competition was possible and that it should be in the area of tank gunnery.

It is proposed therefore, that the competition be conducted at the Combat Arms School, during the period that units are conducting their DFSV Refresher Courses, and during the Royal Canadian Dragoon's Gun Camp. In order that fairness to the Canada based units is maintained while having the Royal Canadian Dragoons participate, it is proposed that the RCD competitors be their second line gunners. The format of the competition would be similar to the old competition in that it would be a combination of pre-firing checks and live firing.

It is appreciated that an initial edge could be gained by The Royal Canadian Dragoons because they would be using their own equipment while the Canadian based units would be using borrowed equipment and would be forced to employ sub-calibre techniques with sub-calibre ammunition. This however, could be equalized by conducting the pre-firing checks as an assessment of the ability of crews to perform properly their pre-fire checks and to discover pre-staged faults. Similarly, the live firing portion could be an assessment of crews in the correct application of techniques towards the attainment of a set standard.

Finally, all assessment would be done by the same group of Gunnery Wing Instructors for all units.

It is hoped that this basic concept meets with approval within the Branch and that the present DFSV refresher period, or whatever it may become in the future, will be an impetus to re-vitalize interest in tank gunnery. The future may lend itself to an air of certainty, but all Armoured personnel should remember that the day we lose the capability of supporting other arms with direct fire is the day we lose the Corps.

"Blessed is the man who, having nothing to say, abstains from giving in words evidence of the fact." [1]

---

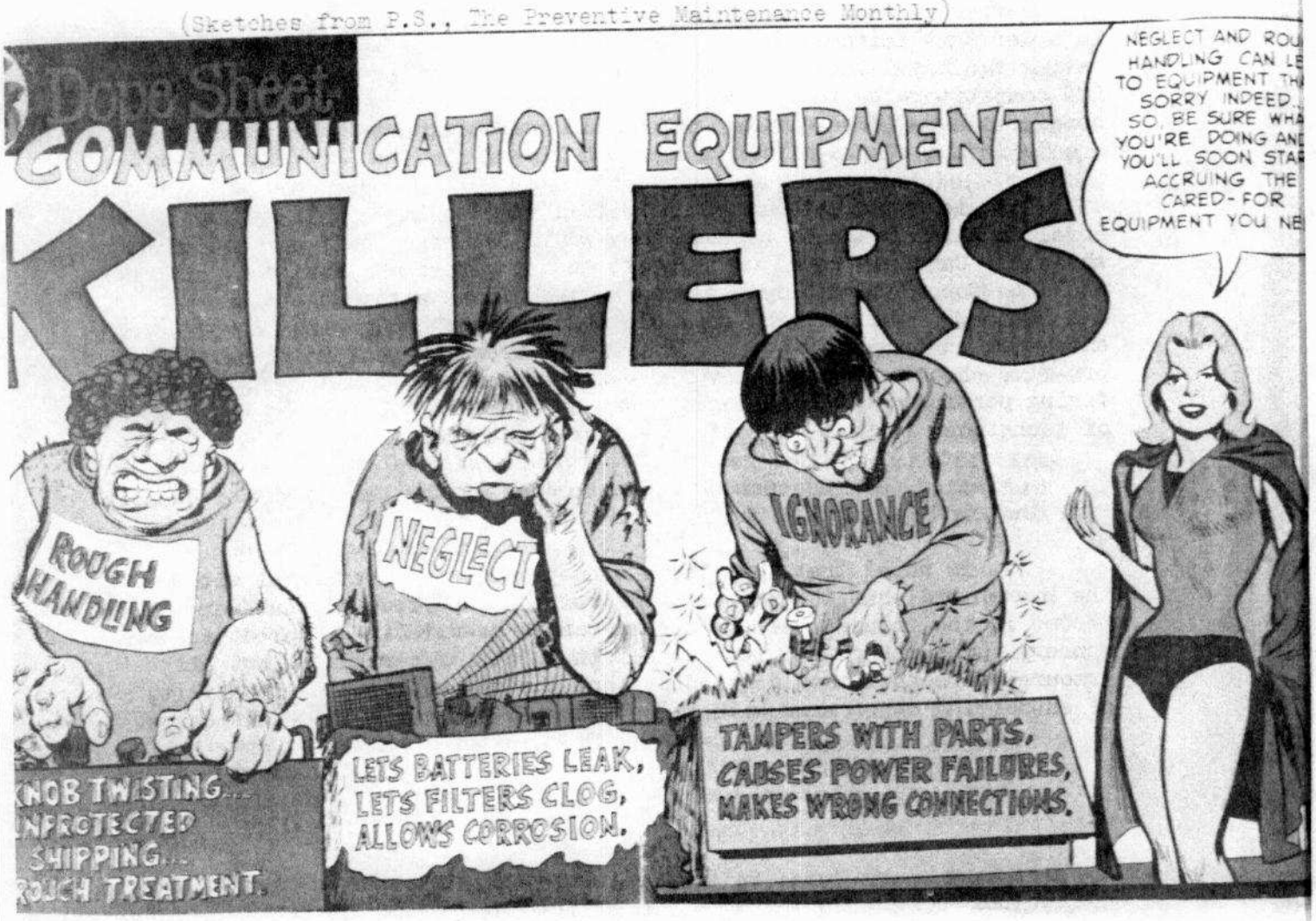
1. Marian Evans Cross (George Eliot)

# PREVENTIVE MAINTENANCE FOR RADIO EQUIPMENT

by

WARRANT OFFICER MacDOUGAL T.T.

(Sketches from P.S., The Preventive Maintenance Monthly)




Seen any of these in action lately? That big fellow whose every move in a vehicle brings instant disaster, whose only method of removing items such as connectors is by brute strength? The individual who hasn't seen, much less checked his equipment in the last three months (you'll also find his missing pieces in the bottom of his locker?) And last that self taught expert who can make anything work if he plays with it long enough?

Any one of these individuals will quickly put a radio installation out of order, and without comms you're in trouble.

Communications equipment is tough and reliable if handled properly. Components are protected as much as possible from moisture, corrosion and rough going by their containers but they are not protected from the user. Only training and proper handling will do that.

To combat these communication equipment killers the US forces use a monthly magazine detailing preventive maintenance, and handling tips. The format is designed to be appealing to the user and most of the points are effective. We have included a sample number from the most recent issues.

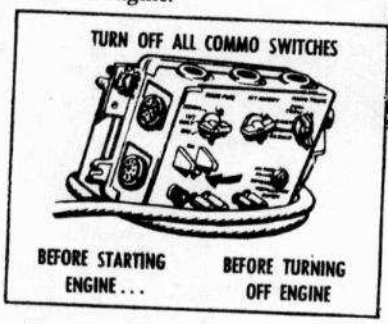
We hope that they provide some food for thought especially for communications supervisors.


...AND TURN OFF YOUR RADIOS
BEFORE YOU TURN OFF YOUR ENGINE!

## OFF TO THE SWITCHES

Turn off those AN/VRC-12 series radio set switches in your wheeled or tracked vehicle.

Don't hesitate, don't dawdle, don't reflect . . . just snap 'em off before you start the engine.




If you don't, uncontrolled current surge can really louse up your set.

If it's a slave start, keep radio switches off until you disconnect the slave cable and turn on the master battery switch.


## WATCH YOUR AS-1729

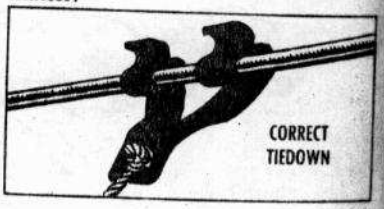
Yes, watch that AS-1729/VRC antenna. It's pretty flexible, but it can be zapped in a second if your tiedown isn't right.

For a workable tiedown, position your tiedown ring on the upper section of your AT-1095 antenna element, about 2-1/2 feet from the tip end.

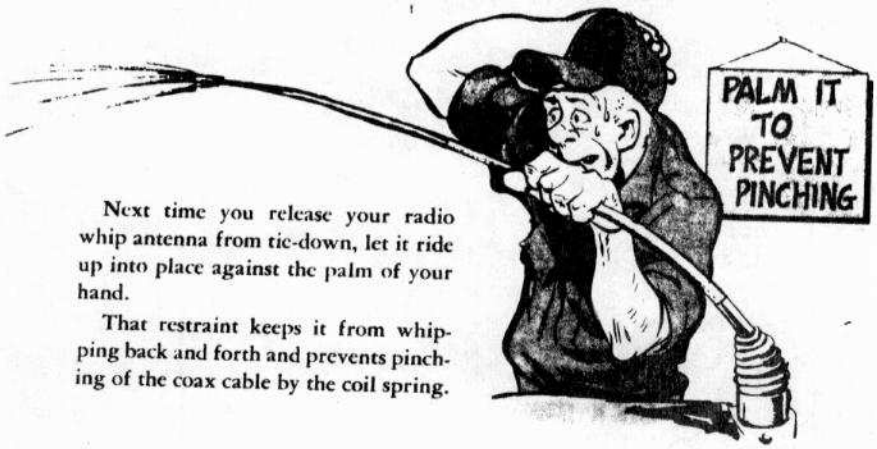
This'll bring the antenna's flexibility into play, and give it a chance to release if it has to defend itself against a misguided tree limb or trouble-causing overhead wires.

If you place the tiedown ring on the lower section of the AT-1095, the antenna could get in a bind and snap.

Some vehicles have a hold-down clamp — which shouldn't be used as a hook. The antenna snaps into the top-side of the clamp, allowing it to spring up if snagged. Don't hook the antenna **beneath** the clamp. If it snags, it'll shatter.

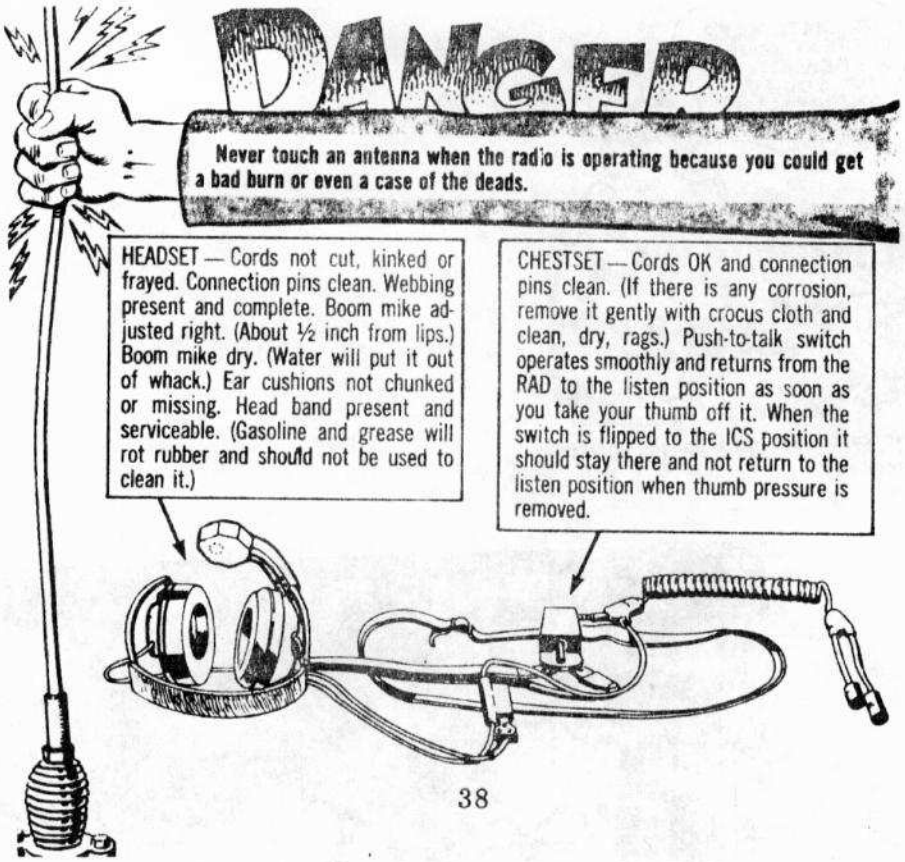



## ANTENNA RELEASE




Next time you release your radio whip antenna from tie-down, let it ride up into place against the palm of your hand.

That restraint keeps it from whipping back and forth and prevents pinching of the coax cable by the coil spring.

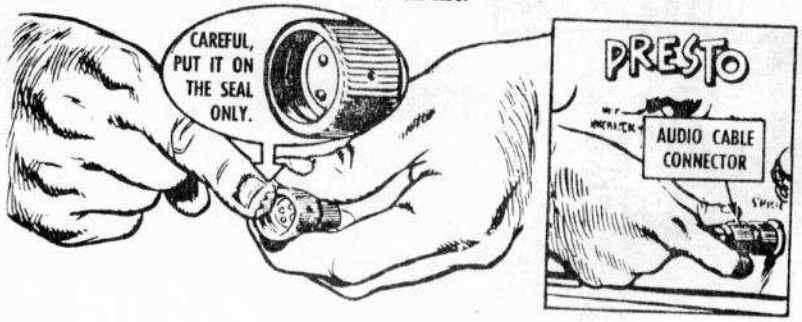



38


Sure can get you mad enough to where you want to take a hammer to the audio cable connector for equipment like your RT-246 or RT-524 and RT-505 receiver transmitter. You know . . . when you have to fight to get the connector on the set.

What makes for a hard time is that moisture seal inside the connector. But it's a battle that's easily won.

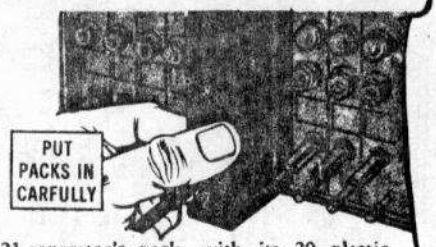
Get yourself some silicone compound and put a light coat on the seal—but not on the conductors. Not only will it make it easier to put on the connector . . . the seal will be given a new lease on life.



# SWITCHING TO SWITCHBOARDS

When you put back a TA-222 line pack in the SB-22/PT switchboard, you've got no problem . . . if you get the connections lined up right.

Otherwise, you crunch one or more of the 8 plastic female receptacles. Which is a good point against forcing the pack. Back up and try again if you run into resistance.




The same thing applies to the TA-221 operator's pack, with its 20 plastic receptacles.

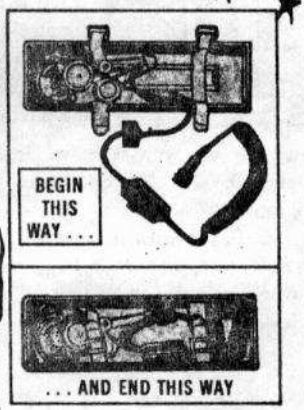
To prevent dry-rot of the rubber insulated sleeve at the insert end of the plugs, keep the insulation dry. You can use an alcohol-dampened cloth to wipe the rubber sleeve, then dry the sleeve thoroughly.

Beware of bending the sleeve . . . it's easy to break the 3 wire strands in it.

# HEADSET HEADACHE


Having trouble storing your H-182/PT headset in the lid of your SB-22/PT switchboard? It's a real uptight job.

Change 4 (Dec 70) to TM 11-5805-262-12 gives you an illustrated 4-step procedure to help you get the headset in.




24

■ Never transmit on high power if the antenna's disconnected, the cables are off the matching unit or the antenna sections are not together. If you throw out that juice under those conditions you'll burn out the power-amplifier and damage the circuits. Real bad, man, and costly, too.


■ Whatever you do, heed the TM caution warnings so's you won't jolt yourself into orbit. Those dangerous voltage warnings aren't snow jobs.

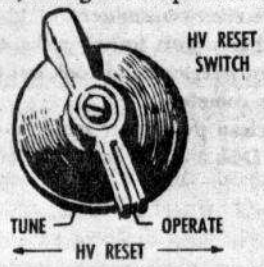


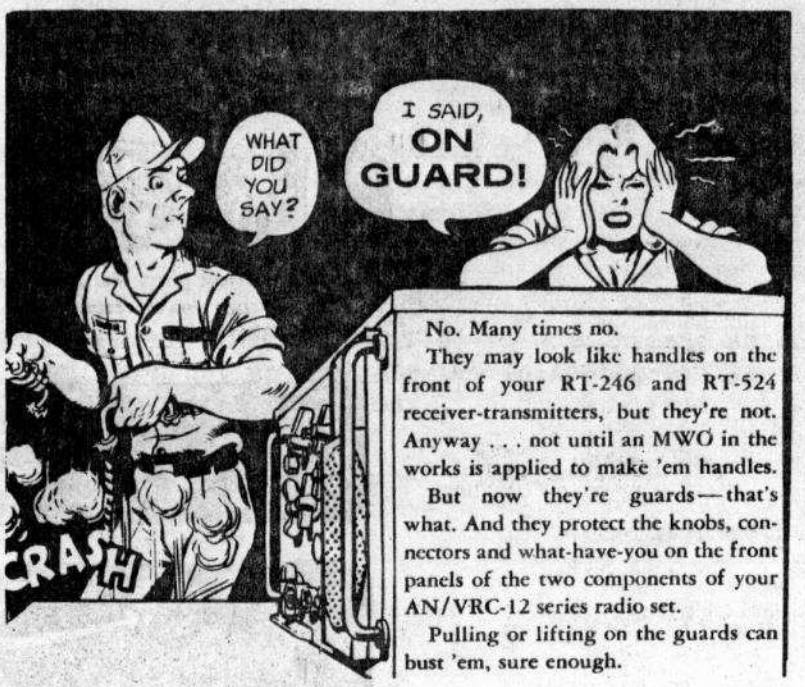
So you're talking up a storm with your AN/GRC-106 radio set, but you're not getting through.

Could be that the whip antenna you figure is sending out the word hasn't got a chance of a snowball in the RF section of doing its job. And for a good reason.

All it takes is for you to leave the UG-201A/U adapter connector on the 50-ohm line after you're through with it. The adapter connector holds open the antenna switch, taking the whip antenna out of the picture.

Something else you want to do is make sure the HV RESET switch is always on OPERATE before you turn off the set. If you turn it off with the switch on TUNE, the high-voltage reset relay won't energize. And that leaves you with a non-working set.



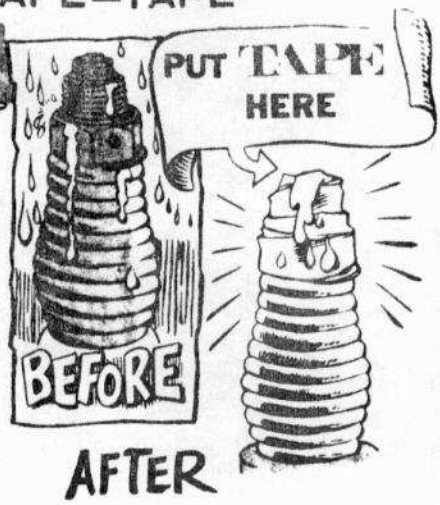

No. Many times no.

They may look like handles on the front of your RT-246 and RT-524 receiver-transmitters, but they're not. Anyway . . . not until an MWO in the works is applied to make 'em handles.

But now they're guards—that's what. And they protect the knobs, connectors and what-have-you on the front panels of the two components of your AN/VRC-12 series radio set.

Pulling or lifting on the guards can bust 'em, sure enough.

## FOR A1 SHAPE—TAPE

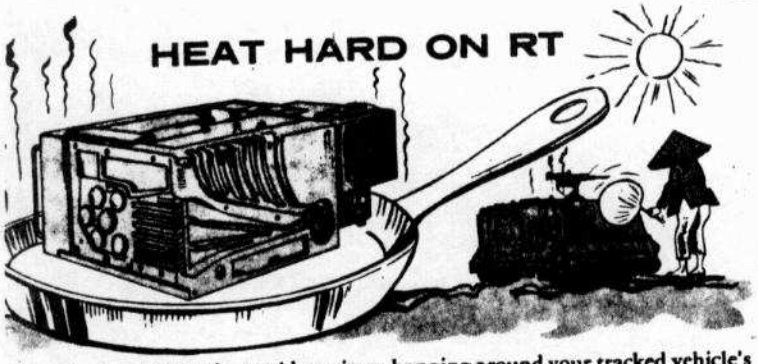



Good connections can take you — and your voice — a long way.

And one thing that'll help when it comes to your AN/VRC-12 series radio sets is to make sure the antenna base connector is clean . . . minus corrosion.

When the antenna's off, the connector takes a beating from the weather, salt air and what-have-you. So keep it covered with tape — but keep the adhesive away from the connector. If it sticks to the connector, you've got an unwanted insulator.

## HEAT HARD ON RT



There's enough heat in torrid territory hanging around your tracked vehicle's N/VRC-12 series radio set without heaping on more.

Take f'rinstance, the RT-246 or RT-524 receiver-transmitter. . . .

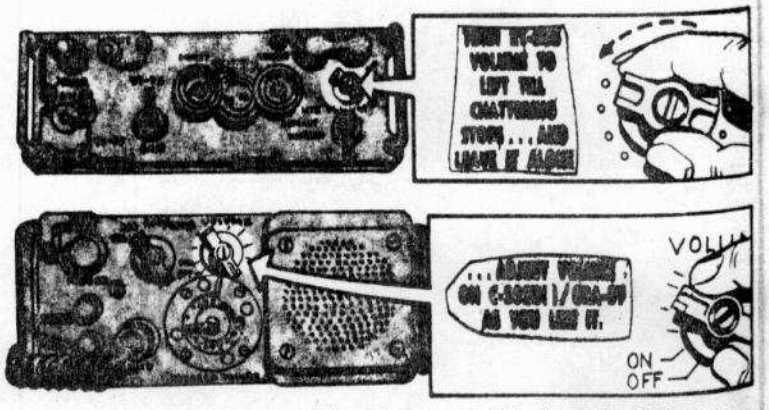
You have to keep the blower intake and exhaust ports free of packs, clothing other equipment or the radio will choke up, overheat and conk out on you. 's even better if you keep that gear off the set completely.

While you're in the remembering mood, clean the blower motor vanes and eat exchangers to help hold the heat down. Dust and dirt can gang up on that T quicker'n a water buffalo can wink.

3. If you get a chattering relay after the GRA-39 is connected to your RT, turn the RT's volume control down to mid-point or lower . . . or until the relay stops chattering. Then, turn the volume up on the GRA-39 control.



Gettin' pussycat purrs, Pal . . . or mournful, muddling motorboat sounds or chattering when you're teaming up your AN/PRC-25 radio set with an AN/GRA-39( ) radio set control group?




Too much twisting on the RT's volume control knob can break the stop . . .

# BASIC CREWMAN TRAINING

by

CAPTAIN W.H. LOGAN

## INTRODUCTION

On the 26th of September 1973 a graduation parade was held marking the completion of the first Anglophone Pay Level 3 Crewman Course conducted at the Combat Arms School in more than two years. Considerable work went into preparing and conducting this course yet the course package is considered far from complete. Comments from the students and instructors have resulted in changes that are taking place with the current Pay Level 3 Courses. Of even more importance will be the reaction by the Regiments once they have had time to assess the performance of these new crewmen.

This article will briefly outline the training that each crewman receives before he arrives at the Regiment. But more important, it will cover those changes that the Combat Arms School, and in particular the Armoured Department, has made, or would like to make in successive Pay Level 3 Courses.

## PRIOR TRAINING

All students for Pay Level 3 training arrive at the Combat Arms School after completing an 11 week course at the Canadian Forces Recruit School in Cornwallis. Here, besides instruction in general service knowledge and drill, they learn first aid, NBCW, national survival and basic map using. Weapons training covers the FN (C1), FN (C2), SMG and pistol. The students also take some fieldcraft and basic infantry training. A full physical training programme brings the students up to a good level of physical condition. In general, the students arrive at the Combat Arms School well motivated and possessing the background knowledge and training required to begin Pay Level 3 training.

## THE AIM

The aim of basic crewman training is to train the recruit to the level where he is able to satisfactorily carry out the duties required of a basic crewman in an Armoured Regiment.

## OBJECTIVES

Communications: To be qualified to communicate as an operator on a squadron net and operate the following equipment and applicable components under supervision:

a. RS C-42;

b. RS AN/PRC 510;

c. AN/GRC 125;

d. AN/PRC 25;

e. AN/GRA 39;

f. Generator sets PU-5008/U and 4.2 KW;

g. SB 22 PT; and

h. TA 43 PT

Gunnery: To be qualified to fire and maintain the following weapons under supervision:

a. 105 mm sub calibre;

b. .50 cal RG;

c. .50 cal Lynx Mounted;

d. 7.62 mm co-ax; and

e. 7.62 Lynx mounted.

Driving and Maintenance: To be qualified to drive and maintain the following vehicles under supervision:

a. $\frac{1}{4}$ ton utility;

b. Ferret scout car;

c. Lynx; and

d. M113A1

Weapons: The crewman also receives instruction on:

a. Grenades;

b. M72 LAW;

c. Booby traps; and

d. Mines.

## CURRENT AND PROPOSED CHANGES

Current Pay Level 3 Courses reflect some of the changes that could easily be made as a result of reviewing the initial course. Other changes will take time to implement and a few proposed changes may not be feasible in the near future because of circumstances beyond the control of the Combat Arms School.

Administration. A pressing need is for a Pay Level 3 Course Officer, but the commitments on the Armoured Department staff make it impossible for one to be supplied from school resources. This officer could help correct a lack in the continuity of normal administrative matters and definitely so in the maintenance of discipline and personal guidance. He could best be provided by a Regiment releasing a junior officer for the duration of a single course. This could be an officer awaiting Phase IV training and the course could privide him with a good opportunity to develop his leadership abilities.

Training General: There is a requirement for more general military training in addition to the trades training now conducted. Future courses will attempt to include periods on drill and military law. It is hoped to instill a greater awareness of the traditions of the Royal Canadian Armoured Corps and future periods will cover Regimental and Corps History as well as a tour of the Base Museum.

Each trades wing will attempt to incorporate map using into its training programme as periodic use of the compass and map would improve the students basic knowledge.

Communications. The communications portion will be reduced by about two days. Instruction on the C42 and 510 sets will be deleted although instruction on the "A" harness will continue. More exercises will be conducted in the field and there will be minor changes in the time allotted to the instruction of other communications equipment and components.

Driving and Maintenance: It is felt that the most important change in the course should be to include instruction on basic mechanics. This could affect the amount of time that must now be spent on the investigation of the different vehicles. Navaid training will be reduced but a complete defensive driving course will be included. "B" vehicles, other than the $\frac{1}{4}$ ton, cannot be introduced at this time.

Gunnery: Individual periods of instruction on equipment and techniques must be lengthened, therefore the gunnery training will be increased by one day. It is appreciated that a major problem is the student/instructor/equipment ratios. Every effort is being made to reduce the number of students per gunnery crew and provide additional instructors and equipment so that high standards can be maintained.

## CONCLUSION

A continuous review is conducted to improve the Armoured Pay Level 3 training and the calibre of the new crewman who leaves the Combat Arms School. At present, all the proposed changes are being aimed towards the standards board that is sitting. (Dec 73). Obviously, the Regiments will be taking a close look at the graduates of the latest courses and they will be assessing these crewmans' performance critically. It is hoped that Regiments can provide feedback on these new crewmen and offer comments on both the Pay Level 3 training and the proposed changes to this training. In this way the Armoured Department can better maintain the high standard that has always been characteristic of the Royal Canadian Armoured Corps.

"Cauliflower is nothing but cabbage with a college education" ([1])

1. Samuel Langhorne Clemens (Mark Twain)

## THE TRAINING OF A CREWMAN

The fall of 1973 saw the key members of Armoured units, staffs of NDHQ, FMC and the Combat Arms School gather in CFB Gagetown to form the Standards Writing Board on the Crewman Trade.

During the "Prepare for Action" when researching the previous reports, the following short story was found on top of a dead file.

### THE NUT PICKERS

A family of baboons lived on a small island near the coast of Africa. The baboons lived near a tree which grew the most wonderful nuts. The family found that by climbing the tree, the nuts could be picked and these provided a very tasty and nourishing meal. As children were born into the family, they were taught by their parents to climb the tree and pick the nuts.

As time went by, it was discovered that the nuts from this wonderful tree could be planted. This resulted in more wonderful nut trees. The baboon population, nurtured by the wonderful nuts flourished and increased into a population explosion. More trees, more baboons, more baboons, more trees; until the island was covered with baboons and wonderful nut trees.

A steady diet of wonderful nuts may be very tasty and very nourishing, but a variety of food was desired. The baboon leaders established a trade agreement with a neighboring island of fruit growers in which wonderful nuts were exchanged for wonderful bananas.

Wishing to follow the best lines of technology in an advancing civilization, the baboons decided to establish a school for nut pickers. The school was to train young baboons in the skill of nut picking. The baboon educators selected a few expert nut pickers for instructors and had them train the young baboons in skills of climbing, balance, and nut removal. To this basic course, the nut inspectors felt that the young nut pickers should be able to discriminate ripe nuts from green nuts, and that the young baboons should be able to detect a fungus or disease which could be developing in the nut trees. A course in Island Fungi and the Care and Treatment of Nut Trees was added to the course.

The Nut Tree Planters felt that any nut picker could be appointed to the Nut Tree Propagation Program and insisted that the course include forestry and horticulture. This was added to the course.

Inter-Island bartering with fruit pickers, cotton pickers and other pickers often led to points in inter-island law. In order to protect the interests of the nut pickers, the baboon lawyers demanded that all nut pickers be cognizant of inter-island law and trade agreements. A block of instruction was added to the course to this effect.

Before a nut picker was allowed to pick nuts professionally, he must obtain his Nut Pickers Union Card. Local 716 tested the applicant; however, the test was designed to determine proficiency in the entire picking profession including fruit picking, cotton picking, spinach picking and sometimes nut picking. An intensive on-the-job-training was required in this area and certain formal picking principles had to be taught before the union test could be passed.

Well, the school got started and the baboons were eager and well motivated students. By the time the full extent of the course could be realized, some of the baboons flunked Horticulture or Island Law. Some had trouble understanding nut analysis and couldn't recognize certain fungi. A few nut pickers found in their OJT phase that fruit picking appealed more to them than did nut picking and moved to another island. Many flunked the union test. A few died of old age. The only part of the course that gave no great trouble was the nut picking phase.

A symposium was held by the island educators to determine what could be added to the course to increase the quality and quantity of nut pickers. A grizzled old veteran opened and concluded the session with a very simple statement, "NUTS .....".

The moral of this story is: LET NUT PICKERS PICK NUTS

For the Crewman Writing Board - "LET TANKERS SHOOT".

"The reports of my death are greatly exaggerated." (1)

---

1. Samuel Langhorne Clemens (Mark Twain)

SECTION 4

# IMAGE INTENSIFICATION

by

CAPTAIN C.J.N. SPROULE, RCD

Current Canadian Forces Armoured vehicles are equipped with a variety of infra red (IR) night driving and gunnery aids. Operational Equipment Requirement (OER) L-1/70 (Wheeled Armoured Reconnaissance Vehicle) and OER L-14/66 (Direct Fire Support Vehicle) both call for passive night driving and gunnery aids. The reasons for abandoning IR are fairly obvious but bear stating.

1. With the use of IR equipment by Warsaw Pact countries, the use of active IR is questionably better than the use of white light. You will be spotted very quickly using either.

2. Canadian soldiers are loath to use IR. The reason for this disuse is in the opinion of the author due to a combination of factors:

   a. Unfamiliarity. Because IR equipment is not being used it isn't thought of and is left in stores.

   b. Fear. Many soldiers are frightened of the power source which in the case of the M113 for example boosts the voltage above 16,000 volts.

   c. Confidence. Our soldiers have no confidence in the equipment. They haven't used it, are unaware of its capabilities and take its disuse as proof of exaggerated limitations.

Most of us are aware that Image Intensification (II) equipment is passive; that is, it emits no light source. However, that is about the limit of our knowledge. Basically there are three stages to II:

1. The available light is collected by means of a lens. It collects both the white light and near IR portion of the spectrum.

2. The collected light energy is changed to electrical and is amplified up to 10,000 times. This is accomplished by photo cathodes which are stacked or cascaded.

3. The electrical impulse is changed into a picture by directing onto a phosphor screen in the same manner as a TV picture is produced.

Modern II equipment also incorporates an Automatic Brightness Control (ABC) since the light produces a current, excess light produces excess current causing early II equipment to 'white out'. The ABC is simply a shunt to remove this excess current. This allows II equipment to be used in daylight; another advantage over IR.

II devices can be put into one of four classifications based on their use:

1. Individual Weapon Sights. These are used on the rifle, GPMG and Carl Gustav both for surveillance and sighting and firing the weapon. They usually have a small magnification.

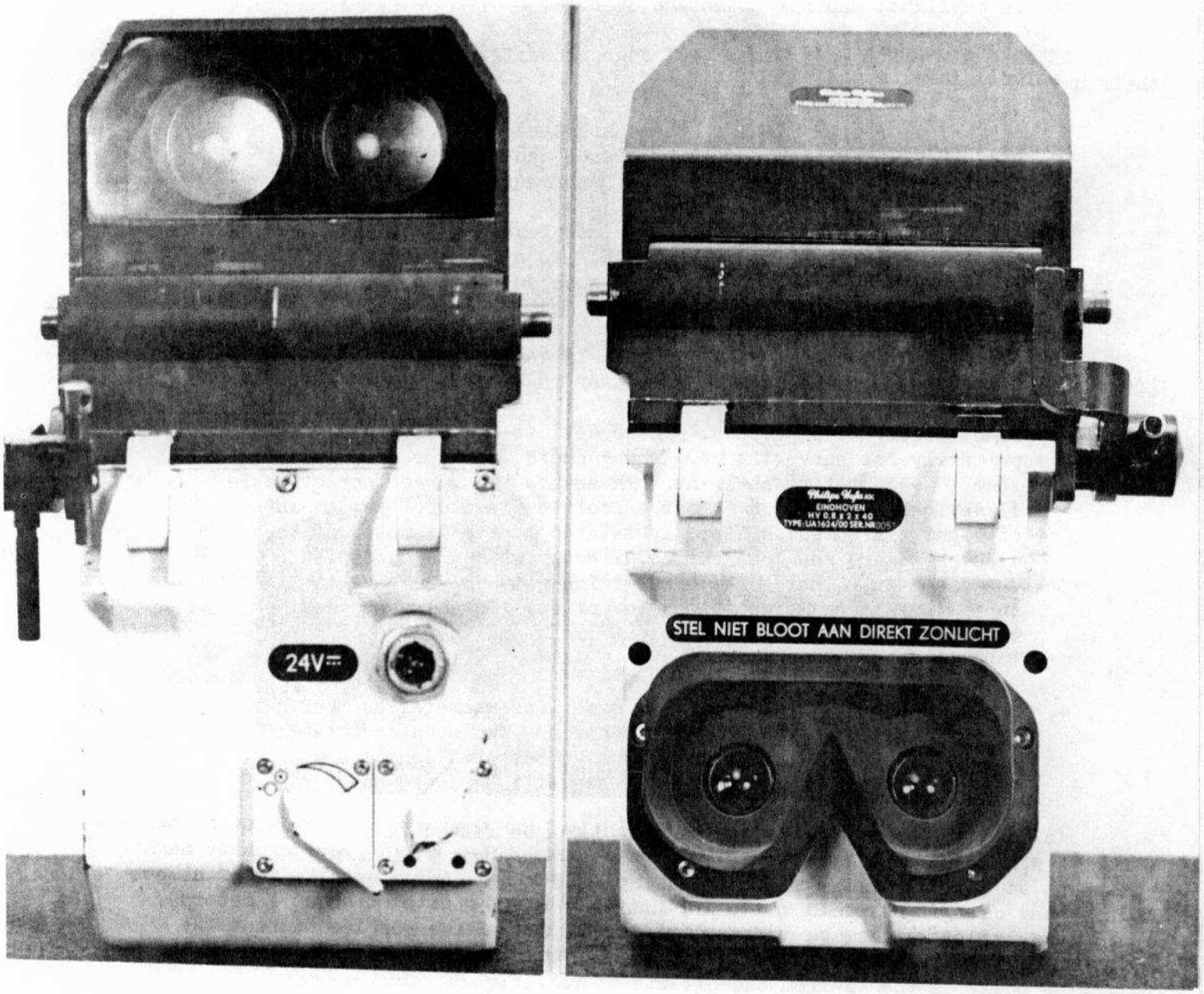
2. Crew served Weapon Sights. These are found on anti tank weapons such as 106mm RCL, and TOW. In a slightly modified form they are also found in DFSVs such as Scorpion and Chieftain.

Essentially the same as the IWS they a larger diameter lens and greater magnification hence generally a greater range.

3. Night Observation Devices. These devices are designed primarily for surveillance. The gunners, however, also use them to adjust fire at night. These are the largest practicable II devices with a lens almost a foot in diameter. The amount of light collected is directly related to the diameter of the lens, however, the cost varies directly with the cube of the diameter. Therefore to see twice as much you have to be willing to pay eight times the price. In all these devices range is dependent on the ambient light and the size of the target.

4. Driving Aids. Generally of the same lens diameter as the IWS devices they have no magnification. Two such devices have recently been on trial at the Combat Arms School and because of their complete difference will be dwelt on.

As the name implies, the Philips scope can be fitted to all Canadian Armoured vehicles. This scope proved to be better than the IR equipment at present in use with the M113, in built up areas, cross country and on roads, at ambient light levels down to moderately dark. Below this level the Philips device using the IR headlights was still better than the IR equipment. In addition the Philips scope did not suffer as badly as the IR from the effects of rain, smoke, dust or fog. The Philips scope being first generation equipment had a manual operative control as opposed to ABC, however, white out was not a problem.




The Philips Scope M113 Mount

The Second Device Were The Night Vision Goggles AN/PVS-5

The goggles weigh slightly less than $\frac{1}{2}$ kg and consist of two 18mm wafer type image intensification tubes which provide unity magnification and a field of view of 720 mils. An adjustable focus allows ranging from 21 cm to infinity (infinity starts at about 2 meters). Diopters are provided which permit use of the goggles without the individual's corrective glasses. An infra red diode is also included as part of the goggles to provide supplementary illumination out to 2 meters when working in extremely dark places.

The Night Vision Goggles AN/PVS-5 proved to be the most effective night driving aid. In addition they were very successfully employed in OPs, foot patrolling and by helicopter observers. Further testing is intended to ascertain their use to medical, LORE, CELE and field engineer personnel.

The testing done by T and E Staff at the Combat Arms School again showed up the problem of sealing. This was earlier experienced on Scorpion and Fox trials. In those cases one II device was provided the gunner. At night the crew commander was blind. The same is the case with driving aids. When the driver is equipped and the crew commander isn't, the latter cannot command his vehicle and becomes another passenger. If the crew commander is to command his vehicle he will require a night vision aid. The goggles AN/PVS-5 were an acceptable and suitable device for him.

What of the future? Will three developments bear passing on? The first is Low Level TV. This combines II and a TV camera and has the obvious ability of being able to allow more than one person at a time to see what is being observed by the device. However, this doesn't improve upon the major limitation of II equipment, i.e., the need for a fair bit of ambient light especially for fire control devices. A solution to this has been 'Laser-Gated Viewing'. This technique uses a laser pulse to illuminate the target which is viewed with an II device. The laser and the II viewer are synchronized. While laser-gating is not a passive technique, it is extremely difficult to detect.

The future, however, is returning to the infra red spectrum. This time it is for IR as opposed to the near IR of present equipment and the technique is called thermal imaging. Thermal Imagers detect the radiation naturally emitted by a target in the 8-13 micron wave length and is able to distinguish objects which are slightly warmer than their surroundings. The images produced are amazingly detailed and can be obtained through rain, fog and smoke and through foliage and camouflage.

These advances in night vision will be both a boon and bane to soldiers. Able to function as well by night as by day, his commanders will expect him to do so and he'll never get any rest.

"Experience is the name everyone gives to his mistakes."(1)

---

1. Oscar Wilde

# SIMILATOR FIRING AND RANGING WEAPON LASER

by

CHIEF WARRANT OFFICER V. GELDART

## INTRODUCTION

The requirement to train crews in tank gunnery has always been one of great resource expenditure in ammunition, man hours and range allocation. Through the use of the Indoor Miniature Range (IMR) and the Field Miniature Range (FMR) much of the initial practice and polishing of the techniques was accomplished without open range work. Crews were then taken to the open range to confirm techniques and experience the actual firing of service and practice ammunition.

The IMR/FMR concept is one of simulating the fall of shot on the ground through the use of a device mounted co-axially with the gun. Up until the mid 1960s a .22 cal barrel and mechanism was mounted on a No. 4 bracket on the tank gun barrel, and fired through the gun firing circuits. Firing of the .22 was restricted to specially prepared areas to remove the inherent safety hazards.

The development of the LASER with its particular characteristics was recognized as having the potential to replace the .22 cal rifle and drastically reduce miniature range safety problems.

## DEVELOPMENT

A Statement of Requirement was submitted by the US Army Armour School in Jul 1962 and a device was developed by the KOLLSMAN Instrument Cooperation, Elmhurst New Jersey. Canadian interest increased as the development progressed. A KOLLSMAN "Firing and Ranging Weapons Simulator (Laser) Device" was demonstrated at RCAC(S) CFB Borden in Jul 65. Five units were first put into service in Jul 69 and have been used to train courses at the CAS since that time.

KOLLSMAN Industries originally guaranteed their product for 40,000 shots. The lasers in fact produced more than the guarantee, however, they began breaking down in Jan 72. Four of the original units are still in use at CAS following a complete rebuild programme in 1973.

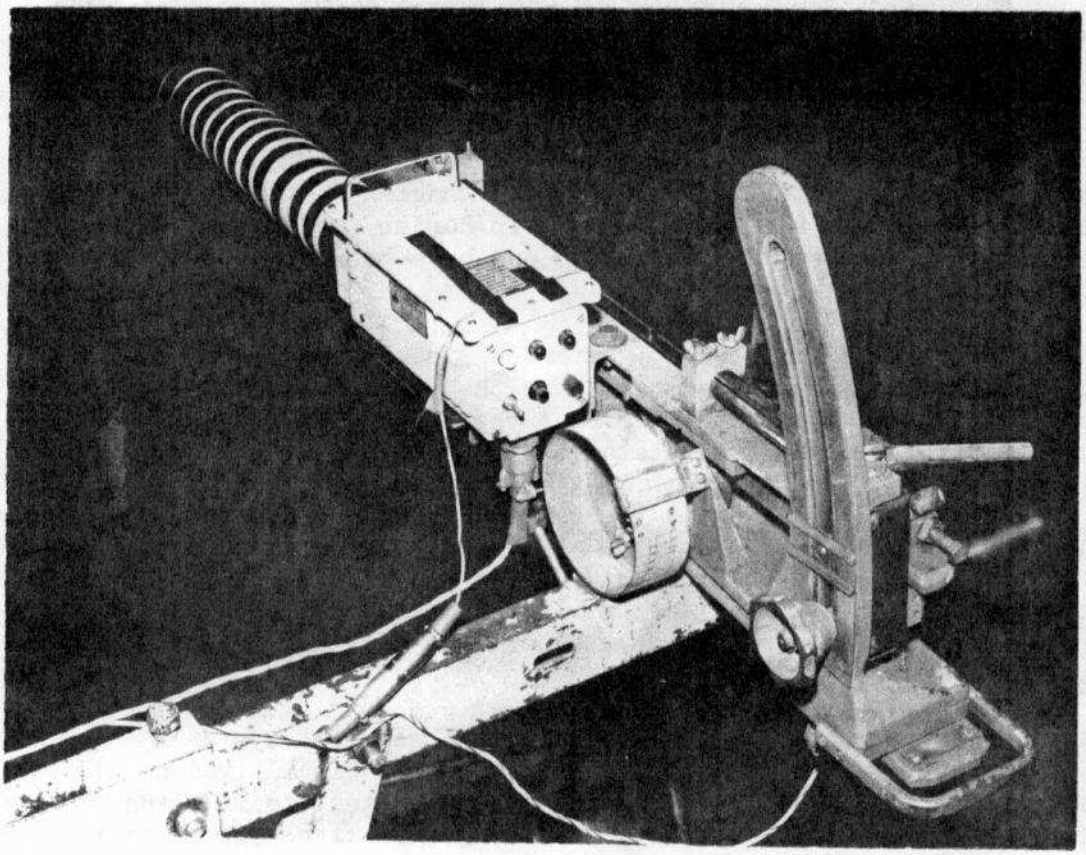
In June 72, the Special Projects Section of Defense Research Establishment Valcartier (DREV) provided a new experimental model Laser Simulator. This model, like the KOLLSMAN, was mounted on the No. 4 bracket and proved to have all of the facilities of the KOLLSMAN and several new features, at a considerably reduced cost. Two DREV models are in use at CAS under evaluation.

Both designs are powered from the vehicle electrical system through a power supply unit (PSU) to the laser source. Facility controls are located at the PSU/Simulator permitting the bracketeer to make adjustments and/or apply firing characteristics. The gunner fires the laser by using the gun firing switches.

When activated, the Laser fires a spot of light in the direction of the lay of the gun. The red spot is easily visible on the ground and is approximately ½" in diameter giving a similar sight picture to an HE hit at 1500 meters. Unlike the .22 cal, there is no permanent record of the fall of shot once the laser trigger is released. Practices where this is desired, i.e., Zeroing and Consistancy of lay, the .22 cal must still be used. Both the laser and the .22 cal must still be used, but they can be mounted on the same No. 4 bracket to allow the flexibility required for all IMR/FMR Practices.

The laser simulators are not harmful to the naked skin, however, there is a decided visual hazard for personnel down range to the simulator. Personnel must be briefed and protected from looking directly at the source even at extended ranges.

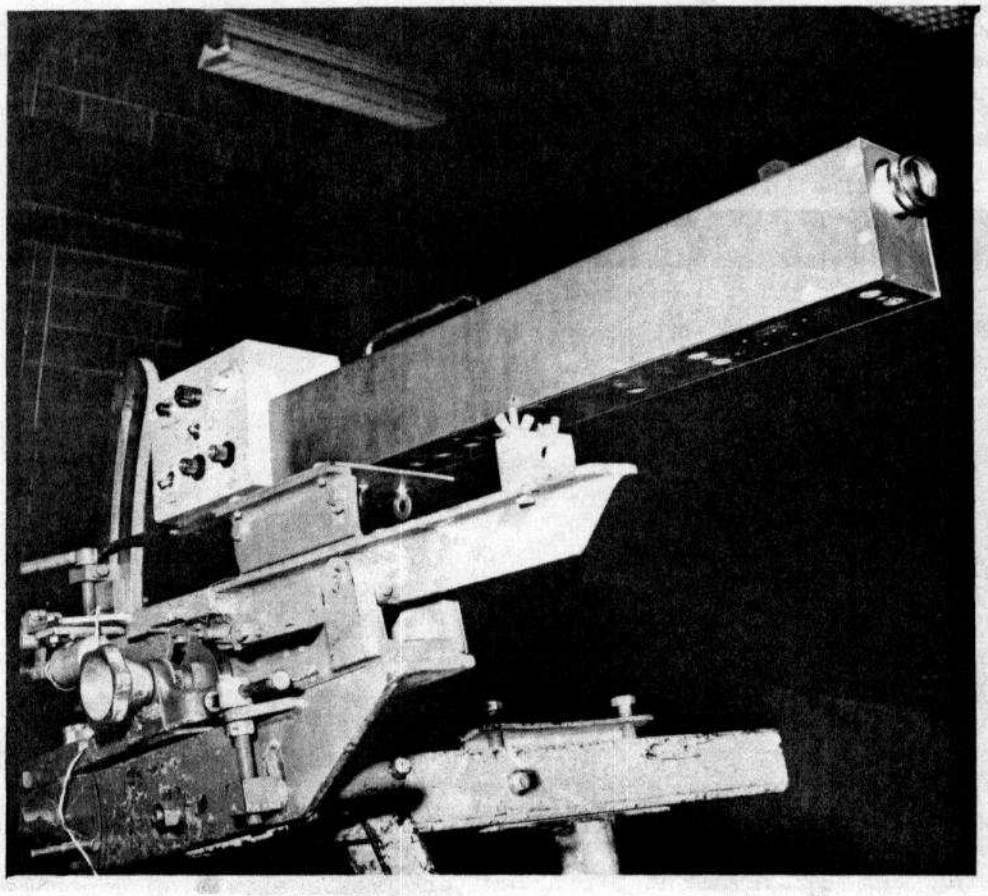
The KOLLSMAN device consists of the simulator and the wiring harness. The simulator houses the PSU and controls in a rectangular box 9 3/4" L, 4 3/4" W. and 4 3/4" H. The laser tube extends forward and houses the laser telescope. Located on the rear face of the box are three indications: "Power On", "Ready", (a short 3 sec delay between shots is necessary) and "Laser On", indicating the laser beam is on. There are three controls; "Power On/Off", "CW" (Continuous Wave - allows bracketeer to hold beam on) and "Energy Increase" which controls the intensity of the beam. Focus of the beam is possible by an internal adjustment.



The Kollsman Laser Fire Simulator

The DREV device is similar in design except the telescope and laser is covered by a rectangular housing throughout its length. A focus control is situated near the front end of the telescope housing. On the control box are two lamps; "Ready/Press to Test" and "Laser On" and two controls; "CW/Pulsed" switch and "Timer Adjustor". The timer permits adjustment of the pulse duration. A new electronic package will include the addition of a Time of Flight (TOF) control. This feature enables the simulation of the time delay between the triggering of the gun and the impact of the "projectile". The TOF control is calibrated from 0.2 to 3 seconds and should be adjusted to the desired value depending on range and ammo being simulated. At minimum setting, the laser pulse is nearly instantaneous (50 milli sec delay).

The DREV simulator also has a miniaturized PSU enclosed in the simulator. The present PSU has an "On/Off" switch, a fuse holder and a "Ready" lamp. The interconnecting harness will be discussed later in this article.

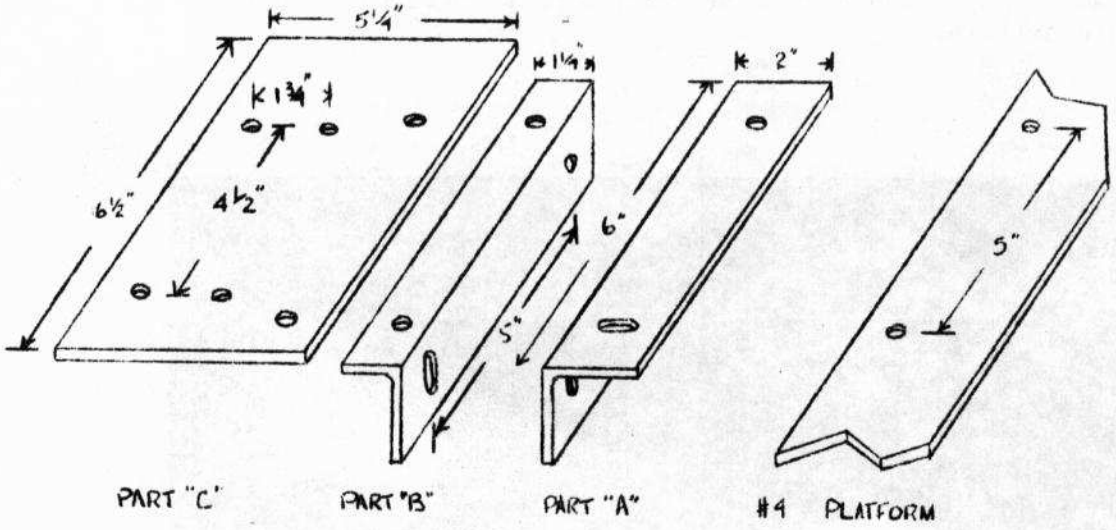


The DREV Laser Fire Simulator

MOUNTING

The mount has been designed to accommodate both types of simulator. The laser is placed to the left of the .22 cal barrel. Previous design placed the laser above the .22 cal.

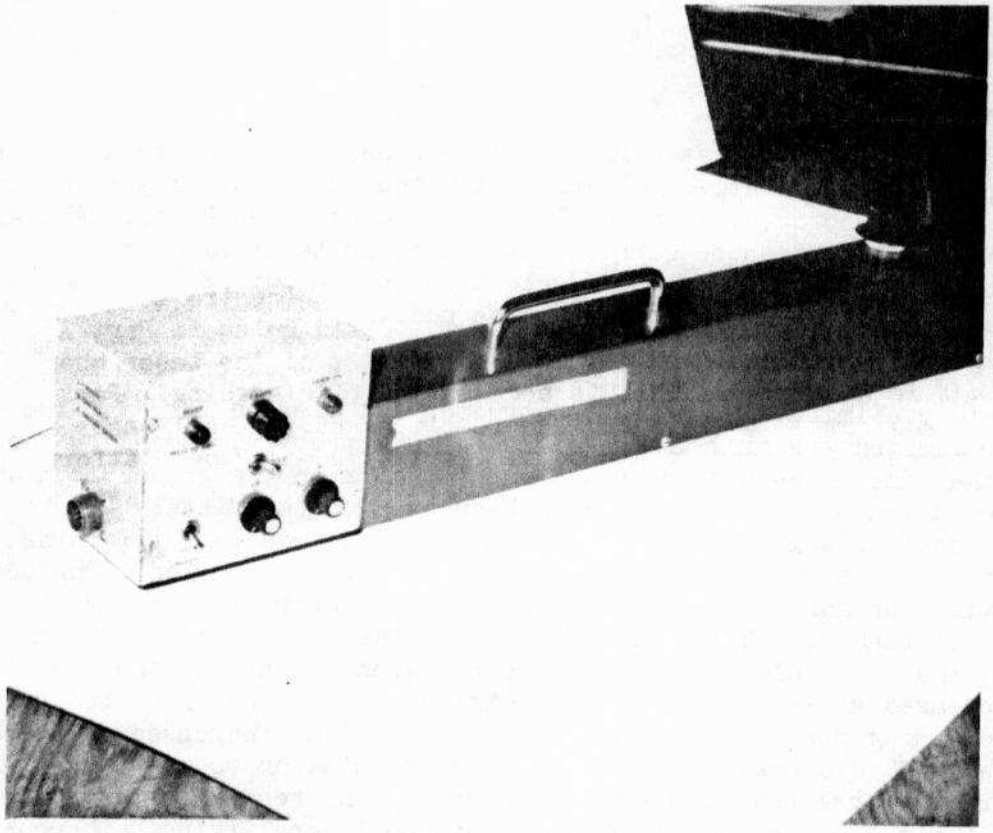
The bracket must be modified to receive Part A of the laser mount (see Fig) two holes five inches a part (centre to centre) are drilled and tapped for bolts. The elongated holes in Part A and Part B permit horizontal and vertical adjustment of the laser when the mount is assembled. This is necessary during zeroing. Part B is bolted to A and Part C to Part B. The receiving part in all cases is tapped to receive the appropriate bolt. Part C becomes the platform for placement of the laser.



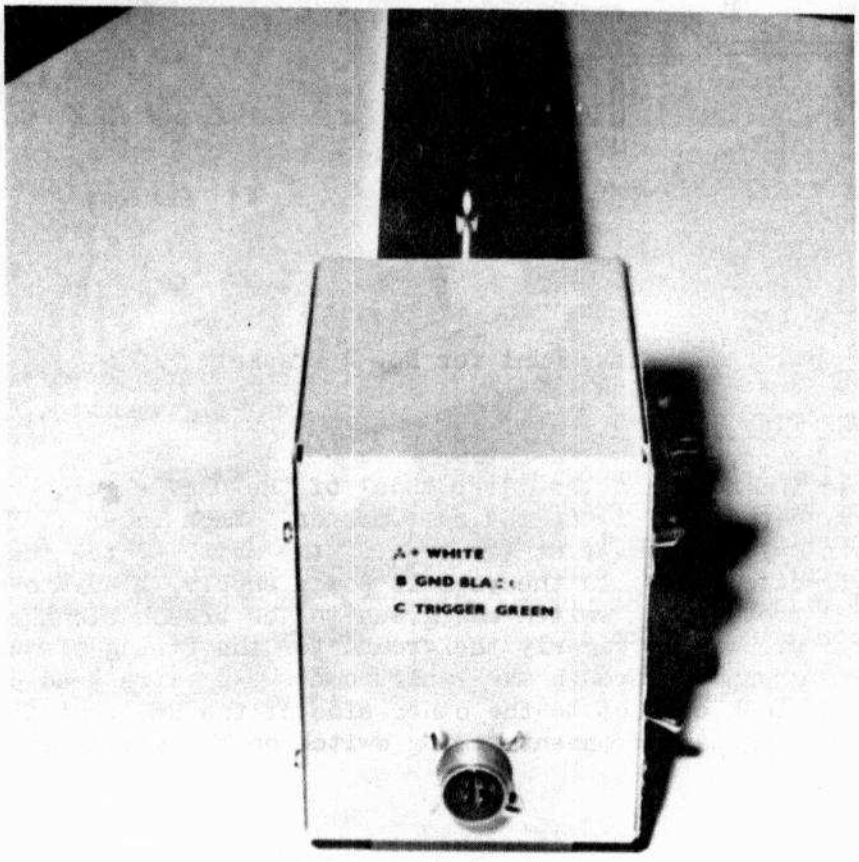

Laser Mount for No. 4 Bracket

INTERCONNECTING HARNESS

The KOLLSMAN and the later model of the DREV simulator are connected to the vehicle in the same manner. Each laser is fitted with a four pin male connector at the rear of the unit. Three leads only are used; white (+24v) to the vehicle power supply, black to one side of the RMG foot firing switch and green to the breech block contact. The fourth pin was previously the ground for the firing circuit. Current models are grounded through the laser mount. An extra lead connects the breech block contact to the other side of the RMG foot firing switch or by using the main armament firing switch on the elevation control handle.



DREV Laser (side view)




DREV Laser (rear view)

SUMMARY

The use of the laser fire simulator has done much to assist in the training of effective gunners. With the exception of zeroing and consistency practices, which still must be done with the .22 cal, all IMR/FMR practices can be carried out using the laser simulator. Greater flexibility is permitted in the selection and layout of the ranges, and safety is more easily maintained. The addition of the time of flight facility adds an extra measure of realism. The perennial problems of stoppages and bracketeer fatigue, encountered for years, have now been completely eliminated enabling instructor and crew to make maximum use of the limited training time available. The problem, caused by the fact that the laser does not leave a permanent mark on the ground from which to make a gunner's correction, has been overcome completely by the instructor's placing continued emphasis on the requirement for the gunner to remember his sight picture at the time of firing. The necessity of having the gunner make a rapid correction before he forgets where the Laser beam struck the ground has also been emphasized, with the result that both old and new gunners are keenly aware of the need for an increased sense of urgency on their part. This has resulted in shorter engagement times on the open range and an increased awareness of the need to observe the fall of shot in relation to the target and make rapid corrections. On the open range, the results attained by crews trained on the Lasers has been extremely gratifying. There has been a significant increase in the percentage of successful engagements by gunners using the normal gunner's corrections during HESH engagements.

A material authorization change request has now been raised by the office of the Director of Armour for 14 of the DREV developed Laser simulators to equip all regular RCAC units with the device. Funds have now been approved and it is anticipated that the devices will be completed in approximately 10 months. The lasers will be authorized on the following scale:

a. each light armd unit - 2;

b. CAS - 4; and

c. RCD - 2 (with one extra located in CFB Lahr in reserve).

For planning purposes, all user units are cautioned that the laser cannot be used at present to conduct zeroing or consistency of lay practices because the beam does not leave a permanent mark on a target. Therefore, units conducting these practices must still use the .22 cal rifle with the normal miniature range safety regulations governing construction and layout of the ranges.

# THE USE OF ARMOURED MG AMMUNITION LOADS

by

CAPTAIN J.C.S. GOWANS

## INTRODUCTION

A continued increase in the emphasis being placed on both night-fighting with AFVs and the engagement of low flying tactical aircraft, has generated a new demand for increased weapon efficiency and more effective training methods. In both of these areas, the use of AFV weapons, either on tanks or on light armoured vehicles has been ineffective.

## BACKGROUND

Since the introduction of the 7.62mm GPMG only one standard type of ammunition load, consisting of a mixture of four ball rounds and one trace round, has been available. Similarly, the .50 cal Browing Heavy Machine Gun mounted on the Lynx reconnaissance vehicle, has the same standard mixture of ammunition.

The fact that both of these weapons are standard equipment on all natures of AFVs currently in use, and have only one ammunition mixture has provided some significant problems in use both at night and against low flying aircraft. Although the problem areas may seem different, the cause of both problems is a lack of sufficient tracer ammunition in the standard mixture.

## NIGHT TARGET ENGAGEMENT

At night, target engagement and correction of fire can only be accomplished when some form of light is available to permit gunners to observe the fall of shot. Fire can then be corrected onto the target. Although every tank has its own white light searchlight available for target acquisition, it would be of great benefit, once the target was acquired, if the searchlight could be switched off. This would greatly reduce the possibility of the tank being pin-pointed while the target was engaged. For those of you who are now asking the question, "What difference does it make whether the searchlight is switched off when the tracer ammunition will give away my own position in any event?" Observation has shown that the tracer rounds ignite after leaving the gun barrel and that at night, this "ignition distance" is sufficient to ensure that the firing AFV will not be illuminated appreciably by its own tracer ammunition. In fact, observation from down range during firing of one tracer round to every one ball round produced surprising results. The AFV itself could not be seen and the fire appeared to be coming from a point in space rather than from a specific location. Viewed from the flank, the tracer ammunition did not ignite until it was at least 150 metres from the gnn muzzle and it did not illuminate the AFV.

In light armoured units, there is virtually no inherent white light capability available on any type of AFV. To permit the engagement of targets at night, some form of parachute flare illumination must be used. At present, no unit has this capability other than by using hand held parachute flares. Artillery or mortar illumination,, although most acceptable, is usually only available on a very limited basis for training purposes. In operations, it is submitted that there will be few occasions when reconnaissance units will be provided with either of these types of illumination. Under these circumstances, the standard ammunition mixture does not provide enough illumination in the target area to permit the correction of either .50 cal or 7.62 mm fire onto the target. Night firing trials using a one ball to one tracer mixture for both 7.62mm and .50 cal weapons produced significantly improved results. With the new ammunition mixture, targets were initially acquired using one or two paraflare illuminating rounds across a battle run frontage. Targets had usually been acquired and initial ranging bursts fired when the flares had burned out. Crews experienced no difficulty in maintaining observation of their targets or making corrections using only the light from the tracer ammunition. Crews using the normal ammunition were unable to correct their fire unless flare illumination was maintained. Obviously, the requirement for some form of illumination to permit target acquisition cannot be completely eliminated, regardless of the amount of tracer ammunition provided. However, much better use could be made of the limited quantities of paraflares now available, by using a machine gun ammunition mixture of one ball round to one tracer round.

In the event that existing or future vehicles become equipped with some form of image intensification equipment, the use of machine gun loads containing additional tracer rounds will improve the night fighting capability still further. The newest types of ambient light source equipments are not adversely affected by tracer ammunition.

ANTI-AIRCRAFT ENGAGEMENT

Statistics of losses in Viet Nam of fighter ground attack aircraft and helicopters, has reaffirmed the ability of ground troops to knock down aircraft with small arms fire. Anti-air drills and engagement techniques that have been ignored for many years are now being re-emphasized. It is intended that these drills and techniques be instituted in the near future on gunnery courses at the Combat Arms School. Evaluation of the required gunnery techniques has produced only one major problem. Both the .50 cal and, in particular, the 7.62 mm standard ammunition mixture, does not have enough tracer ammunition to permit gunners to apply corrections quickly. Modern aircraft move out of 7.62mm range (1100 metres) very rapidly, and low flying aircraft pass a position on the ground in a fraction of a second. In addition, the engagement of aerial targets is far more difficult than ground targets because there is neither background to provide contrast, nor reference points to permit range estimation and correction of fire.

When engaging aircraft, the technique used is similar to "hose-piping". To track an aircraft, the gunner estimates the amount of aim off necessary, aims and fires while continuing to track. Corrections must then be made to the point of aim by adjusting the line of tracer

in relation to the target. The line of tracer provides the only reference point. Therefore, an almost continuous stream of tracer is an absolute necessity if we are to seriously consider engaging aircraft of any nature with other than specialized anti-aircraft equipment. Although the .50 cal machine gun has a greater effective range (1800 metres) than the 7.62mm weapon, it also has a lower cyclic rate of fire. This latter characteristic, increases the gunner's difficulty because even fewer tracer rounds are fired per minute than with the 7.62 machine gun. To resolve these problems, the capacity to fire more tracer rounds per minute is required. Short of expensive re-working, or procurement of new equipment, the addition of more tracer ammunition is the only simple way to provide this capability. Complete belts of tracer ammunition are not required, but a ratio of one ball to one tracer is the minimum acceptable load for effective aircraft engagement.

DAYLIGHT TARGET ENGAGEMENTS

The preceding paragraphs have described specific areas in operations and training where the standard ammunition mixtures are not effective. The provision of special ammunition loads for night operations or anti-aircraft engagements is not practical. It is feasible however, to use the one ball/one tracer mixture as the standard load for all types of operations. This solution also has the added attraction of providing various auxillary advantages.

During the 1970 Canadian Army Trophy Tank Gunnery Competition, the standard Canadian 7.62mm machine gun ammunition load was compared with the standard British and German 7.62mm ammunition using a 1 ball round/1 tracer ratio during daylight engagements. Each tank fired two belts of 100 rounds at two targets presented between 700 and 1000 metres. Scores were calculated by actual hole count.

On the first day, both the German and British crews obtained not less than 75 hits on each target out of each 100 round belt. The Canadian crews were unable to exceed 45 out of 100 rounds on each target.

On the second day, the German and British crews once again demonstrated the same degree of accuracy shown on the previous day. Having observed the devasting results achieved by these crews the previous day, the Canadian crews procured sufficient belts of the same type of ammunition mixture for their own use. Not less than 85 hits out of each 100 rounds were obtained by each Canadian crew. On all subsequent days approximately the same results were recorded. The venerable Browning/Canadian 7.62mm machine gun appeared to be directing a continuous line of light at the targets. The gunners merely adjusted the line of tracer onto the centre of the targets with the first burst and hosed the target until the 100 round belt was finished. At the very minimum, each crew obtained 40 additional hits on target out of each 100 rounds.

During the Royal Canadian Dragoons annual gun camp at Bergen-Holme in 1972, British generosity produced 4,000 rounds of the same ammunition, described in the preceeding paragraph, to satisfy Canadian curiosity. This ammunition has now been adopted for general use on all

British AFVs as the "Special AFV Load". A complete Canadian Squadron fired the British ammunition, both by day and night, with the same results attained during the Canadian Army Trophy Competition. Unlike the former .30 cal ammunition where the tracer round trajectory was approximately 3 ft higher than the ball round at 900 meters, the 7.62mm tracer trajectory is only a few inches above the ball round. Therefore, when the tracer trajectory is adjusted onto the head of a normal figure 11 target, the mean point of impact (MPI) of the ball rounds is on the centre of the target. This is a significant improvement and greatly simplifies machine gun shooting. The gunners require fewer rounds to range onto the target, corrections are easier to apply, and significantly more rounds are placed on target. In these days of "cost effective warfare" this kind of result cannot be ignored.

## CONCLUSION

Almost all NATO countries have now adopted the one ball/one tracer ammunition for standard use, and since Canada must depend on her NATO allies for the provision of ammunition, adopting the same MG load would simplify procurement. From the practical effectiveness viewpoint, very significant results have been achieved that cannot be achieved with our present ammunition load. Finally, from the economic viewpoint, the increased number of tracer rounds per belt is also cost effective in ammunition expenditure required per target. Therefore, it is strongly recommended that Canada adopt the new ammunition mixture as our standard load.

DISTRIBUTION LIST

| | | |
|---|---|---|
| Col Comdt Armd Branch | | - 1 |
| Col of Regt - | RCD | - 1 |
| | LdSH(RC) | - 1 |
| | 8 CH | - 1 |
| | 12e RBC | - 1 |
| NDHQ - | D Armd | - 5 |
| | PCO/Armd | - 2 |
| | PCOR/Armd | - 2 |
| | Royal Roads | - 5 |
| | RMC | - 5 |
| | CMR | - 5 |
| | ULOs | - 30 |
| | CFLO Fort Koox | - 2 |
| FMC - | HQ | - 2 |
| | SO Armd | - 2 |
| | 1 Cbt Gp | - 2 |
| | 2 Cbt Gp | - 2 |
| | 5 Cbt Gp | - 2 |
| | 4 CMBG | - 2 |
| | RCD | - 10 |
| | LdSH (RC) | - 10 |
| | 8 CH | - 10 |
| | 12e RBC | - 10 |
| | RSS HQ's | - 10 |
| | 403 (Hel) OTS | - 2 |
| | 444 Tac Hel Sqn | - 2 |
| CTC - | HQ | - 2 |
| | CFOCS | - 5 |
| MIL DIST - | BCD | - 1 |
| | BCR | - 1 |
| | 8 CH (M) | - 1 |
| | Elgin R | - 1 |
| | FGH | - 1 |
| | GGHG | - 1 |
| | 1st Hussars | - 1 |
| | KO Calg R | - 1 |
| | R de Hull | - 1 |
| | Ont R | - 1 |
| | 12e RBC (M) | - 1 |
| | PEI R | - 1 |
| | QY Rangers | - 1 |
| | RCH Montreal | - 1 |
| | Sask D Moose Jaw | - 1 |
| | Sher H | - 1 |
| | SALH Medicine Hat | - 1 |
| | Windsor Regiment | - 1 |

INTERNAL

| | |
|---|---|
| Commandant | - 1 |
| DComdt | - 1 |
| CI | - 1 |
| Armd Dept | - 6 |
| Arty Dept | - 1 |
| Inf Dept | - 1 |
| Tactics Dept | - 1 |
| Stds Staff | - 1 |
| Coord Staff | - 1 |
| T & E Staff | - 1 |
| Tpt Coy | - 1 |
| Spares | - 6 |