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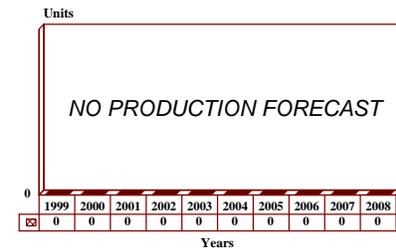
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TYC-39(V) - Archived 8/2000

Outlook

- TRI-TAC funding continues without mention of the TYC-39 in the FY1999-2000 RDT&E
- All TYC-39(V) units, including all variants, delivered by 1997
- TRI-TAC program expected to end in 2010
- Barring any unexpected renewal of the TYC-39, this report will be archived in 2000

10 Year Unit Production Forecast
1999-2008



Orientation

Description. The AN/TYC-39A is the latest configuration of the TYC-39(V) and is a mobile, automatic, modular, electronic store and forward message switch under processor control with integral communications security and multiplex equipment.

Sponsor

US Army
Communications & Electronics Command
Ft. Monmouth, New Jersey (NJ) USA

Contractors

GTE Government Systems Corp.
Communications Systems Division
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Needham Heights, Massachusetts (MA) 02194
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Status. Operational service, with software improvement completed in 1998. Hardware upgrade and retrofit completed in 1996.

Total Produced. Total TYC-39(V)s and upgrade kits produced is estimated at 84.

Application. Used in the corps and theater echelons by the US Army as part of the TRI-TAC/MSE system, also used by the US Air Force.

Price Range. The per unit cost for the TYC-39(V) was approximately US\$3 million during initial procurement in 1980. The price for upgrade kits is determined by each individual contract.

Technical Data

Design Specifications. The TYC-39(V) is housed in two S-280 shelters and can terminate up to 50 teletype and/or data circuits at speeds ranging from 45.5 baud to 16K bits per second. It has a peak throughput capacity of 33,750 messages per day and an output bit error rate of less than one error for every 10^{10} consecutive bits.

The TYC-39(V) is able to function not only as a message switch but also as an "electronic file cabinet" because it has so many recording schemes, storage

redundancies and software features. Messages can be decomposed, filed and then recalled for editing and transmission at a later date. Reference files can be accessed in under two minutes for Flash, ECP and critical messages, and no more than 15 minutes for all other messages. History tapes not only include copies of each message sent but also when it was received, who sent it, when it was sent, who received it, and verification of its receipt.

The TYC-39(V) is the first tactical communication system to use optical fiber equipment. Two small optical fiber cables are used for inter-shelter transmission to minimize set-up and tear-down (less than one hour), and greatly reduce weight and storage requirements.

Operational Characteristics. For the most part, current tactical record traffic is transmitted primarily by

means of point-to-point circuits requiring mirror-image terminals. Incoming messages are punched out on paper tape and then switched manually to a comparable terminal for retransmission. The TYC-39(V), through extensive preprogrammed automation, eliminates much of the time and labor-intensive procedures. Also, with the TYC-39(V) there is no need to create a separate network for intelligence traffic; tactical, strategic and intelligence communications are serviced at the same time, with the effect of equipment and personnel savings.

The TYC-39(V) interfaces with the US AUTOVON and AUTODIN networks, with NATO communications systems, and with a wide variety of present and planned TRI-TAC subscribers, switches, COMSEC, technical control elements and transmission systems.

Variants/Upgrades

Single-Shelter TYC-39(V). The single-shelter TYC-39 (V) is a compact version of the dual-shelter TYC-39(V) currently operational with the US Army in Germany. The original 50-line capacity has been cut in half to allow a single-shelter configuration for those missions requiring higher mobility and fewer lines. It offers fully automatic access and tandem message processing, automatic message protection and management, traffic segregation, and dial-up access through TRI-TAC automatic switches, as well as most other features available in larger, fixed plant systems. The switch is housed in a single S-280 shelter. Technical specifications are essentially the same as the dual-shelter TYC-39(V). It is designed for use at all theater echelons.

TYC-39A. The TYC-39A, also known as the TYC-39 (V)6, is an improved version of the TYC-39(V). This variant uses a modified version of the DCA-accredited TYC-39 software. Most components in the two versions are the same, except for a new processor and disk. The upgraded switch can provide up to 50 subscriber lines in a single S-280 shelter or up to 24 subscriber lines in a single S-250 (or downsized) shelter. The TYC-39(V)6 includes redundant L3212 processors (256K of memory expendable to one megabyte), two 170 Mb Winchester disks, and plasma displays for the operator positions. Large-scale integrated circuits are used throughout.

Service features include: service messages to subscribers, an integrated traffic service function, message accountability, message transmission and retrieval, dial-up data with forward error correction, and standard

store-and-forward features. Available operating speeds range from 45.5 baud to 16,000 bps.

MTCC. The Modular Tactical Communications Center is a GTE development that combines the proven technology and operational experience of the TYC-39(V) with the most up-to-date automatic message processing gear. The MTCC is able to handle up to 24 local or remote subscribers at information rates ranging from 45.5 baud to 16 kbps and transmission rates of up to 32 kbps. It requires only one S-280 shelter.

Besides the automatic access and tandem message processing, message protection and accountability, and dial-up access of the TYC-39(V), the MTCC also features an expanded variety of labor- and time-saving message-handling devices. Among these are an optical character reader, document copier, digital facsimile, interfaces for remote military and civilian terminals, NSA-approved document shredder, and internal terminals for message preparation. It is completely compatible with new TRI-TAC equipment being fielded.

The MTCC was intended to be a Non-Developmental Item procurement for TRI-TAC, where it would serve the Single Subscriber Terminal and switching links with electronic distribution functions and automatic message processing. However, the MTCC failed to meet US Army TRADOC specifications, resulting in the postponement of the original initial operational capability of January 1989. In early 1988, the Army canceled procurement of the MTCC for the third time.

Program Review

Background. The TYC-39(V), in conjunction with the TTC-39, forms an integral part of the TRI-TAC program. TRI-TAC was established in 1971 by the Department of Defense to develop and field future, tactical, multichannel, switched, communications systems and equipment. In order to satisfy the tactical communications needs of the military services, and to achieve interoperability between the US Army and various US Department of Defense (DoD) telecommunications systems, new equipment that reflected the most recent technology had to be provided and development duplication among the services and agencies had to be eliminated.

In 1974, the initial contract was awarded to GTE with the first production of the TYC-39 occurring in 1979. In 1980 the US Army procured 12 TYC-39 systems with an additional four procured in 1981. In 1982, the first preproduction model of the TYC-39 single-shelter version was revealed to the public. The TYC-39's AUTODIN interface began the modernization process in 1983 with the TYC-39's AUTODIN interface software development completed in 1984. The TRI-TAC Mode VI interface to TYC-39 was continuously modified and upgraded throughout 1985. Also in 1985, the last TYC-39 system, from the original contract, was delivered.

In 1987, the TRI-TAC Mode VI interface to TYC-39 was completed, as well as the last purchase of the TYC-39(V) for fielding to the Republic of Korea. In 1989, the development of the TYC-39 PIP began, in order to provide a main memory upgrade. At the start of the 1990s, 1991 in fact, contracts were awarded for TYC-39 upgrade kits. In 1993, the First Qualification Unit was completed, with the entire upgrade program, as well as TYC-39A fielding, ending in 1996. The program was transitioned to Communication Directorate, CECOM, in 1996 also. Lastly, the software improvement program ended in 1998.

The TRI-TAC systems are now providing combat forces with tactical communications equipment to meet the mobility, security, reliability and availability requirements of the modern battlefield, providing resistance to the intercept and electronic warfare threat of potential enemies, and reducing life-cycle support and personnel costs.

TRI-TAC equipment bridges the span from the current analog equipment to digital systems. Both voice and record traffic switching functions are secure, automated, and processor-controlled.

NOTE: For related information, see the report titled *TRI-TAC* in this volume.

Funding

	US FUNDING							
	<u>FY98</u>		<u>FY99</u>		<u>FY00</u>		<u>FY01(Req)</u>	
	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
<u>RDT&E (US Army)</u>								
PE#0208010A								
Joint Tactical Communications (TRI-TAC) ^(a)	-	20.8	-	35.7	-	18.4	-	19.7
	<u>FY02(Req)</u>		<u>FY03(Req)</u>		<u>FY04(Req)</u>		<u>FY05(Req)</u>	
	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>	<u>QTY</u>	<u>AMT</u>
<u>RDT&E (US Army)</u>								
PE#0208010A								
Joint Tactical Communications (TRI-TAC) ^(a)	-	7.8	-	7.8	-	8.8	-	17.7

All US\$ are in millions.

Source: US Department of Defense FY1999/2000 RDT&E Program (R-1)

^(a)This program is for TRI-TAC functions, modification, etc.; TYC-39 is a part of TRI-TAC; thus the PE funding amount being included in this report. However, there are no specific references to the TYC-39 in the FY99/00 PEDS.

Recent Contracts

<u>Contractor</u>	<u>Award (\$ millions)</u>	<u>Date/Description</u>
GTE	31.6	Apr 1991 – FFP delivery order contract to design and build 41 each retrofit kits for the TYC-39A(V)1 message switches. Completed April 1996. (DAAB07-89-C-J021)
GTE	18.7	Jan 1992 – FFP for engineering and materials necessary to retrofit seven TYC-39(V) message switches, to include associated spares and data. Completed April 1996. (DAAB07-89-G-J021)
GTE	20.4	Dec 1992 – Modification for 34 TYC-39A retrofit kit materials. (DAAB07-89-G-J021, 0015/08)
GTE	7.4	Sep 1993 – Increment (dollar value released with each delivery) as part of a US\$7.4 million time and materials contract for systems and software engineering services, to support the post deployment software support of the TTC-39 and TYC-39 family of switches. Completed September 1998. (DAAB07-93-D-Q002)
GTE	148.2	Jul 1996 – A CPAF/time and materials, and FFP contract (appropriation number and dollar value will be issued with each delivery order) with an estimated cumulative total not-to-exceed US\$148.2 million (estimated total five year requirement) for technical services for support of AN/TTC-39 and AN/TYC-39 Tactical Communications Switches. Services include operation and maintenance of a system test facility, development of hardware and software enhancements, depot level repair, and field technical assistance. This is a SS contract initiated on October 27, 1995. Contract is expected to be completed by July 5, 2001. (DAAB07-96-D-F308)

Timetable

<u>Month</u>	<u>Year</u>	<u>Major Development</u>
	1971	Joint Tactical Communications Office (TRI-TAC) established
	1974	Initial development award to GTE
Oct	1979	USAF IOT&E Evaluation report for TYC-39
Nov	1979	First production of the TYC-39
	FY80	Initial Army procurement for 12 TYC-39s
	FY81	Four more TYC-39s procured
Jun	1982	First preproduction model of TYC-39 single-shelter version unveiled
	FY83	Start of upgrading of AUTODIN interface of the TYC-39
	FY84	Software development of the upgraded TYC-39 AUTODIN interface was completed
	FY85	Continued systems improvements to TRI-TAC Mode VI interface to TYC-39
Feb	1985	Last original production contract TYC-39 delivered
	FY87	Completed TRI-TAC Mode VI interface to TYC-39
	1987	Last TYC-39(V) purchased by Army fielded to the Republic of Korea
	FY89	Development of TYC-39 PIP to provide main memory upgrade (expansion) initiated
Apr	1991	Awarded of TYC-39(V) upgrade kits contract
Jan	1993	TYC-39A First Qualification Unit completed
	1996	Upgrade program completed. TYC-39A fielding completed. System transitioned to Communications Directorate, CECOM
Sep	1998	Software improvement program completed

Worldwide Distribution

The TYC-39(V) is in use only by the **US Armed Forces**, particularly the Army and the Air Force.

Forecast Rationale

The TRI-TAC program, including the TYC-39(V), was developed in 1971 as a way to integrate and achieve interoperability of the US Army and other US Department of Defense (DoD) telecommunications systems. Throughout the years, modifications and additions have been made to the program, but it appears that upgrades to the TYC-39(V) have ended. As of the FY 1999-2000 DoD RTD&E program (R-1), there was no mention of the TYC-39 nor was funding provided for it. Most likely, this is because the last unit was procured in 1985, the last upgrade unit was procured by 1996, and the software upgrade program was completed by 1998.

Although the TYC-39(V) appears to have no future production/procurement scheduled, the TRI-TAC program appears to have approximately 11 additional years of service scheduled, and it is expected to be completed by 2010.

At this time, it seems very unlikely for any future procurement/production of the TYC-39. Not only has it

been fully in place for approximately 13-14 years, but modifications of the TYC-39(V) and software upgrades have already been produced. The system will most likely be in operation for another 11 years, along with the TRI-TAC program, but its disbandment appears inevitable. By the end of 1999, the Defense Message System (DMS) is expected to replace AUTODIN. Most likely, DMS will take over TRI-TAC's tasks and, slowly but surely, the tasks of TYC-39 will be replaced with newer, faster, more advanced message switches.

After the US Army procures its Digitized Battlefield equipment (2002), there does not seem to be anything extraordinary planned for the TRI-TAC program. Maintenance funding and some small modifications are the most probable, but they most likely will not touch upon the TYC-39(V). Due to its lack of funding and production, and barring any unexpected activity, this report shall be archived next year.

Ten-Year Outlook

The forecast chart has been omitted.

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