

## TRIO—A Major Innovation in Tactical Operations Training

**B**BN Laboratories Incorporated is developing TRIO, an intelligent tutoring system for training military personnel in complex, real-time tactical operations. This system represents the first successful application of intelligent tutoring system technology to a significant tactical program of instruction.

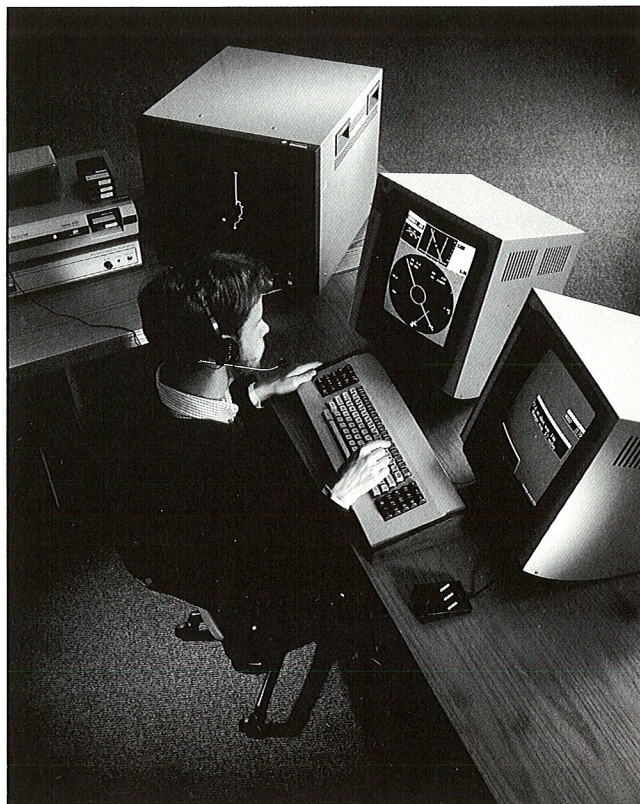
With TRIO, trainees participate in simulated engagements under the tutelage of task and tutorial expert programs. These programs can demonstrate correct tactics, provide assistance in correcting misconceptions, evaluate trainee performance, and adaptively generate reasoned explanations of proper strategy.

TRIO allows the trainee to manipulate all normal system controls and observe all normal indicators of system function, including simulated sensor outputs. In a debriefing mode, TRIO generates and displays analyses of each simulated engagement from a global perspective, to help the trainee understand the effects of his real-time decisions on the development of the tactical situation.

TRIO is currently being developed and adapted to training F-14 Radar Intercept Officers (RIOs) in basic air intercept tactics. The U.S. Navy RIO school at NAS Pensacola, Florida is providing significant assistance in developing subject matter expertise and in adapting TRIO concepts to the RIO program of instruction. Validation and verification of the TRIO-based program of instruction will be performed at NAS Pensacola during 1987. Techniques for organizing the systematic delivery of a graded series of air intercept exercises are also being produced as a result of current TRIO development.

### Simulation Facilities Provide Realism

**T**RIO represents a significant new approach to training personnel in tactical operations. The situation and system simulation facilities of TRIO



provide trainees with the realism of standoff air-to-air engagements. A speech recognition subsystem allows the trainee to issue directions to the pilot simulator, using the same language a RIO would use during actual operations. TRIO's powerful simulation model captures the relevant cognitive and perceptual aspects of real-time tactics. This allows the trainee's time to be concentrated on developing the skills of spatial reasoning and tactical awareness essential to the successful management of real engagements.

TRIO is being developed under contract to the Navy Training Systems Center (NTSC).

The tutorial power of the TRIO tactical expert in debriefing the trainee during engagement replay is designed to achieve a level of diagnostic quality comparable to one-on-one tutoring by a RIO instructor. This high quality instruction is achieved at very low cost, because TRIO reduces the need for training on actual equipment (with its attendant capital, maintenance, and supply costs). The articulate instructional expert in TRIO greatly increases the effectiveness of instructor time as well. Graduates of the TRIO program of instruction are expected to show improved performance from the time of their initial assignments. This will translate to increased operational readiness and a reduction in subsequent proficiency training and skill maintenance costs.

### Many Tactical Training Applications

**T**RIO will be suitable for tactical training in a wide variety of other settings and for a wide range of modern weapon systems. The situation and system simulations that are able to model the results of trainee actions in air intercept operations are equally able to model other types of combat engagements, such as area air defense. The TRIO tutorial strategies for demonstration, guided practice, and debriefing of RIO trainees are readily extendible to other tactical tasks requiring a mixture of real-time analytical skills.

INCOFT, a new application of the TRIO technology, will be implemented by BBN Laboratories in 1987 at the U.S. Army Air Defense Artillery School, Ft. Bliss, Texas. INCOFT will apply TRIO technology to training Patriot Air Defense Officers and Missile Crew Members in the operation of the Engagement Control Station of the Patriot system. INCOFT will considerably extend the adaptability of TRIO to tactical operations training for other systems, such as HAWK and FAADS.

TRIO's full potential has not yet been realized; but it has already demonstrated the effective application of intelligent tutoring systems technology to important military training problems. The power, capabilities, and flexibility of the system will continue to be expanded, demonstrating that the techniques of artificial intelligence and cognitive psychology can be effectively applied to the problem of real-time tactical operations training for the complex weapon systems of today's technology-based armed forces.

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