MANPRINT Quarterly

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The Director's Corner

Greetings to a community that makes a difference — for achieving victory at the least cost possible to soldiers.

Upon assumption of MANPRINT Directorate responsibility, I have reviewed the program's history. In the beginning, MANPRINT conceptualized the entire systems life cycle as its domain. After all, soldiers are required to operate, employ and maintain systems from the time they are new until they are old and replaced or removed. As modernization funding swelled, MANPRINT naturally concentrated on the acquisition phase. As acquisition diminishes, MANPRINT will gradually shift attention to the other phases of the systems life cycle. Thus, MANPRINT will continue to maintain its attention on the acquisition phase, but it will be increasingly attentive to post-fielding issues.

Jack H. Hiller
Director for MANPRINT

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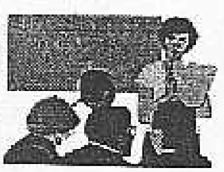
1995 MANPRINT Practitioners Conference

MANPRINT IN FORCE DESIGN AND DEVELOPMENT

Rosslyn Westpark Hotel, Arlington, Virginia
November 14-16, 1995



It's that time again to begin making plans to attend the 1995 MANPRINT Practitioners Conference. The planning for this conference began the same day the 1994 conference ended. The theme will be in keeping with and supportive of the major initiative facing the Army today, FORCE XXI. Present plans call for the conference to be held at the same location as last year, now known as the Holiday Inn Rosslyn Westpark Hotel in Arlington, Virginia, November 14-16, 1995. We started our planning early and took great pains in our preparation to provide the best possible forum for our practitioners to have a rewarding, professional experience. The overarching goal and purpose of the conference is to:

- Provide information on the current status and future of MANPRINT;
- Attract Army wide support and visibility for the program;
- Provide opportunities for hands-on instruction; and
- Conduct a forum wherein the practitioners can exchange information and network.

The new Director for MANPRINT, Dr. Jack Hiller, will host the conference and we are planning and expecting an exciting array of guest speakers. In the very near term, invitations to address the conference will be issued to a variety of ARSTAF and Secretariat level principals, Directors of our Research and Development activities, and action officer level MANPRINT practitioners. All of our speakers will have FORCE XXI as one of the major activities on their view screen for the next several years.

The workshop subjects we have planned this year will range from how to acquire and use the

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Why MANPRINT Makes Sense for Streamlined Acquisition[1]

Dr. Jack Hiller and Dr. Tom Killion
MANPRINT Directorate

Recent Department of Defense initiatives for acquisition reform have generated a welcome interest in the reduction of excess documentation requirements, empowerment of lower level decision makers, and acceleration of the overall process for fielding effective systems which exploit emerging technologies. Streamlining the acquisition process should not, however, cause us to relearn past lessons on the need to recognize personnel and training requirements in system design. Demonstrations of the critical role of human performance in system operation have been all too prevalent in major incidents that have provoked public awareness, including: the accident at Three Mile Island; the accident at the Chernobyl nuclear power plant; the accidental shootdown of an Iranian commercial airliner by the USS VINCENNES; and most recently, the accidental shootdown of two U.S. Army helicopters by a pair of U.S. Air Force F-15s over northern Iraq in 1994. Similarly, weapon system failures in the past, having been traced back to faulty system controls, operator or maintainer training deficiencies, or personnel shortages, led DoD to direct attention to human-system integration (HSI) requirements in systems acquisition (DoD 5000.1, 5000.2), in compliance with Title 10, Section 2434. The Army's implementation of HSI is incorporated in its Manpower and Personnel Integration (MANPRINT) program.

Within the Army, the MANPRINT program evolved from concerns about lack of adequate consideration of human factors, manpower, personnel, and training (HMPT) issues in the weapon system acquisition process. The Army Research Institute's Reverse Engineering Program, initiated in response to guidance from General Maxwell R. Thurman, documented shortfalls in system design and performance resulting from inadequate attention to HMPT issues.[2] This inquiry examined four major, current programs: the <u>initial</u> version of the STINGER man-portable air defense system, the Multiple Launch Rocket System (MLRS), the BLACK HAWK helicopter (UH-60A), and the Fault Detection and Isolation Subsystem (FDIS) of the M1 tank. The purpose was to examine these programs in detail to determine what was done with respect to HMPT and what else could or should have been done to improve the resulting systems, in terms of performance effectiveness with the soldier in the loop and costs.

Major conclusions from the Reverse Engineering Program for each of the systems were as follows:

- **STINGER**
  - The complexity and demands of the STINGER engagement sequence created significant training and operational problems, particularly in the areas of target acquisition, tracking and ranging, and lock-on/firing.[3]
  - Ground clearance requirements to avoid back blast and flying debris resulted in either serious limits on elevation or to use by a very small percentage of the soldier population (i.e., 98th percentile for height).
  - System requirements were not fully specified in terms of soldier performance (e.g., manportability was never defined).
  - The lower mental category soldiers, who constituted a large portion of the population of gunners, could not operate STINGER to meet the required single engagement kill probability.
- **MLRS**
  - Requirements and system assessments were addressed in terms of machine, *not* man-machine system performance (total system performance).
  - Maintenance issues led to a decision to create a new MOS (27M) for direct support maintenance relatively late in system development, increased manpower demands beyond initial planning, and a need for a maintenance training device which was to be delivered two years *after* Initial Operational Capability.
  - MLRS Self-Propelled Launcher Loader (SPLL) personnel were initially above average in terms of mental category. There was no evidence that this was necessary or what the consequences would be if skill levels were lower.
- **BLACK HAWK**
  - Assessment of reliability, availability, and maintainability (RAM) performance and scoring criteria used during testing permitted *exclusion* of soldier-produced failures, resulting in unrealistically high estimates of system (i.e., man-machine) performance.
  - Failure to operationally define the requirements for missions, including nap-of-the-earth and night flying, led to incomplete testing from the HMPT viewpoint. In 1984, the

Army Safety Center reported that *half* the BLACK HAWK accidents to date were attributable to human error.

- MOS 67T (BLACK HAWK repairer) manpower was underestimated by 21% to 600% (various estimates), necessitating recruitment efforts to obtain required personnel and a significant training "surge" at Fort Eustis.
- Compensating for delays in acquisition of Mission Flexibility Kits, Peculiar Ground Support Equipment, Test Measurement and Diagnostic Equipment, and flight and maintenance simulators cost significant time, money, and effort.

- **M1 FDIS**
  - M1 requires complex troubleshooting skills, yet the MOSs selected as organizational mechanics were *lower* in mental aptitude than either M1 tank crewmen or the general population of soldiers Army-wide.
  - As early as DT/OT II, maintainers showed limited understanding of system functions, inability to identify accurately basic faults, and limited facility in using technical manuals.
  - M1 Simplified Test Equipment (STE) was so unwieldy, difficult to transport, and difficult to connect to the tank that it actually discouraged its use.
  - Volatility in the M1 maintenance training program severely hampered efforts to assess its effectiveness.

The results of the Reverse Engineering Program contributed directly to the initiation of the MANPRINT program, which promotes an integrated approach to the design of the entire systems life cycle, from R&D through post fielding modifications. MANPRINT domains now include: Manpower; Personnel; Human Engineering; Health Hazards; Training for operators, maintainers, commanders and units; System Safety; and Soldier Survivability.

Even with the creation of MANPRINT, allocation of resources to the domains has been too thin to prevent new problems from inadequate attention to soldier considerations in system design. Examples include:

- After initially convening a system safety working group for the OH-58D helicopter, it did not reconvene for *4 years* (1985-1989), during which time numerous modifications were made to the aircraft.
- Initial use of panel lighting for the Single Channel Ground and Airborne Radio System (SINCGARS) which was *incompatible* with the lighting requirements of the Aviator's Night Vision Imaging System (it was five times too intense) (1990).
- Inattention to the MOSs needed to operate and maintain the Command and Control Vehicle (C2V), potential for requirements for increased soldier quality for the C2V, and significant lags in training development (1993).

On the other hand, effective application of MANPRINT to the design process can yield significant benefits. A stellar example is the Comanche program, where an estimated $3.29 *billion* cost avoidance was achieved through aggressive application of MANPRINT principles.[4]

Another example is the XM93E1 Nuclear, Biological, and Chemical Reconnaissance System (NBCRS), at a cost of $1.7M per copy. Because initial workload assessments indicated operator overload, crew member tasks were automated or reassigned to other crew members when the system was reconfigured for 3 soldiers in place of the original 4. However, the system was evaluated "not operationally suitable" during Initial Operational Test and Evaluation (IOT&E), primarily because the 3-man crew workload reduced mission performance to unacceptable levels. Using a human figure model and the Hardware versus Manpower (HARDMAN) III modeling methodology, the Army Research Laboratory assisted the Product Manager with the design of a modified workstation configuration which was estimated to reduce mission perfomance time by 12% and reduce operator workload to acceptable levels for the 3-man crew. The HARDMAN III modeling also allowed the Operational Evaluation Command to reduce the amount and cost of follow-on testing of the modified system.

To avoid problems and ensure effective application of MANPRINT to system acquisition, there is a need for: (1) enhanced education and sensitization of program managers and decision makers to its value-added for optimizing system cost and performance; (2) continuing influence and leverage from an independent functional proponent (DAPE-MR), to ensure that effective policies and procedures are applied; (3) MANPRINT representation on Integrated Product Teams and Concept Exploration Task Forces; and (4) inclusion of relevant soldier performance data and criteria in cost and performance trade-off analyses and milestone decision criteria.

MANPRINT principles applied to Army design engineering create user-centered, reliable and maintainable systems, leading to significant reductions in life-cycle costs and increased mission effectiveness. Application of MANPRINT can also contribute significantly to system performance throughout the life cycle via its application to system upgrades,

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horizontal technology integration, and pre-planned product improvements. However, the greatest leverage can be attained by attention to MANPRINT early in the acquisition process, incorporating soldier considerations in the Integrated Product/Process Development Team at program initiation, helping to avoid many problems not found by the present acquisition system until IOT&E.

[1] The authors want to express their appreciation to Mr. Walter Hollis, Deputy Under Secretary of the Army (Operations Research), for his helpful comments on an earlier version of this article.

[2] David M. Promisel, C.R. Hartel, J.D. Kaplan, A. Marcus & J.A. Whittenburg (January 1985) *Reverse Engineering: Human Factors, Manpower, Personnel, and Training in the Weapon System Acquisition Process* (Technical Report 659). Alexandria, VA: U.S. Army Research Institute for the Behavioral and Social Sciences.

[3] It should be noted that a number of the steps that contributed to the complexity of the operating sequence related to the Identification Friend or Foe (IFF) process. These steps were irrelevant to the use of the Stinger in Afghanistan, thereby significantly simplifying the operation.

[4] S.R. Yawn, J.T. Skonieczny & J.B. Minninger (January 1995) *MANPRINT/Human Systems Integration Influence on Comanche Design & Development Program.* St. Louis, MO: The Analytic Sciences Corp.

Getting the Word Out

ATTENTION MANPRINT PRACTITIONERS - as noted in the last issue of the MANPRINT Quarterly, the AIS MANPRINT "How To" Guide is available for distribution. The guide is available in hard copy or on a floppy disk. To obtain a copy of the Guide, please send your name and address to the MANPRINT Quarterly office. If you have already sent in your request, don't worry, we are filling those requests as fast as we can. The "How To" Guide is being added to Version 3.0 of the AIS MANPRINT Tool. LTG Stroup, the DCSPER, has asked the MANPRINT Directorate to enter the Internet, so we are in the process of developing a prototype layout for a MANPRINT "Home Page" for the World Wide Web. The target date for completion is July 1995. The Internet connection will allow our industry partners access to the MANPRINT network. This planned Internet connection will replace the envisioned MANPRINT Bulletin Board. Look for more information on this effort in upcoming issues of the Quarterly.

1995 MANPRINT Practitioners Conference *(cont'd.)*

MANPRINT "How To" Guide to a MANPRINT Lessons Learned workshop for a given program. The Lessons Learned workshops will be presented by a selected program manager from the automated information system world and a selected program manager from the materiel side. We will ask them to present their workshop in a forum that will allow participation by the PM offices, TRADOC or functional proponents, industry, PERSCOM DCSPLANS, and the Human Research and Engineering Directorate (ARL). This presents some significant challenges, and will be very beneficial to all our practitioners.

Who should make plans to attend? All MANPRINT practitioners everywhere!! We want all MANPRINT practitioners, MANPRINT specialists in the R&D and Tech Base area, industry representatives, and anyone with a general interest in the program to be there.

LTG Stroup, the DCSPER, will be asked to open the conference this year, provide the DCSPER's perspective, and present the first ever MANPRINT Practitioner of the Year Award. The DA Circular for the award is in final staffing and will be submitted for publication in the near future. Should the circular not be available in the early summer for distribution, DAPE-MR will publish by separate message the nomination procedure and criteria that will allow the board to make its selection. We will select one practitioner from the materiel or automated information system community, and one practitioner from the combat developer or functional proponent area.

Final details for the conference and preregistration information will be published in the Fall issue of the MANPRINT Quarterly. Look forward to seeing you there. Mark your calendar now and make your plans to attend.

MANPRINT in the CCATTD/ASM Contract

by Dick Pardini
MANPRINT Manager, Teledyne Vehicle Systems

A team led by Teledyne Vehicle Systems has recently completed the Common Chassis Advanced Technology Transition Demonstrator (CCATTD) contract. Considered a key element of the Army's Armored System Modernization (ASM) initiative, CCATTD had three primary products:

- ASM vehicle systems designs
- Electronic integration demonstrations
- A high mobility test chassis

Development of these products was supported by a full range of tailored MANPRINT tasks.

Vehicle Systems Design Effort

The central theme of ASM was development of a family of combat vehicles characterized by modern combat technology to achieve fighting superiority and extensive inter-vehicle commonality to maximize procurement and life cycle cost savings.

The central design issue of the CCATTD contract was concept definition of a common chassis with the flexibility and growth potential to accommodate a complete range of future combat systems when and if each was to be fielded. To insure this accommodation, a tailored systems engineering effort was established for the concept design of sixteen individual heavy chassis systems. Special emphasis was placed on the first systems to be fielded. Initially this was a future tank (the Block III); eventually the artillery system (AFAS & FARV) was earmarked as the next vehicles to be fielded.

Although MANPRINT requirements, trade studies, and design reviews were incorporated into the overall systems engineering effort, the most critical factor ensuring effective design influence was the management emphasis given to concurrent engineering and active participation by MANPRINT personnel within the ongoing design effort. Advice was asked for, given, and insisted on; "after-the-fact" criticism was considered too little–too late. Given the scale and pace of the program, no other approach could have proved effective.

Management support for an effective mock-up policy was also notable. Mock-ups were considered design tools to be hammered together, tested, evaluated, disassembled, and re-hammered together in alternative guises. Although marketing personnel would have preferred neatly painted "final designs" for "exhibition," a "no painting, sanding or finishing" policy ensured that mock-ups remained clearly focused on engineering issues of work space, component integration, and accessibility. Working mock-ups were developed for power plants, vision systems and crew stations. A troop compartment mock-up of the heavy infantry fighting vehicle provided an opportunity to test troop capacity, configuration, stowage, and dismount times using infantrymen from a local National Guard unit. The full-scale AFAS mock-up ultimately went through three iterations.

The one ASM design element with the greatest soldier impact was definition of a common crew station. Like other ASM common elements, the (largely electronic) crew station had to be flexible enough to effectively perform an extremely diverse set of crew functions and modular enough to be accommodated in a wide variety of future crew spaces. For reasons of survivability and combat effectiveness, ASM also envisioned extensive task and role shifting between individual crew stations (often referred to as "reconfigurability").

By generically analyzing a full range of operator tasks and task types for the five primary systems–tank, IFV, artillery, resupply and combat engineer vehicles–HFE personnel were able to identify a full range of likely crew functions, tasks, and task types which the common crew station would need to accommodate.

The final concept was simple and highly modular. It included two common control/display consoles, a set of fixed-function switch panels, and provisions for any type(s) of handle controller (or other input devices) required or desired by the user.

The common control/display console concept was optimized for a worst case, mobile environment. Programmable bezel switches with software controlled labels and icons were used extensively. The concept emphasized simplicity and immediate access to critical controls while providing tactile, visual, and sound feedback. A common electronic menu structure utilized clusters of functionally distinct screens, each identifying a distinct software CSU. The majority were ASM common, a minimal number were vehicle specific. Primary operator screens were all one level deep; safety critical functions were always "one push button away." Hand controller operation, a function of the particular display screen selected, incorporated entirely conventional motions for each of its various functions—i.e., gunning, driving, etc.

Electronic Systems Integration

The program's electronic integration demonstrations provided the opportunity to test the applicability of the common crew station concept to particular vehicle systems. A facility called the Systems

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Integration Laboratory (SIL) was intended to test and demonstrate the integration of critical ASM common core electronic concepts, software modules and baseline functionalities. A second objective was validation of processing requirement predictions.

Unlike the ATD program (See MANPRINT Quarterly, Winter, 1995), MANPRINT exploration was not the primary function of the artillery system simulation developed in the CCATTD/ASM SIL. Yet MANPRINT issues were an inherent part of the fundamental electronic approach.

Initially planned to demonstrate its basic capabilities employing Block III functionality, the transition to AFAS/FARV proved an unanticipated fortuitous test of the soundness of the initial common crew station approach.

Focused task analysis and rapid prototyping were knitted together within an AFAS and FARV artillery system scenario to support the detailed man-machine allocations and control/display Soldier-Machine Interface (SMI) needed to support the electronic/software demonstrations.

Although by no means presenting a complete SMI, the SIL was able to demonstrate the specific adaptability of the basic common crew station concept to AFAS and FARV, and within that set of functions, the flexibility to accommodate a wide range of alternate "standard-look-and-feel" approaches.

Most importantly, the SIL was able to demonstrate the ability of operators to readily adapt to electronically switching crew roles at individual crew stations. As the SIL's simulated AFAS halted to shoot, for instance, surveillance and secondary weapon control complete with changes in display screens and handle functions, automatically switched from the commander to the driver. Many other such role transitions were used. Yet operators experienced little difficulty with either this type of role switching or the constant changes in dexterity functions required. Overwhelmingly, these transitions were quickly taken for granted.

Critical operational and safety issues were also effectively assessed. If AFAS is to meet its proposed firing timeline goals, fire mission processing must be automatically initiated and crew tasks minimized. Of greatest importance to MANPRINT, the SIL demonstrated (in real operating software) the practicality of maintaining effective operator control within a highly automated system which, of necessity, must employ positive control using a "press-to-keep-going" approach to human intervention.

Lessons learned in the SIL for follow-on programs included the importance of early and continuous user feedback, a need for quick turn around of rapid prototyping, and an absolute requirement for SMI design to stay well integrated with and well ahead of the software coding and debugging schedules.

Future technical implementations of these lessons may rely on systems like the Virtual Application Prototyping System (VAPS) which, when fully developed, will generate its own object-oriented software code directly from rapid prototyping. The organizational solution to effective electronic crew stations will depend upon truly integrated, multi-discipline product development teams. To design a totally effective crew station package, MANPRINT, electronic, software and other engineering disciplines must work in an effective cross-discipline environment more closely than ever before. The advent of concepts for embedded decision aids, maintenance and technical help emphasizes this need even further.

Mobility Demonstration Chassis

In its final embodiment, the mobility demonstrator, known as the Automotive Test Rig (ATR), employed an advanced turbine engine, light weight hull structure and hydropneumatic suspension to provide a platform for assessing the future applicability of electric drive transmissions in 50-ton weight class tracked vehicles. (See Figure 1)

Although, again, the ATR was primarily focused on mobility, not MANPRINT issues, use of an electronic drive-by-wire control system allowed exploration of the practical ergonomics of role shifting under mobile conditions. Figure 2 shows ATR driver's station. Station layout was a derivative of the ASM crew station concept. In addition, the station incorporated three different implementations of handle controllers:

- A "conventional" driver scheme using foot controls for the accelerator and brake and a two-handed yoke for steering.
- A two-handed "gunner's" type yoke controller integrating all three driving functions.
- A work-space efficient single-handed "commander's" side-arm controller integrating all three functions within a single assembly.

Drive-by-wire also allowed driving from any one of several locations using the expedient of moving the single-handed controller to different mounting locations. Handle shaping response characteristics were similar to those outlined in MIL-HDBK-759A.

In testing, all three control schemes proved acceptable, even natural, and with little or no "relearning" required. Most surprisingly, operators favored the two-handed yoke controller– the very one which HFE personnel initially believed would prove most awkward to drive.

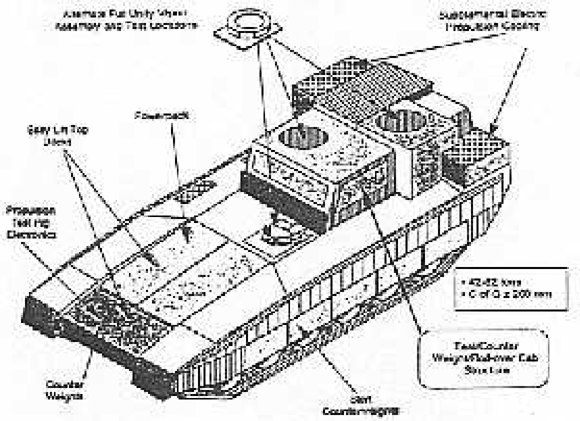

Figure 1

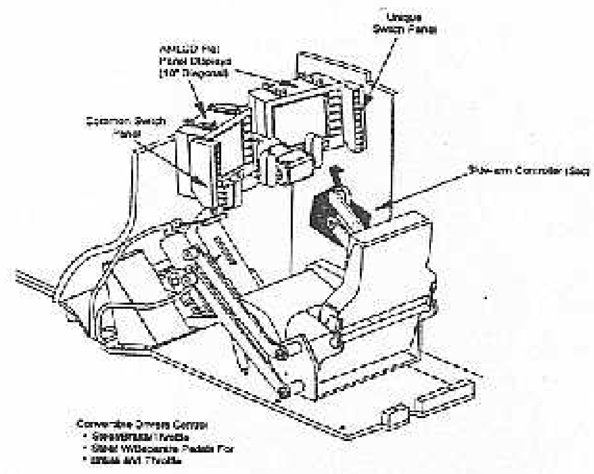

Figure 2

Overall, testing in the SIL and ATR indicated the basic adaptability and even "naturalness" of the advantages of electronically-based crew stations. All this is good news for the future vehicle integrator.

Transitioning to AFAS/FARV

Lessons learned during CCATTD (added to those of ATD) have already been applied to the advanced artillery program, recently named CRUSADER. Most prominently, CRUSADER features an all-discipline Integrated Product Team (IPT) development philosophy. Among other advantages, this approach is consciously intended to encourage, even require, continuous but cost-effectively tailored MANPRINT involvement in the early design process. CRUSADER's electronic crew station IPT, for instance, prominently emphasizes a continuous welding of human engineering and software efforts. The automotive (or chassis) IPT, which subsumes the physical crew space, emphasizes extensive Soldier Survivability design efforts. Other CRUSADER program elements provide equally significant MANPRINT emphasis

GLINT: A Soldier Survivability Issue

by Beth Redden
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While canoeing with my family on the Flint River in 1992, I noticed a flash of light far ahead of us on the river. The light was a reflection of the sun's rays off the oar in another canoe almost 1 mile ahead of us. Later that month, during participation in a Dismounted Battlespace Battle Lab experiment, I noticed that I could often see flashes of light off the front of reflex collimator optics from long distances. These flashes of light that can be seen during civilian and military activities are called "glint"; and glint is a growing threat to soldier survivability (SSv).

Recent literature about soldier survivability does not seem to include glint as a survivability issue. There is no mention of glint in the Infantry Lessons Learned Database at Fort Benning. The SSv parameter assessment list (PAL) does not include glint under "Component II: Reduce Detectability" that assesses a system's physical signature as it affects the system's detectability by threat forces. Other signatures such as the system's silhouette, thermal signature, olfactory signature, and acoustic signature are covered, but glint is not. How many times has glint from soldiers' optical devices or other equipment given away their positions and led to engagements by an adversary? Unfortunately, no one seems to have an answer to that question — even for peace-

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time force-on-force training exercises. A look at historical battlefield accounts does, however, provide insights into the glint issue. Three compelling combat accounts of target detection because of reflections are provided to illustrate the importance of glint reduction.

During World War II, the top Soviet sniper, Vasili Zaitsev, had more than 200 kills to his credit. This sniper was so demoralizing to the German troops that Hitler ordered the head of his Wehrmacht Sniper School, Major Koning, to personally go to Stalingrad to kill the Russian sniper. After 3 days of being pursued by the German, Zaitsev positioned himself so that the sun would be behind him and used reflections from his opponent's scope to locate and engage him.

During the battle of Guadalcanal, the Japanese Army's second attack on Henderson Airfield was planned as a surprise assault from the dense jungle to the south of the field. The U.S. forces were warned about the coming attack when, on October 24, a member of a 7th Marine patrol noticed a reflection coming from a hilltop. The source of the reflection was a pair or binoculars held by a Japanese officer. Our forces were shifted in time to repel what was planned as a surprise attack.

Glint was also a significant factor in the outcome of the Battle of Gettysburg. Reflections from the Confederate Army's equipment alerted the Union Army's General Warren to the extent of the Confederate flanking position below him on Little Round Top. The reinforcements he sent for were able to prevent Confederate forces from occupying Little Round Top and pouring cannon fire down the Union line.

"The Soldier's Manual of Common Tasks" includes tasks for equipment camouflage. Included in performance measures for the self and individual equipment camouflage tasks are requirements to "cover shiny parts of the weapon" and "remove or conceal all shiny objects such as watches and rings." The "camouflage equipment" task performance measures require a soldier to "cover all shiny areas of equipment such as headlights, reflectors, mirrors, and windshields." Tactics, techniques, and procedures for avoiding enemy detection are included in virtually every individual and collective task. Our soldiers are provided with camouflage patterned field uniforms, camouflage face paint, and weapons and other individual equipment with nonshiny surfaces. Combat vehicles and crew-served weapons have nongloss finishes, and camouflage nets are provided to further reduce their visual signature. We teach camouflage techniques of using natural foliage and terrain features to prepare positions that are less likely to be visually detected from the ground and from the air. When using optical devices, soldiers are unable to fully comply with camouflage requirements and still be able to execute operational requirements. The soldier becomes vulnerable to detection each time he removes optic covers.

Considerable time and effort go into teaching our soldiers proper camouflage, cover and concealment techniques, but we have done little to prevent glint from optical devices. Soldiers must be given the means to prevent glint from the eyeglasses, binoculars, night vision goggles, sights and so forth. It is especially important that the sniper be able to move into and occupy a position without being detected. Glint reduces the capability of our soldiers to use the element of surprise. It is an obvious signature that can key even a marginally trained counter-observer to detect troops and allow him to position weapons for accurate return fire. Glint is a serious threat to soldier survivability and operational security.

We must be proactive to avoid glint in future equipment that we field. The future battlefield will have a proliferation of optical surfaces that have not been present in the past. Even optical laser coatings can exacerbate glint. Thus, the glint problem is more critical on the battlefield of the future than ever before. Requirements documents should address glint in the SSv paragraph. Glint should be included in the SSv PALs. We must also be reactive to the glint problem in systems that are already fielded or about to be fielded. A simple, low cost, retrofittable solution is needed for items such as the close combat optic, thermal weapon sight, the Sniper day and night sight, headlights, and so forth. A proposal for such an item was submitted by HRED's Field Element at Fort Benning to the U.S. Army Training and Doctrine Command System Manager (TSM) Soldier as a Soldier Enhancement Program (SEP) item. This antireflection shield was chosen as a 1996 SEP new start at the March FY96 SEP review. When fielded, a retrofittable solution will go a long way toward reducing glint on current systems, but it is imperative that future equipment requirements include glint reduction. The ability to remain undetected is critical to survival and mission completion.

MANPRINT is Moving Into the 21st Century

LTC Wayne Salls, Chief, MANPRINT Division,
DCSPLANS, PERSCOM

The influx of several Automated Information Systems (AIS) into the Army is changing how the Army does business and is paving the way for the Army to transition into the 21st Century digitized battlefield. The Army continues to use the latest technology to automate military functions which will be supported by the digitization process. Digitization will impact on future soldiers by requiring new tasks and skills to operate automation systems.

Manpower and Personnel Integration (MANPRINT) has been a cornerstone in putting the soldier in the forefront during an AIS's life cycle process. MANPRINT Practitioners have been instrumental in emphasizing the need for Systems Administrators and Tower Administrators for most AISs, ensuring the total Army requirements are considered when looking at any given Military Occupational Specialty (MOS) and surfacing the security requirements for information systems which interface with secured systems. The MANPRINT community has also introduced new tools such as the AIS MANPRINT Management Tool and FOOTPRINT which assist the acquisition community in analyzing and determining manpower, personnel and training requirements.

As the Army's resources continue to shrink, a greater need exists to produce the best system for the least cost and to produce systems that reduce manpower requirements. MANPRINTing will be the vehicle to ensure soldiers are considered in all new system acquisitions. Even though everyone in the Army talks about building systems around the soldier, it is the MANPRINT Practitioner who ensures issues within the seven domains are identified, documented and resolved. Digitization will be no different. Digitization of the battlefield will surface problems that have been encountered with past AISs, and new problems will also be identified.

An example of similar problems encountered with past AISs is the determination of manpower, personnel and training requirements specifically for digitization and how they impact on other MOSs within the Combat Arms. Depending on the outcome of the digitization initiative, the skill level and definitely the manpower requirements will be affected for the Tactical Operations Center (TOC) and other Command and Control Centers. The challenge for MANPRINT and the acquisition community is to consider the impact on the total Army and not just within the area of digitization. Additionally, the impact digitization will have on related MOSs must be considered. For example, the streamlining of data from the battlefield to the Commander in a digitization environment will likely reduce current staff requirements in TOCs (i.e., related MOSs). Another issue is the MOS skill level requirements for the soldiers receiving data from the battlefield via the digitization process. The system needs to be designed to keep the skill level requirements down and to control what data will be passed to prevent information overload on the decision maker.

New technology always brings change in how the Army does business, and it can create challenges in training users to maximize the capability of the system. MANPRINT can facilitate the transition if all agencies responsible for the seven domains are involved from conception to fielding a system. This is very true with the concept of digitizing the battlefield as the impact on the Army is enormous. In addition to doctrinal changes, major manpower, personnel and training changes will result from the digitization effort. One method for the Army to lessen the impact is to use the MANPRINT cell at Fort Hood, TX, the home of the Experimental Force (EXFOR), 2d Armored Division. Sufficiently resourced, this cell could guarantee all aspects of this digitization effort are MANPRINTed, and will allow the Army to produce the best system(s) with the least cost in manpower, personnel and training.

* * * * * *

FY 95 MANPRINT Training Schedule

MANPRINT Action Officer Courses

Class	Date	Location
95-706	1-10 Aug 95	Ft Leonard Wood, MO
95-002	14-24 Aug 95	Ft Lee, VA
96-701	16-26 Oct 95	Ft Leavenworth, KS
96-702	5-14 Dec 95	Ft Bragg, NC

MANPRINT For Managers Courses

Class	Date	Location
95-709	22-23 Aug 95	Rock Island Arsenal, IL
95-710	19-20 Sep 95	Ft Leonard Wood, MO

MAISRC

Class	Date	Location
95-704	26-29 Sep 95	Ft Huachuca, AZ

MANPRINT Workshops

Class	Date	Location
96-701	3-5 Oct 95	Ft Benning, GA
96-702	31 Oct - 1 Nov 95	Picatinny Arsenal, NJ
96-703	28-30 Nov 95	Ft Sill, OK