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JOINT COMMUNICATIONS IN SUPPORT OF JOINT TASK FORCE SOUTH DURING OPERATION JUST CAUSE

A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

MASTER OF MILITARY ART AND SCIENCE

by

JARED A. KLINE, CAPT (P), USA
B.A., The Citadel, Charleston South Carolina, 1980

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This study investigates and analyzes the provision of tactical and strategic communications in support of Joint Task Force, South (JTF-South) during Operation Just Cause, the American invasion of Panama during the period December 1989 - January 1990. The purpose of the study is to present a detailed analysis of communications support actually provided to a joint task force engaged in a contingency operation, while at the same time recording for posterity the actual history of what occurred in this connection. This study explains that communications in support of JTF-South, while they were a brilliant success, were not perfect, and that lessons for future operations may be derived from a study of the actions of the men and machines that provided communications during Operation Just Cause.

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ABSTRACT

JOINT COMMUNICATIONS IN SUPPORT OF JOINT TASK FORCE SOUTH DURING OPERATION JUST CAUSE by Capt. (P) Jared A. Kline, USA, 240 pages.

This study investigates and analyzes the provision of tactical and strategic communications in support of Joint Task Force South (JTF-South) during Operation Just Cause, the American invasion of Panama during the period 20 December 1989-12 January 1990. The purpose of the study is to present a detailed analysis of communications support actually provided to a Joint Task Force engaged in a contingency operation, while recording for posterity the actual history of what occurred in this connection.

Operation Just Cause was conducted in a country that had known a long and continuous U.S. military presence. An extensive "fixed-station" or strategic telecommunications infrastructure therefore existed upon which JTF-South could build their tactical communications networks. This was a critical factor in the quality and quantity of communications means available to JTF-South. Single channel radio was the most important tactical means of command and control communications, and the use of a single document to govern all radio communications, the Joint Communications Electronics Operating Instructions (JCEOI), and the use of a single communications security (COMSEC) variable throughout the entire theater ensured the reliability of radio communications, in spite of the risk to COMSEC. The tactical multichannel network, initially a weak area as a result of inadequate systems and technical control, was made useful by bringing a large contingent of tactical systems control officers and sergeants from Fort Bragg to Panama four days after the initiation of open war.

This study explains that communications in support of JTF-South, while they were a brilliant success, were not perfect, and that lessons for future operations may be derived from a study of the actions of the men and machines that provided communications during Operation Just Cause.

ACKNOWLEDGEMENTS

I wish to acknowledge my debt of gratitude to Colonel Jackson C. Moss III, formerly Commander, 35th Signal Brigade, and to Colonel William L. Mason, formerly Deputy J-6 for JTF-South. These gentlemen contributed so much not only to the successful outcome of the events described in this history, but also to my ability to put all of this information together while the operation was still in progress, that it is no exaggeration to state that the success of both enterprises would have been in doubt without their wise and effective leadership.

I would also like to acknowledge the kind assistance of Lieutenant Colonel Samuel Lambert and Major Steve Witt, both formerly of JTF-South J-6, for reviewing and criticizing Chapters II-V. The success of single channel radio communications in support of the operation which is the subject of this study owed more to these two gentlemen than to anyone else.

Finally, I would like to acknowledge the bravery and skill of the Signal Corps and Air Force communications soldiers who helped to make Operation Just Cause a military victory.

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PREFACE

This paper is addressed to two audiences. In the first place, it is intended to provide an analysis of an instance in which successful communications were provided in support of a small war in the form of a contingency operation, at a basic enough level that a reader who is not a specialist in such things (such as a civilian, a new Signal Corps lieutenant, or an officer, non-commissioned officer, or soldier with a different area of expertise) may derive some useful knowledge from it. In the second place, this study is intended to record for posterity the history of communications in support of Joint Task Force South (JTF-South) on Operation Just Cause, the American invasion of Panama in 1989-1990.

This second reason is of some moment. As yet, there has been no detailed attempt to record and analyze communications in support of Operation Urgent Fury, the American invasion of Grenada in 1983, which had been the last large contingency mission prior to Just Cause, even though communications were an important issue in that operation. Much has been lost in regard to the history of Urgent Fury, as imperfect and impermanent human memory has thus far been the primary repository for the events surrounding communications support for that operation. This

study seeks to prevent such a loss to history with respect to Just Cause.

It should be noted at the outset that, as in most if not all historical studies, there are certain limitations to a definitive analysis of this subject. A definitive analysis would require the collection of every written order, every unit after-action report, every edition of every telephone directory, and communications-electronics operating instructions from every level. In addition, every signal officer, non-commissioned officer, and soldier would have to be interviewed. All of the commanders and staff officers who used the communications system would have to be polled about their evaluation of the network's effectiveness. General Noriega and his staff would have to answer questions about why they did not take very effective actions against JTF-South's communications system, while the Soviet, Cuban, and Nicaraguan intelligence communities would have to provide us with their evaluation of JTF-South's signal and communications security.

Not all of these sources were available for this study. Sources that were available have been examined very critically and checked against other sources to guard against a possible lack of objectivity. Especially in the case of published literature, many writings by participants show a partisan slant, and although a degree of objectivity

can be derived from careful analysis and comparison among various sources, this tendency to remove unpleasant material from the written record can only be partially rectified.

A small number of articles of widely varying quality, detail, and accuracy have already been written about communications in support of Operation Just Cause. Most of what has been written is self-congratulatory and bears a greater resemblance to awards recommendations than to objective history. If a reader was to base his judgment of communications on Just Cause entirely upon the body of articles that have thus far been published about it, he would be forced to conclude that everything was perfect at all times. Of course, such a conclusion would be false; no military operation of any significant degree of complexity and directed against a living enemy will be perfect in every detail. To recognize this is not to be unreasonable or even uncharitable; it is merely to be realistic.

Many Americans view history as a sort of fairy tale or, better still, a morality play in which stylized characters representing various virtues and vices act out their parts with a kind of Manichaean consistency. As the historian for XVIII Airborne Corps once told me, he looks for "heroes and villains" to people his accounts. This approach has been abandoned for this present work. The purpose of this study is to bring history into accordance

with the facts and to evaluate those facts in light of reasonable judgment and actual effect. Problems have been addressed in some detail, both to ensure historical accuracy and also to permit the reader to learn both from those things that were done properly and from those things that were not. It is hoped that the reader will find that the accounts of these problems have been placed in their proper perspective with reference to the ultimate success of the operation.

Finally, this is not a complete study of all communications in support of Just Cause. This work addresses only those areas that bore directly upon JTF-South itself. It does not address communications in support of JTF-Panama prior to the war, except as necessary to understand what was in place for Just Cause; nor does it address in any great detail communications in support of the civil-military phase of Operation Promote Liberty, which followed Just Cause. It is hoped that other writers will take up similar studies for the various components of JTF-South.

-CHAPTER I-

BACKGROUND TO OPERATION JUST CAUSE

Operation Just Cause was preceded by a lengthy political crisis dating back at least to June 1987 when General Manuel Antonio Noriega expelled his chief rival, Colonel Roberto Diaz Herrera, from his position within the Panama Defense Forces (PDF). Herrera's subsequent allegations against Noriega, which included drug trafficking, election fraud, the unlawful sale of work visas to Cubans, and the murder of the international political activist Doctor Hugo Spadafora, resulted in demonstrations and strikes against the Delvalle-Noriega regime by opposition groups and disgruntled citizens within the country. Noriega responded to this threat by appealing to the patriotism of the citizenry and, when this failed, by employing force.[1]

The military forces of the United States in Panama, under United States Southern Command (SOUTHCOM), had maintained close working relations with the PDF for many years and initially attempted to maintain normal relations with it in spite of the escalating unrest in the country. General Frederick Woerner, the SOUTHCOM Commander, initially

[1]The best book available at present concerning the evolution of Noriega's relationship with the United States is Frederick Kempe's Divorcing the Dictator (New York: G.P. Putnam's Sons, 1990).

kept American forces aloof from the internal dissensions that were, quite properly, considered to be domestic Panamanian affairs. The 4 February 1988 indictments brought by two federal grand juries in Florida against General Noriega on drug trafficking charges all but ended Woerner's approach of peaceful coexistence.

In the spring of 1988, the White House and Congress put pressure on the Noriega-backed regime to democratize the Panamanian political system. After a period of political and economic sanctions against Noriega, Panamanian President Eric Delvalle taped a television announcement from the Papal Nunciatura in Panama City in which he relieved Noriega of his position at the head of the PDF. Noriega responded by having the National Assembly pass a resolution on 26 February 1988 to dismiss Delvalle and his vice-president Roderick Esquivel, naming Manuel Solis Palma as Minister in Charge of the Presidency until general elections could be held.

With the dismissal of Delvalle, the United States froze all Panamanian Government funds on 2 March, and the Reagan Administration refused to recognize the Palma-Noriega government. Soon, however, the United States was the only country in the world that still recognized Delvalle as the legitimate president of Panama. The bank-freeze had a devastating effect upon the Panamanian economy. On 16

March, a group of PDF officers attempted an unsuccessful *coup d' etat* against Noriega, and Noriega blamed SOUTHCOM for complicity in the attempt. Noriega further spoke against SOUTHCOM's right to continue to operate in Panama, in spite of treaties guaranteeing it. Unofficial contact between SOUTHCOM and the PDF was forbidden, and official contact was limited.

As the bank freeze and other economic measures against Panama destroyed more and more of the economy, crime of all sorts flourished. Some of this crime was directed against American installations and nationals. PDF harassment rose with the escalation of Noriega's anti-American pronouncements, to include arrests and arbitrary fines. The situation was clearly not getting any better, and in late February the Joint Chiefs of Staff (JCS) directed SOUTHCOM to initiate contingency planning for possible military action in response to a wide range of possible crises. Plans were drawn up to meet contingencies ranging from the defense of U.S. lives and property to the defeat of the PDF in battle. The SOUTHCOM staff refurbished the standing operations plan for the combined defense of the Panama Canal to reflect the PDF's new status as a hostile army. This new plan was named "Elaborate Maze." Elaborate Maze required a joint task force (JTF) to act as the headquarters element for combat operations in Panama. This function largely fell

to the United States Army, South (USARSO). USARSO was the Army component of SOUTHCOM (see figure 1-1).

In late March and early April, President Ronald Reagan ordered that U.S. forces in Panama be augmented to enhance security of American personnel and property in Panama. These forces included two battalions of military police with their brigade headquarters, a company of Marines, an aviation task force from the 7th Infantry Division (Light), and several smaller elements. SOUTHCOM realized the requirement to provide command and control for these forces in Panama. Finding that its responsibilities in other countries suffered due to its day-to-day management of the crisis in Panama, SOUTHCOM passed along the mission to USARSO, which stepped in to assume command and control functions, even before the USARSO commander was designated as the commander of JTF-Panama (9 April 1988).

JTF-Panama's first commander was Major General Bernard Loeffke, Commanding General of USARSO. JTF-Panama had been intentionally kept small because of manpower shortages and concerns about being unduly provocative. Most of the staff was taken from the USARSO staff, and most of them were required to hold their positions on the USARSO staff even while they served with JTF-Panama. Naturally, this meant that one man often had to do at least two jobs in separate organizations. Nearly every tactical unit in Panama, to

include augmentation units from the United States, fell under the operational control of JTF-Panama.

JTF-Panama continued to manage the day-to-day operations in response to the crisis. Armed PDF attacks against American installations such as the Arraijan Tank Farm and the Rodman Ammunition Supply Point, rules-of-engagement questions, and a host of other issues kept JTF-Panama in a reactive mode. All the while, General Loeffke worked to improve the efficiency of the JTF and its forces. He inaugurated a series of joint training events that improved operations involving all of the JTF's components. Soldiers assigned to JTF-Panama learned that low-intensity conflict is, in many ways, more difficult to master than open war.

The crisis seemed to abate somewhat by late 1988, with a reduction in the incidence of crimes against Americans and in the armed attacks against U.S. installations. The military police brigade headquarters and one MP battalion were actually sent back to the United States, but JTF-Panama was kept in place as a headquarters to maintain stability. Periodic firefights continued at the tank farm and at Rodman Naval Station, but the fear of impending war had largely passed.

JTF-Panama continued to work on its contingency plans. In April, 1988, JCS had directed SOUTHCOM to prepare a series of plans for the range of operations covered by Elaborate Maze, and these plans collectively came to be known as the "Prayer Book."[2] "Elder Statesman," later renamed "Post Time," directed defensive operations in line with Elaborate Maze. "Blue Spoon" was the operations plan for offensive operations to defeat the PDF. Civil-military operations were addressed by "Krystal Ball," later renamed "Blind Logic." Also included in the Prayer Book series was "Klondike Key," the plan for evacuation of non-combatants. SOUTHCOM retained control over Blind Logic, while all of the plans for conventional operations fell upon JTF-Panama for modification and, if need be, execution.

In the course of planning it was discovered that JTF-Panama would require elements of the XVIII Airborne Corps at Fort Bragg, North Carolina, to implement some of the Prayer Book requirements. General Loeffke resisted involving the corps headquarters in planning and operations, but in November 1988 the JCS directed that XVIII Airborne Corps would be the executive agency for planning and, if need be, execution of the Prayer Book plans. Participation by the corps staff was limited by its commitment to other missions, however, until the crisis escalated in the spring of 1989.

[2] SOUTHCOM Briefing Script and Slides on Just Cause, no date.

On 7 May 1989, General Noriega's candidate for the presidency lost the general election to Guillermo Endara by an estimated three-to-one margin, in spite of widespread vote fraud on the part of the PDF.[3] Noriega declared the election null and void, and members of his paramilitary "dignity battalions" (DIGBATS) attacked Endara and his supporters during a victory parade. President Bush responded by sending 1,900 additional troops to Panama under Operation Nimrod Dancer. Nimrod Dancer pre-positioned some of the troops required by the Prayer Book plans, including a brigade headquarters and a battalion from the 7th Infantry Division (Light), a mechanized infantry battalion from the 5th Mechanized Division, and a Marine light armoured infantry company. All of these troops came under the operational control of JTF-Panama.

At the same time, Operation Blade Jewel was inaugurated to move as many non-combatant Americans out of Panama as possible. Military dependents were moved out to the maximum possible extent, and all of those dependents living off-post that could not be returned to the United States were moved onto American installations. This caused a great deal of dislocation, both to the families involved and to the units to which the soldiers were assigned, because in many cases it had the practical effect of sending soldiers to stateside assignments earlier than planned, without immediate

[3] Kenneth J. Jones, The Enemy Within (El Dorado, Panama: Focus Publications (Int.), 1990.), p. 47.

replacements. This had an adverse effect upon at least some of the units.

JTF-Panama formed all combat units in Panama into three task forces. Task Force Atlantic, under the brigade commander from the 7th Division, was responsible for the Atlantic side of the Canal. Task Force Bayonet, under the commander of the 193d Infantry Brigade, had the east bank of the Pacific side of the Canal, leaving the west side to Task Force Semper Fi, commanded by the MARFOR commander. Under authority from Washington, JTF-Panama initiated a series of actions meant to assert the rights of the United States under the Canal treaty. Beginning with simple convoy movements in May 1989, operations intended to keep the PDF off balance continued through late fall of 1989. These exercises were named "Sand Flea" and "Purple Storm" operations. Noriega backed away from a confrontation with the United States during Nimrod Dancer, and PDF attacks on the tank farm and ASP, together with PDF harassment of Americans, declined during the summer of 1989.

In late June of 1989, Brigadier General (soon promoted to Major General) Marc Cisneros replaced Loeffke as USARSO commander. Cisneros increased the tempo of JTF-Panama's exercises. On 30 September 1989, General Maxwell Thurman replaced General Woerner as SOUTHCOM commander. Thurman was an old paratrooper and the former commander of the 82d

Division Artillery. With Thurman as the SOUTHCOM commander, close coordination with XVIII Airborne Corps was assured. No sooner had Thurman assumed command when another *coup d' etat* was attempted by PDF officers against Noriega on 3 October 1989. This attempt was no more successful than the first had been, and in its aftermath it became apparent that Noriega was not likely to be deposed unless the United States made it happen.

As early as August 1989, XVIII Airborne Corps had completely refurbished SOUTHCOM Operations Order 7-88 (Operation Blue Spoon) in favor of its own JTF-South Operations Plan (OPLAN) 90-1. Final revisions in OPLAN 90-1 were made following the failed *coup d' etat* to meet General Thurman's specifications, and the JCS approved JTF-South OPLAN 90-2 in early November. Under 90-2, JTF-Panama would be deactivated on order and replaced by JTF-South, under Lieutenant General Carl Stiner, commander of XVIII Airborne Corps. JTF-South would consist of the XVIII Airborne Corps commander and staff, with augmentation from a number of sources to include the USARSO members of the then defunct JTF-Panama. Figure 1-2 shows the military units that were assigned to JTF-South under OPLAN 90-2, under the task organization into which these units were ultimately to settle. November and December saw several command post exercises involving the various headquarters included in 90-2.

On 15 December 1989, General Noriega was named head of state by the National Legislature, dispensing with even the pretense of a puppet civilian government. The following evening, members of the PDF's *Macho de Monte* shot and killed Marine Lieutenant Robert Paz as the car in which he was a passenger ran a PDF roadblock. A naval officer and his wife, who witnessed the event, were detained by the PDF. The PDF made matters worse by beating the officer and threatening to rape his wife. This proved to be the final provocation. On 17 December, the National Command Authority ordered the execution of OPLAN 90-2, and JTF-South was activated the next day. JCS designated "H-hour" (the time of the initiation of hostilities) to be 0100 hours (local time) on 20 December 1989.

JTF-South's objectives under OPLAN 90-2 were to protect U.S. lives and facilities, capture General Noriega, defeat the PDF, and support the establishment of a democratic government in Panama. To achieve these objectives, OPLAN 90-2 called for simultaneous strikes against a variety of targets over a dispersed area. Figure 1-3 shows a map in which these objectives may be seen. On 20 December, Task Force Atlantic seized Colon, Madden Dam, Gamboa, Renacer Prison, and Cerro Tigre. Task Force Bayonet secured Fort Amador, the Commandancia, and various PDF strongholds throughout Panama City. Task Force Red (75th Rangers and

the 82d Airborne Division) secured Tocumen-Torrijos International Airport and Rio Hato. Units from the 82d Airborne Division secured Panama Viejo, Tinjitas, and Fort Cimmarron. Task Force Black (Special Operations) took the Pacora River Bridge and some important enemy communications sites, while Task Force Semper Fi secured the Bridge of the Americas and part of Howard Air Force Base. 2d Brigade of the 7th Division landed at Howard AFB; this unit was to join the 82d in specific operations.

It should be emphasized that these units did not merely walk in and occupy these objectives. In most cases they had to be wrested from the grasp of the PDF, sometimes against fierce resistance. In spite of the lack of unified command after Noriega fled into hiding, individual PDF units fought hard. The full account of the combat between the forces of JTF-South and the PDF is beyond the scope of this work.

The JCS ordered execution of the civil-military phase of the operation, Operation Blind Logic, on 21 December, even as combat operations continued. Blind Logic (quickly renamed Promote Liberty) was to gain in importance and emphasis as the intervention progressed, finally replacing combat operations altogether by the middle of January 1990. The Canal, which had been closed when the war began, was reopened for daytime operation. As the operation continued, task organization was revised repeatedly to meet changing

requirements. The bewildering series of task organization changes in itself is worth serious study, once again outside of the scope of this work. The general circumstance that task organization changed often, however, is important to this study, as communications means had to be available to support each change.

On Christmas Eve General Noriega sought asylum with the Papal Nuncio in Panama City. By this time the PDF was no longer a serious military threat, although pockets of resistance would continue for several more days. By the time that General Noriega surrendered to JTF-South on 3 January 1990, combat operations were basically a thing of the past, with civil-military and stability operations predominating. On 31 January Operation Just Cause was declared to be finished.

Having outlined in broad terms the background to the operation, the remainder of this work will chronicle and analyze communications support for JTF-South during Operation Just Cause. Where possible, all relevant details, to include the names of participants and military units, have been included in this account. (Because of the nature of the primary sources consulted -- after-action reports, etc. -- the first names of officers and soldiers are occasionally not given since they are not readily available.) The next chapter will examine the military

communications infrastructure that existed in Panama prior to Operation Just Cause, as this infrastructure was of pivotal importance to the form that communications support for JTF-South ultimately took, to include those actions that JTF-Panama took to improve the communications situation in anticipation of the trouble that finally came.

FIGURE 1-1

United States Southern Command (SOUTHCOM)

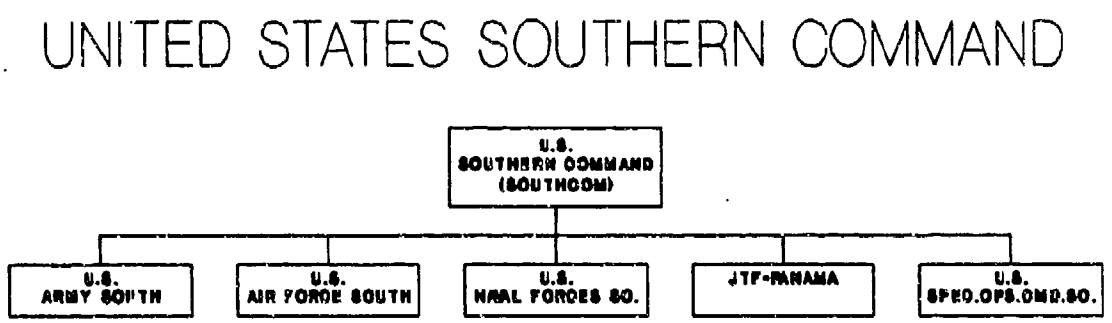


FIGURE 1-2

JTF-South Task Organization

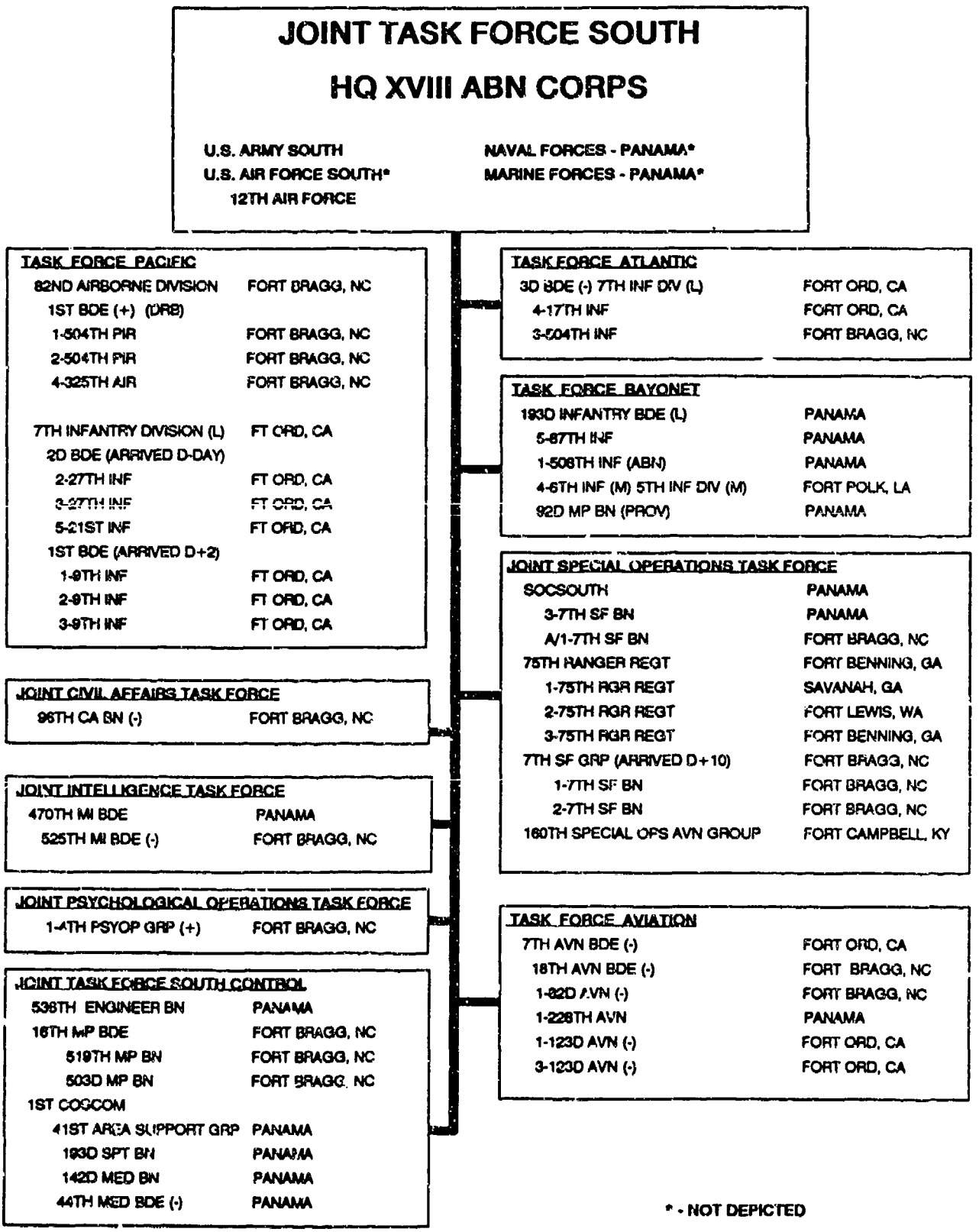
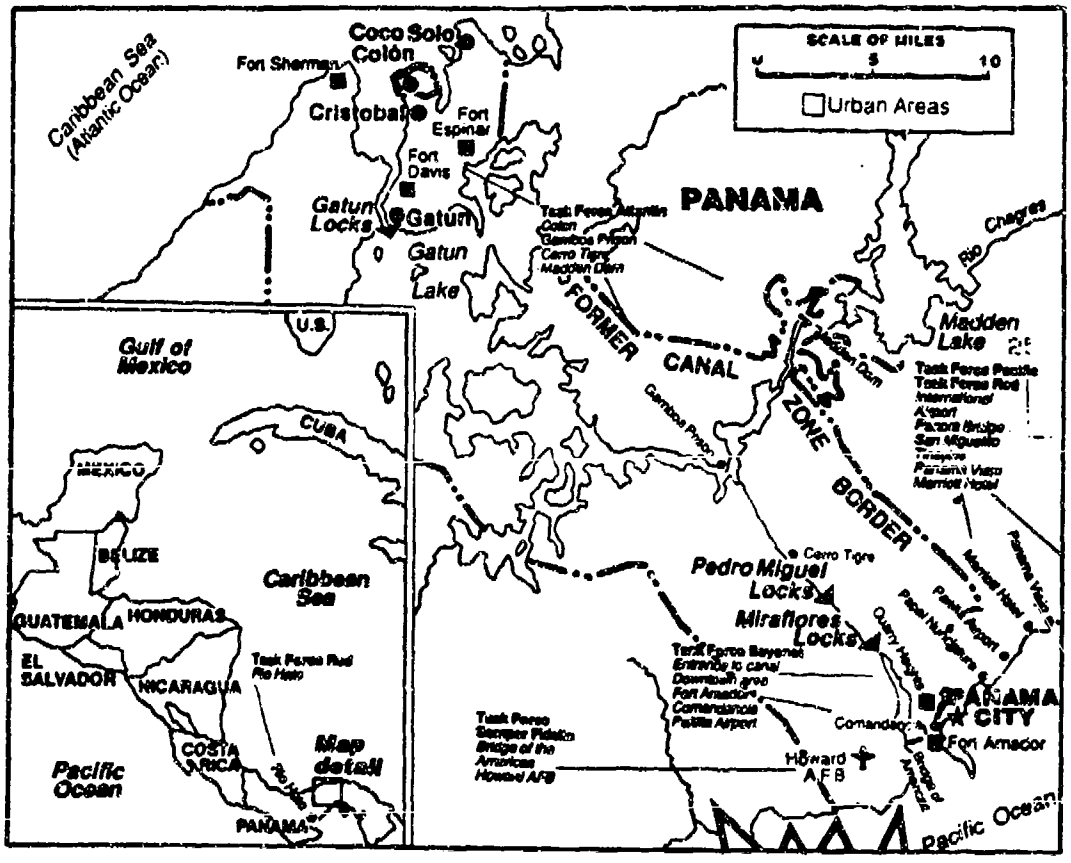


FIGURE 1-3

Map of JTF-South Area of Operations



-CHAPTER II-

COMMUNICATIONS INFRASTRUCTURE BEFORE JUST CAUSE

The purpose of this chapter will be to examine the strategic and tactical communications infrastructure for United States forces in Panama prior to Operation Just Cause.

Just Cause was unusual for a contingency operation in that U.S. forces already had an extensive communications system in place to support them before the initiation of hostilities. This communications system included tactical and strategic communications means. Communications officers in JTF-South considered the fixed-station strategic communications to be second in importance only to tactical single-channel radio communications in the success of the operation.[1]

The words "strategic" and "tactical" have different implications when applied to military communications than they have when applied to military art in general. For example, a tactical military operation may be largely supported by strategic communications; conversely, and more commonly, a strategic operation, such as a strategic movement, is often supported by tactical communications.

[1] 35th Signal Brigade, "Internal After Action Report for Just Cause," Fort Clayton, Panama, 9 January 1990, p. 18.

The words "tactical" and "strategic" in these cases apply strictly to the communications means. Strategic communications are generally "fixed-station" communications, installed in a given location with the intent never to move them. They are installed in buildings, permanent towers, or other permanent facilities. They make extensive use of underground cable, commercial or military industrial power grids for electricity, and are often manned by civilian workers rather than soldiers. Many of these civilian workers are natives of the country where the fixed-station communications are established. Strategic communications are connected to the Department of Defense's worldwide Automatic Voice Network (AUTOVON) and Automatic Digital Network (AUTODIN), giving users of the strategic communications system, often referred to as "subscribers" in conformity to commercial practice, worldwide communications capability. AUTOVON brings telephone service to United States military installations around the world, while AUTODIN is the military version of Western Union's teletype network. In addition, strategic communications connect to commercial telephone networks for maximum flexibility.

Tactical communications provide far less capacity than strategic communications. They are intended to be temporary and mobile. They may or may not be connected to strategic and commercial communications systems, and they are almost always installed and operated by soldiers, rather than by

salaried civilian workers. Tactical communications are designed to serve military formations in battle. Therefore, they are generally simpler and more rugged than strategic communications. At the time of Just Cause, the United States Army Signal Corps customarily installed tactical communications on a "command" and "area" basis. Command systems were aligned to support communications from a higher commander to a lower commander and were thus tied to a specific unit. Command communications followed a specific unit when it moved. Area communications, as the name implies, were set up to cover units in a specific area. When these units moved, they would be supported by the area communications systems closest to their new location. Combat "maneuver" units, such as infantry, armor, and cavalry, were usually served by a command system. All others were generally served by the area network.

A large and capable military strategic communications system had developed during the long period of American presence in Panama, and it is difficult to overestimate its importance. Strategic communications in Panama were the overall responsibility of the 1109th Signal Brigade. The 1109th Signal Brigade belonged to the United States Army Information Systems Command (ISC). When the Panamanian crisis began its escalation in 1988, Colonel Robert Van Steenburg commanded the 1109th Signal Brigade, as well as serving as J6 (communications officer) for JTF Panama and as

the Deputy Chief of Staff for Information Management (DCSIM) for United States Army, South (USARSO). It was a heavy responsibility in view of the theater-wide communications commitments and the overall shortage of staffing for his three signal offices.

Van Steenburg had a good strategic system from the very beginning of his tenure (see figures 2-1 through 2-4 at the end of this chapter). The 1109th Signal Brigade had three major communications "nodes" to connect Panama with the outside world. "Nodes" are communications switching and technical control centers that connect different parts of the communications network together (see figure 2-1). Fort Davis at Battery Pratt had a submarine cable connecting Panama to Florida City, Florida. This submarine cable carried eight inter-switch trunks (a "trunk" is a telephone line between two switchboards or central offices) and two special circuits. Corozal, the main node of the strategic system in Panama, had three separate satellite systems spoked out of it. One system went to Joint Task Force Bravo (JTF-B) in Honduras, in support of Southern Command's responsibilities there. This system carried thirteen inter-switch trunks, three weather reporting circuits, and one World Wide Military Command and Control System (WWMCCS) circuit. (WWMCCS is a computer-served secure teletype network often used throughout Department of Defense as a sort of second AUTODIN). A second satellite system linked

Corozal with the Defense Communications Agency's station at Fort Detrick, Maryland. This system carried eight inter-switch trunks, four "automatic secure voice communications" (AUTOSEVOCOM) circuits, and seven special circuits. The third satellite system linked Corozal with Fort Belvoir, Virginia, and it carried twenty-four inter-switch trunks and eleven special circuits. The third node at which the 1109th Signal Brigade ran communications out of Panama was at Utive. The Utive station was a commercial Panamanian installation under contract to the United States government. Utive was connected via satellite to Etam, West Virginia. This system, operated by INTEL, the Panamanian telephone company, carried twenty-six inter-switch trunks and seven special circuits.[2]

While the strategic communications system thus relied upon four satellite systems from two locations and a single submarine cable for communications connectivity out of Panama, communications internal to Panama relied upon microwave radio and cable. Fort Davis, Corozal, and Howard Air Force Base were the main microwave nodes (see figure 2-2). Fort Davis had a 96-channel system to Coco Solo Hospital, of which 72 channels were in actual use. Fort Davis further had a 192-channel system to Fort Sherman, with 120 channels committed, and another 192-channel system to Galeta Island, with 96 channels committed. Fort Davis

[2] Ibid, p. 30. See also, United States Southern Command J-6 After Action Brief, 29 June 1990.

linked to the main node at Corozal with a 192-channel system relayed through Cerro Gordo. This system had 144 channels in use.

Corozal had a 192-channel system to Fort Clayton, of which 168 channels were in use. Corozal had a twelve-channel system to Chiva Chiva, utilizing obsolete frequency-division multiplexing equipment, with all twelve channels in use. A 192-channel system linked Corozal to Quarry Heights, of which 102 channels were in use. Quarry Heights had a smaller 96-channel system linked to Fort Amador, of which only 48 channels were in use. Corozal linked to Howard Air Force Base (AFB) via a 192-channel system, of which all 192 channels were in use.

Howard AFB, later to be the site of the SOUTHCOM Alternate Command Center (ACC) had a 240-channel system linked to Albrook Air Force Station (AFS), of which 190 channels were committed. A 96-channel system had been installed to Sierra Minon from Howard AFB, but no circuits had been run over it before Just Cause began.[3]

This microwave radio network was designed so that if any individual link of the microwave system were to fail, or even if the microwave system could not carry the full

[3]1109th U.S. Army Signal Brigade microwave technical drawing, 19 November 1989, designed by Capt. Young & D. Brown, drawn by A. Pizarro.

required load of traffic, an extensive cable system would be able to compensate for any shortcoming (see figure 2-3). The cable system was essentially redundant to the microwave radio network with regard to the major locations, but it was the only means to the smaller, less important, and more remote areas. Cable also connected the military strategic system to INTEL, the Panamanian telephone company, and to the Panama Canal Commission (PCC), which maintained its own separate telephone system. The PCC tied in by cable to Quarry Heights, Fort Amador, and Corozal. INTEL tied into Quarry Heights and Corozal. The Empire Range area, Rodman Naval Station, Cocoli, Curundu, Gorgas, and the Marine Barracks relied exclusively upon cable for telephone communications.[4]

The 1109th had ten dial central offices (DCO) to provide automatic telephone switching to the approximately 2,000 telephone subscribers under their area of responsibility, fifty percent of which had access to the AUTOVON network.[5] 1109th Signal Brigade had two DCOs at Corozal, and one DCO each at Rodman, Gorgas, Quarry Heights, Fort Clayton, Fort Davis, Fort Sherman, For Espinar, and a tandem switch that served an area including Fort Amador. In addition, the United States Air Force 1978th Communications Group operated one DCO each at Howard

[4] 35th Signal Brigade, "Internal AAR," p. 32.
[5] Colonel Jorge Luis Torres-Cartegena interview with Dr. Lawrence Yates at Fort Clayton, Panama, 29 June 1990.

AFB and Albrook AFS. These DCOs were absolutely and perfectly integrated into the 1109th Signal Brigade network.

When the crisis escalated in April 1988, Colonel Van Steenburg requested an acceleration of Southern Command's scheduled fielding of the new "Secure Telephone Unit, version III," or STU-III.[6] The STU-III is an analog telephone, compatible with commercial and military telephone lines. It is versatile enough to be used over almost any analog telephone line in the world. It is secure, with the conversation being "scrambled" by a cryptographic key approved by the National Security Agency. Unlike the STU-II that preceded it, it is light in weight and easy to use. It does not require an especially high quality circuit, and so can be used over all types of tactical communications systems with ease. At the time of Just Cause, there probably was not a better secure telephone in the world. The STU-III was destined to be the most used secure telephone during the crisis. Van Steenburg managed to get an initial issue of 150 STU-IIIs for Southern Command in June 1988, added to a very small number that existed in Panama prior to that time.[7] By the time of the invasion, Southern Command would have 1,140 STU-IIIs, increasing to 1,220 STU-IIIs by the end of the operation.[8]

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[6]Colonel Robert Van Steenburg interview with Dr. Lawrence Yates, 12 June 1989.

[7]Lieutenant Colonel Kay Witt interview with Dr. Lawrence Yates, 28 April 1989.

[8]United States Southern Command J-6 After Action Brief, 29 June 1990.

When Colonel Van Steenburg started to receive them, the STU-IIIs faced two obstacles to their most effective use, but the instruments overcame both. The first obstacle was that staff officers with SOUTHCOM and JTF-Panama were initially reluctant to use them. The cumbersome and scarce STU-II, AUTOSEVOCOM, and the other secure telephones previously available had conditioned staff officers to avoid using them. They generally preferred to use the magneto telephones on the 154th Signal Battalion's tactical system. Van Steenburg had to educate the SOUTHCOM, USARSO, and JTF-Panama staffs to convince them to use the STU-III. The ease and reliability of the instrument gradually won them over.[9]

The second obstacle was Signal Corps doctrine. Signal Corps doctrine before Just Cause was a disjointed affair with reference to secure voice communications. Generally speaking, communications were not considered secure unless they were encrypted from one end to the other, but numerous exceptions to this existed as a practical response to the insufficient number of secure tactical telephones and the incompatibility of different types of secure telephones. This condition was the result of the integration of several different generations of imperfectly compatible equipment, and even of simultaneous implementation of non-compatible systems. These problems, which were overcome with great

[9]Van Steenburg, Interview.

success in Just Cause, will be addressed in detail under tactical communications.

Colonel Jorge Torres-Cartegena was the SOUTHCOM J-6. His role later on in Just Cause as Commander of the 1109th Signal Brigade is almost bigger than life, but as SOUTHCOM J-6 at the time of the escalation beginning in 1988, Torres was responsible, among other things, for three documents. These documents were the "SOUTHCOM Joint Tactical Architecture," the "Joint Communications Operations Plan," and the "Command and Control Communications Master Plan."[10] The "SOUTHCOM Joint Tactical Architecture" did not devise new communications measures, but codified communications systems as they actually existed in SOUTHCOM. The "Joint Communications Operations Plan" was intended to guide communications in support of JTF-Panama in the event of war, and it played a part in the early development of the communications plan to support the "Blue Spoon" operations plan that preceded the final plan (OPLAN 90-2) that was actually executed in December 1990. In fact, due to factors that will be made clear in Chapter IV, the communications annex to Operations Plan 90-2 was written without any reference to either of these SOUTHCOM documents.[11] The "Command and Control Communications Master Plan" actually

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[10] Torres-Cartegena, Interview.

[11] Capt. Roderick MacLean of the XVIII Airborne Corps Signal Office and this author wrote the communications annex to OPLAN 90-2 in October 1989 without ever seeing any of these documents.

had greater application, as it had been prepared in coordination with the Defense Communications Agency (DCA), and provided a basis for DCA support of the operation.

The extensive strategic communications network was not without weakness. Communications planners within SOUTHCOM had been concerned about the tactical vulnerability of the fixed-station communications facilities for years. The fact that they relied upon industrial power grids for electricity meant that any interruption in electrical power would affect them. The fact that these facilities could not be moved and had been in the same locations for years meant that a potential enemy knew where they were. Microwave radio stations were often positioned in areas that could not easily be protected. Cable was vulnerable to damage by anyone with a shovel or a machete. In short, the strategic telecommunications infrastructure represented a relatively low risk, but lucrative target for even the most poorly equipped enemy.

There was little doubt that the enemy would strike against the strategic telecommunications system. It was well known that the Panamanian government was thinking along those lines at least to some extent, as proven in May 1989 when it threatened to deny the 1109th Signal Brigade access to the commercial satellite station at Utive.[12] Noriega

[12] Torres-Cartegena, Interview.

himself, as well as many of his subordinates, had been trained in unconventional warfare at Fort Bragg and at other American and Israeli establishments.[13] The damage or destruction of strategic communications facilities is fundamental to modern unconventional warfare, and is taught to every student of the subject.[14] The ease with which these facilities could be attacked, considered with the tremendous damage that would result, made their priority as a target an almost foregone conclusion.

Another potential weakness of the strategic system was its heavy reliance upon local civilian workers to operate it. The very complexity and the automated nature of the vital switching centers made them especially vulnerable to sabotage, while that same complexity made them utterly dependent upon trained workers. A placements would not have been useful without lengthy training in some of the most critical positions.

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[13] Frederick Kempe, Divorcing the Dictator (New York: G.P. Putnam's Sons, 1990), p. 58.

[14] G2, United States Army First Special Operations (ABN), Special Operations Targeting Handbook for Students in the Strategic Industrial Target Analysis Training Course, edition 3, pp. 64-67. This article is an unclassified digest of Capt. William H. Burgess III and MSG Raymond T. Yongen's Strategic Industrial Systems as Targets of Unconventional Warfare (U), 6 March 1984 (Draft), SECRET NOFORN. In spite of the impressive security classification, information about methods of destroying strategic communications facilities abound, and this author has never read a modern unconventional warfare handbook, of whatever political or national perspective, that did not cover this subject in an essentially similar fashion.

Finally, security was not perfect in the strategic system. In spite of the influx of STU-IIIs after June 1988, most telephones in SOUTHCOM remained non-secure. Three or four Soviet ships remained docked in the Panama Canal at all times at the base of Ancon Hill. Ancon Hill was a key microwave radio site, owing to its commanding position and its proximity to SOUTHCOM Headquarters at Quarry Heights. These Soviet ships were signal intelligence collection stations that were assumed to be intercepting all non-secure telephone traffic that passed through Ancon Hill. Other intelligence gathering means were assumed to be directed at the strategic system, as the strategic system was as lucrative a target for intelligence as it was for unconventional warfare.[15]

Because of the vulnerability of the strategic system, and also because of the shortage at that time of secure telephones, SOUTHCOM undertook to reinforce strategic communications with a tactical communications network. Before proceeding on the tactical communications system as devised for "Blue Spoon," it is necessary to examine the recent historical background for Army tactical communications, as several of the disparate trends and

[15]This author saw the three Soviet ships docked in the Canal at the base of Ancon Hill in December 1989 and recognized the purpose of the antennas on the ships. Senior Chief Young, USN, was the harbor master at Rodman Naval Station at the time. He informed the author that he had been there for two years and that the ships had been stationary there for at least that long.

schools of thought came to a decisive collision in the course of Just Cause.

Before the early 1980s, the United States Army used manual telephony for field communications. Manual telephony relied upon magneto telephones, with internal batteries to provide line current, connected either directly to other local-battery magneto telephones or to manual switchboards. Manual telephones were simple, reliable, and cheap. Manual switchboard operators connected subscribers at the switchboard, and since the Second World War, manual switchboards included features that allowed the operators to access commercial dial telephone networks. These magneto telephones were not considered secure, as anyone could "tap" a line and hear what was being said. Security, when considered essential for tactical telephones, was provided by a device called the KY-65, or "PARKHILL" device. The PARKHILL could be hooked to a manual telephone, or to any telephone for that matter, to encrypt the conversation. Voice quality on the early versions of PARKHILL was poor, and it required a practiced ear to distinguish what was being said. Recognition of a person by his voice was not possible on the early PARKHILL machines; neither were they fielded in more than limited numbers, so they were not used as a matter of routine. Their use was restricted to especially sensitive circuits. In general, telephones were not thought of as a secure means.

During the early to mid-1980s, the Army fielded the SB-3614, developed originally for the Marine Corps by General Telephone and Electric (GTE). This was an automatic switchboard intended to replace the manual switchboards then in general use. It operated with dual-tone multi-frequency (DTMF) "touch-tone" telephones. Theoretically, the SB-3614 could still be used with the PARKHILL, but in fact the SB-3614 was sensitive to circuit noise, and most signal officers thought that they were doing pretty well to get the switchboard to function properly even without the PARKHILL, so the SB-3614 was hardly ever used to switch secure circuits. The poor voice quality made PARKHILL more and more a device that signal officers left at home, but there was nothing to replace it in the field.

Classified traffic has to be communicated across secure circuits, at least in principle. A theoretical, if not logically unassailable, solution was the "protected distribution system" or PDS. The PDS was based upon the idea that a circuit could be *physically* protected from eavesdropping by allowing no connection between the tactical system and the strategic and commercial networks. Cable runs had to be patrolled, PDS telephones were supposed to be kept away from non-PDS telephones, and a great number of other rules were applied. The *de facto* PDS expert for the Department of Defense was Chief Warrant Officer Jack Ritter

of United States Readiness Command (REDCOM). Ritter was the Intertheater Communications Security Package (ICP) manager for the Joint Chiefs of Staff (JCS),a post that he held for many years as he continued in that capacity at MacDill AFB as a DOD civilian after his retirement from active duty. While PDS was not officially his primary concern, the fact that REDCOM supervised so many joint exercises led to this responsibility falling upon his shoulders by default.[16]

PDS was a very controversial subject. PDS criteria were based upon the best available information concerning hostile eavesdropping capabilities, and classified regulations specified how far apart PDS telephone lines must be kept from non-PDS lines, how PDS circuits were to be isolated from the ground, and a plethora of other technical requirements that made adherence to PDS standards require a lot of work and time. Many of the signal officers who had to implement these standards did not understand the necessity for them, not being privy to Ritter's intelligence resources, and so did not convince local commanders that the standards represented reasonable requirements. Because PDS standards required a lot of extra work that some communicators did not really agree with, they were often

[16]Major Steve Witt, formerly of United States Special Operations Command, Central Command (SOCCENT), told me how Ritter came to be known as "PDS guru" during a visit that I had with him at Fort Bragg in December 1990.

compromised, with the result that non-secure circuits were treated as if they were secure.[17]

The situation became even more complicated with the fielding of the TTC-39 family of automatic switchboards. Used at corps level and above, the TTC-39s had both digital and analog capability. A new tactical secure telephone came with the TTC-39: the KY-68, or "digital secure voice terminal" (DSVT). The KY-68 was intended to become the standard secure telephone for all services in the Department of Defense. Because it was a digital telephone, it could neither be used with the analog SB-3614 switchboard, nor with commercial civilian switchboards. Another shortcoming of the KY-68 was that, while it could communicate with most telephones in the non-secure mode, it could only communicate secure with another KY-68, and it required a digital path throughout the circuit to function in the secure mode. What this meant in practice was that the TTC-39 was the only switchboard that could operate in the secure mode with the KY-68, and telephones on any other switchboard could only communicate in a non-secure mode with the KY-68. Most of the AUTOVON system was analog, at least as far as the telephone instruments themselves were concerned, as well as most commercial systems. Of course, the tactical systems at division level and lower were strictly analog, and so could

[17] 35th Signal Brigade (Corps)(Airborne), "Protected Distribution System," part of the after action report to XVIII Airborne Corps for exercise Caber Dragon 89, 17 November 1988.

not be secured in a manner that was compatible with the KY-68.

The result of this bewildering cobbling together of the military communications network was that secure telephones used throughout the Department of Defense (STU-IIIs) could not communicate in the secure mode with the TTC-39 equipped corps (KY-68), which could not communicate in the secure mode with divisions and lower headquarters (touch-tone analog telephones). Since corps had to interface with echelons above corps, and since echelons above corps relied upon AUTOVON and commercial circuits, all pretext of isolating the PDS from the Defense Communications System was abandoned, and by 1989 it was common practice in some Army organizations to call just about any tactical network a PDS, whether or not it adhered to any of Ritter's original guidelines.[18]

Such was the general situation that Lieutenant Colonel Kay Witt encountered when he received the mission to back-up the strategic network for JTF-Panama on 8 April 1988. Because of the vulnerability of the strategic system, SOUTHCOM undertook to reinforce it with a tactical communications network. The first tactical communications plan devised to meet this requirement was the communications

[18]This is my opinion, based upon my observation of some divisions calling their network a PDS when it met none of the standards.

annex, or "Annex K," to the operations plan for "Blue Spoon." Colonel Torres, in his capacity at the time of SOUTHCOM J-6, wrote the first version of this "Annex K."[19] The organization tasked to implement most of this original plan was the 154th Signal Battalion, commanded until June 1989 by Lieutenant Colonel Witt. When the crisis escalation began in April 1988, the 154th was three years old. It had been organized basically on the lines of a light infantry division signal battalion. It relied upon twenty-three TRC-145 multichannel radios for transmission. This allowed the battalion theoretically to install eleven systems of twelve analog channels each, but in fact the 154th could do more than that, as each TRC-145 had a completely redundant array of radio equipment intended to back up the equipment in use. If a radio failed, the system could be covered at once by the spare stack of equipment. It was considered poor planning to design a network that required the TRC-145s to use their spare equipment, but in an emergency this could actually be done. The battalion also had four TRC-113 relays that could extend the range of the TRC-145 systems.

At that time, the 154th Signal Battalion had no automatic switchboards, and rather than use manual switchboards, Witt elected to establish a network of "point-to-points" in which local battery magneto telephones were connected directly and permanently from JTF-Panama at

[19] Torres-Cartegena, Interview.

Building 95 to all of the subordinate headquarters by dedicated lines across the TRC-145 multichannel radios. By 12 April 1988, the network was completed. It required 21 out of the battalion's 23 multichannel radios to implement. In addition to the dedicated telephone circuits, Witt also backed up the local teletype communications network with sixteen teletype stations, manned by radio teletype operators, which were connected over the tactical multichannel system to the GTE produced TYC-39 at Corozal. The TYC-39 was a teletype switchboard, automatic and computer-driven, that Witt had established at Corozal to extend the AUTODIN network to his tactical stations. Other teletype stations connected with the TYC-39 via fixed-station cable, and the TYC-39 became a permanent fixture at Corozal, even when the tactical multichannel radio system was no longer connected to it.[20]

Because of the PDS confusion that had been endemic in recent history, the staff officers in Panama preferred the tactical magneto telephones for security reasons, and even when STU-III telephones became available many officers resisted using them out of habit.[21] Witt himself had a number of PDS related problems. The intelligence officer (J-2) for JTF-Panama initially refused to accept the security of the PDS because, in fact, the wirelines were not perfectly secure, even though there was no known contact

[20]Witt, Interview.
[21]Van Steenburg, Interview.

between the tactical network and the commercial and AUTOVON networks. After long disagreement, the J-2 finally agreed that the "probability of interception was low," and Witt was able to carry on with his PDS.[22]

Neither Witt nor Van Steenburg were satisfied with the old-fashioned equipment that the 154th was using, and they tried unsuccessfully to get SB-3614 automatic switchboards fielded to the battalion ahead of schedule. When this proved impossible, they adopted a more oblique solution. Taking advantage of the increased importance of Panama in light of the crisis, they requested a sixty-day temporary loan of six SB-3614 switchboards from United States Army Forces Command (FORSCOM). FORSCOM agreed and ordered III Corps at Fort Hood, Texas, to loan six switchboards to the 154th for sixty days. The 154th Signal Battalion received the switchboards on 21 June 1988 and simply never gave them back.[23] This action solved the immediate lack of automatic switchboards, but it was considered a dirty trick by some and the memory of this incident played a role in the question as to whether to pre-position equipment from the 35th Signal Brigade later on.

June 1988 also saw other augmentation to the 154th Signal Battalion. 11th Signal Brigade from Fort Huachuca and the Joint Communications Support Element (JCSE) from

[22] Witt, Interview.
[23] Ibid.

MacDill AFB sent multichannel satellite communications teams to Panama, amounting to around forty soldiers. Additionally, the 35th Signal Brigade sent another forty soldiers from A Company, 426th Signal Battalion at Fort Bragg to install a tactical microwave radio system from Howard AFB to Gunn Hill on Fort Clayton, with a "video cable" system extending from Gunn Hill to the 154th signal site next to the chapel near Building 95. "Video cable" was coaxial cable that carried the same multichannel signal that the microwave radio system carried, and it was broken down into individual channels at the Building 95 signal site. This network was integrated with the tactical communications that the Air Force's 3d Combat Communications Group had established at Howard AFB.[24]

As more STU-IIIs arrived in Panama, Colonel Van Steenburg applied himself to educating the various staffs on their use, with the result that the tactical network was used less and less. As Witt perceived that it was not really appreciated any more, he requested to take the tactical network out of service, since it effectively prevented his battalion from doing very much else. Finally, in February 1989, the 154th was allowed to take the tactical multichannel system down, only to reinstall it in May as the crisis grew worse.[25]

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[24] Ibid.
[25] Ibid.

The *ad hoc* nature of communications support for JTF-Panama, involving as it did JCSE, the 11th Signal Brigade, the 154th (not yet under the 1109th Signal Brigade) and the Air Force, prompted Colonel Van Steenburg to establish a central authority to control and integrate the network. In May 1989 he established the Joint Communications Control Center (JCCC) at Fort Clayton, under the auspices of the 1109th Signal Brigade, but with augmentation from the 154th and from JCSE.[26]

Summer of 1989 was a time of change for JTF-Panama communications. The tactical system was taken down, and JCSE, the 11th Signal Brigade, the company from the 426th Signal Battalion, and the 3d Combat Communications Group personnel were finally sent back to their home stations. JTF-Panama continued its planning and exercises, as outlined in Chapter 1, using the strategic system and relying upon the STU-IIIs. In a 12 June 1989 interview, Van Steenburg expressed his opinion that his organization was ready to support the "Prayer Book" contingency plans, but also noted that the personnel policies incidental to the requirement to move dependents out of Panama as quickly as possible were having a bad effect upon the strength of his brigade.[27] In an interview on 28 April 1989, Lieutenant Colonel Witt opined that, even without the personnel shortages, his battalion was too small for all of the missions that were

[26] Van Steenburg, Interview.
[27] Ibid.

its lot. He hoped, at the time of this interview, that Lieutenant Colonel Andre Francis, who was scheduled to replace him, would take action to modify the Table of Organization and Equipment to bring the structure of the battalion in line with its actual missions.[28]

Colonel Van Steenburg was replaced by Colonel Jorge Torres-Cartegena in June 1989. Colonel Torres had been the SOUTHCOM J-6 for three years prior to assuming command of the 1109th Signal Brigade. An officer with a strong background in Special Operations, a complete command of the Spanish language, and the best grasp of the civilian and military communications networks in Panama, Colonel Torres was the perfect man for the position. Torres was a sort of *caudillo* of communications; having kept his position as J-6 for SOUTHCOM, he also commanded the 1109th Signal Brigade, served as Deputy Chief of Staff for Information Management of USARSO, and as J-6 for JTF-Panama. He increased his authority over military communications in Panama even further by arranging the removal of the 154th Signal Battalion from the 41st Area Support Group and placing it under the 1109th Signal Brigade. Whereas Van Steenburg had little control over the 154th Signal Battalion's daily affairs, Torres now had absolute authority over the battalion, and over its new commander Lieutenant Colonel Francis. Additionally, Torres had a great deal of informal

[28]Witt, Interview.

influence over and personal knowledge of the Panama Canal Commission telephone system and the commercial telephone company (INTEL). The only limitation to Torres' personal control over all military communications in Panama was his span of control as a single man over all of the agencies for which he was responsible.

The communications infrastructure already present in Panama prior to Just Cause was an important and unusual factor in the conduct of that operation. It was definitely non-stereotypical in that the contingency forces sent to that country would not have to carry all of their communications means with them, and the time that was available to prepare for the operation also reduced the dependence of XVIII Airborne Corps upon its customarily austere echelonment of communications. In spite of this advantage, however, XVIII Airborne Corps contingency communications were the standard to which XVIII Airborne Corps and its 35th Signal Brigade trained. Their expectations, habits, and normal practices were therefore based upon normal communications, which they did bring with them to an extent. The next chapter will address contingency communications in XVIII Airborne Corps.

FIGURE 2-1

Strategic External Connectivity

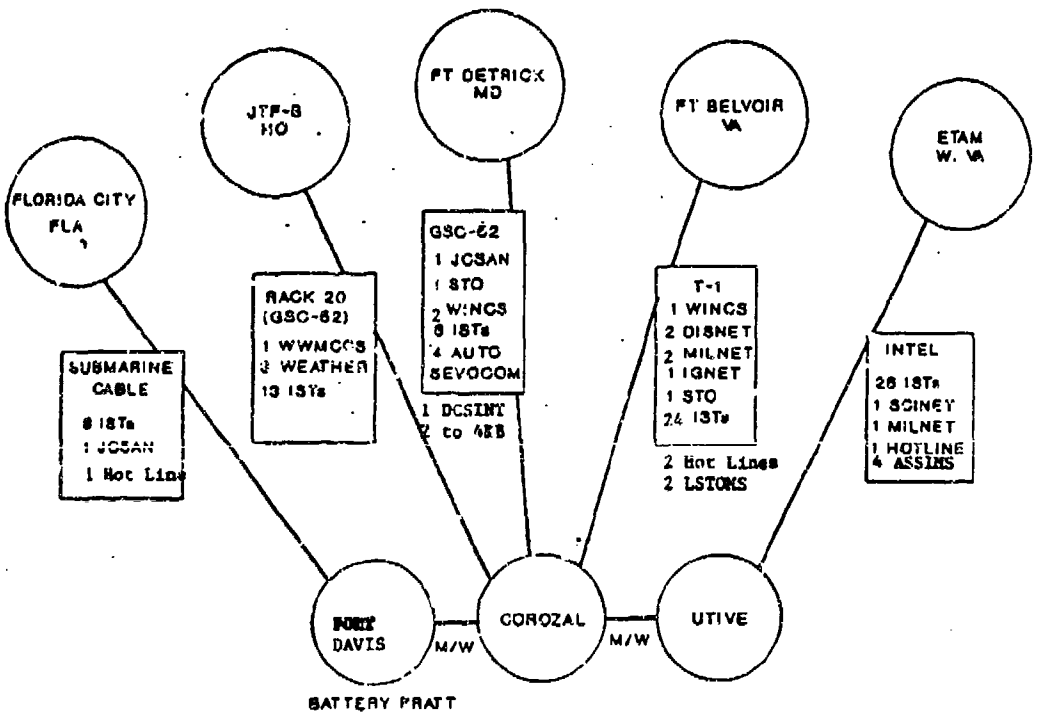


FIGURE 2-2

Strategic Microwave Radio Network

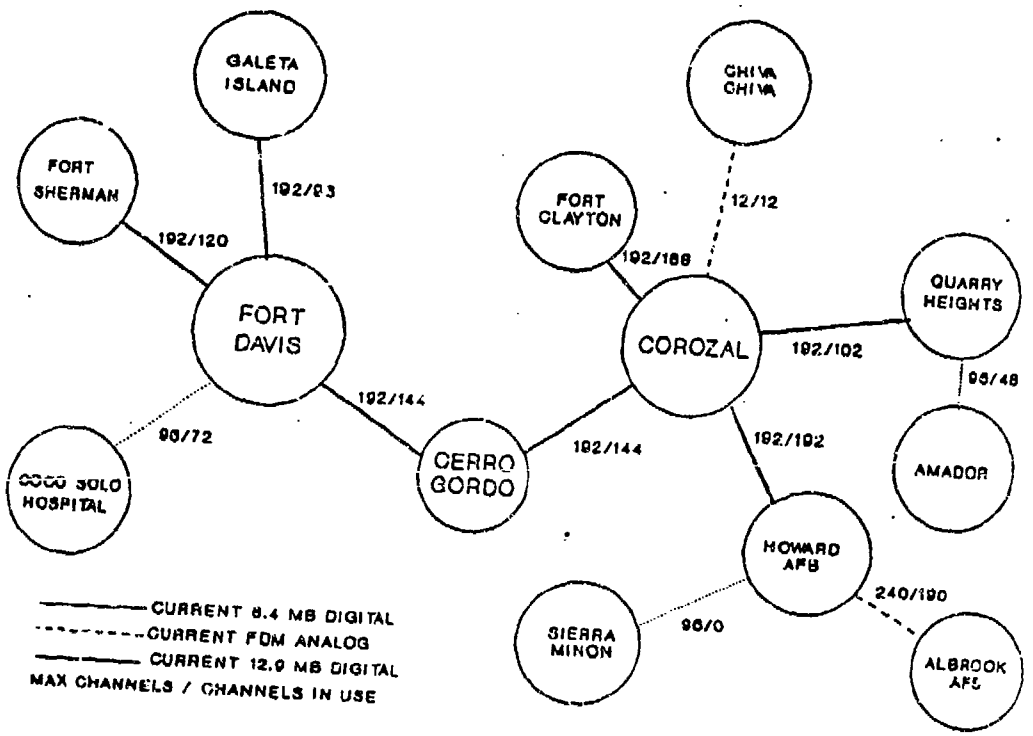


FIGURE 2-3

Strategic Cable Network

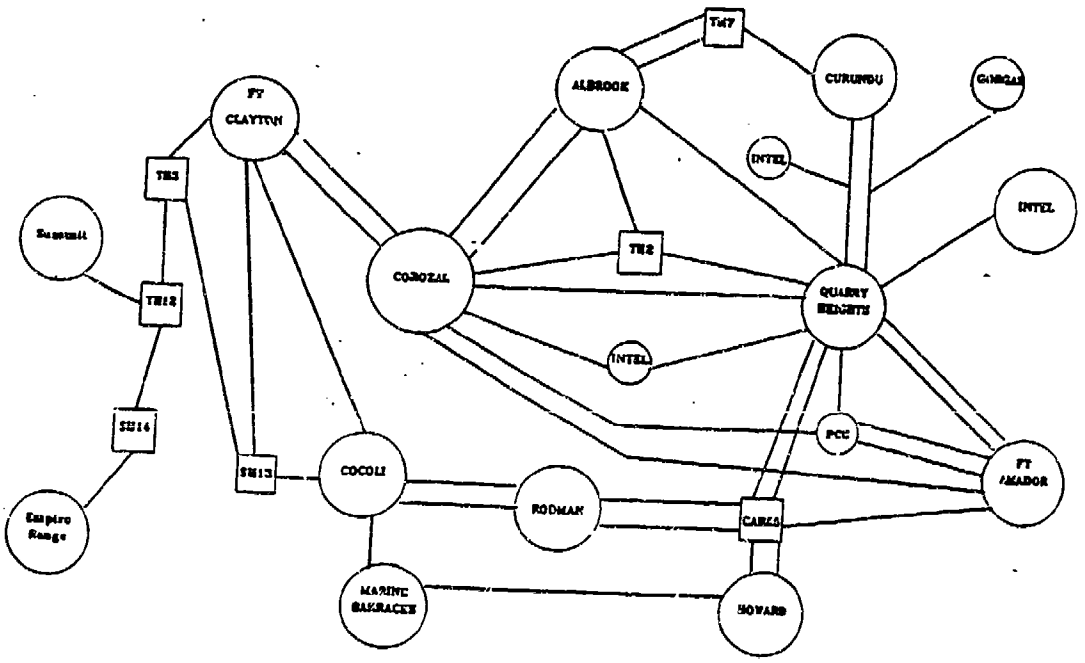


FIGURE 2-4

Military Dial Central Offices in Panama

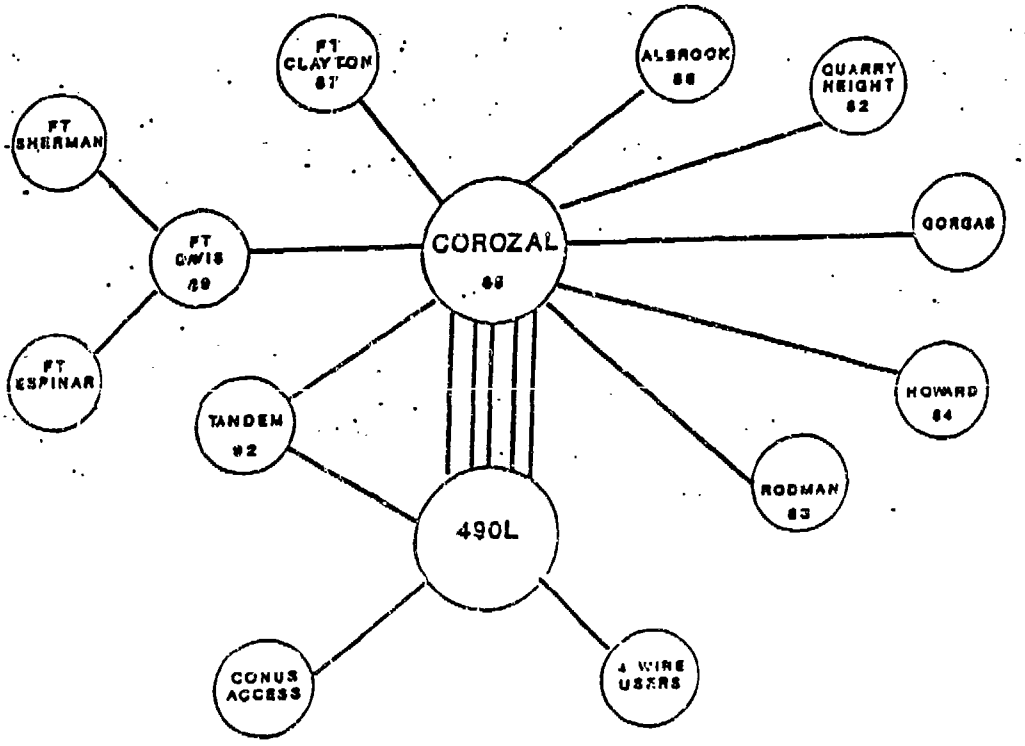


FIGURE 2-5

1109TH Signal Brigade Organization Chart

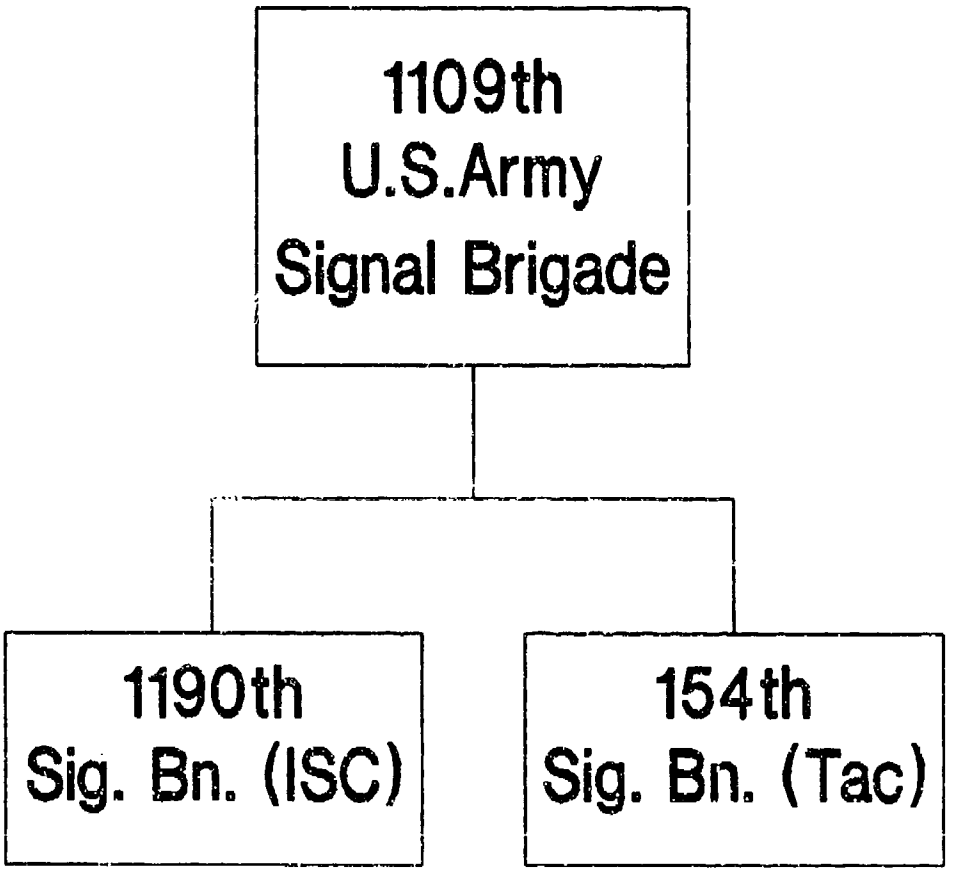
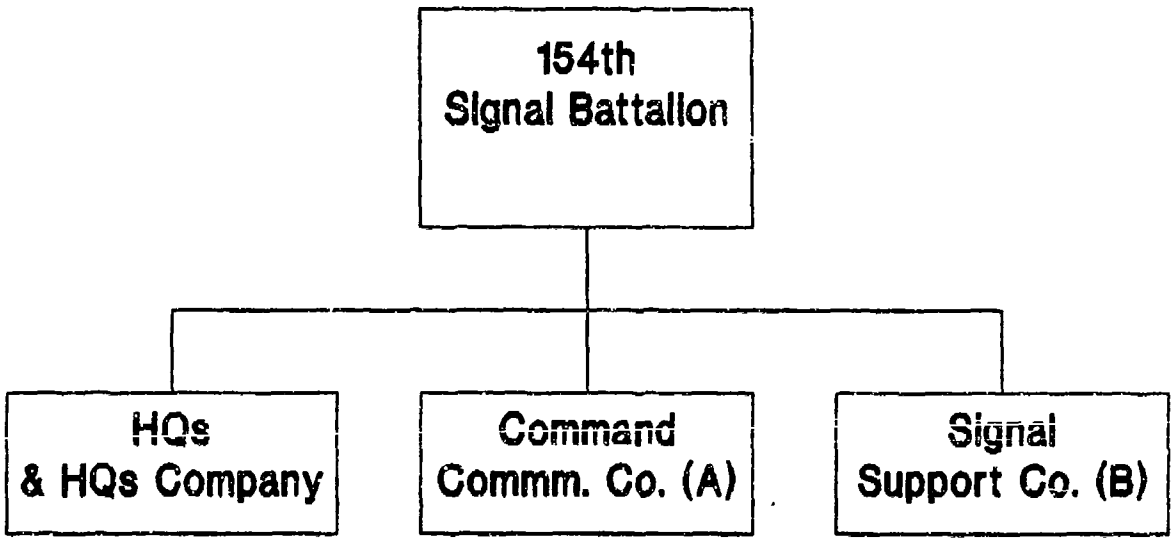


FIGURE 2-6

154th Signal Battalion Organization Chart



-CHAPTER III-

CONTINGENCY COMMUNICATIONS IN XVIII AIRBORNE CORPS

Chapter II examined the strategic and tactical communications infrastructure for United States forces in Panama prior to Operation Just Cause, with the object of supplying the reader a background in the communications systems that were already available in Panama prior to the operation. The purpose of this chapter is to present the background of "contingency communications" for XVIII Airborne Corps. The term "contingency communications" refers to communications in support of contingency operations and will be elaborated upon later in this chapter. JTF-South was little more than XVIII Airborne Corps with regard to the headquarters, with the most important positions filled by officers from Fort Bragg. As such, XVIII Airborne Corps brought many of their own communications personnel with them, especially on the JTF-South J-6 (Communications) staff. Many XVIII Airborne Corps communications techniques and requirements were therefore imposed upon the tactical communications infrastructure already in Panama, as well as upon reinforcing communications soldiers, staff, and equipment brought in from Fort Bragg once the operation began. It is essential to the understanding of this subject for the reader to grasp the communications standards that XVIII Airborne Corps was accustomed to operate under,

and to understand how and why these standards and techniques differed from those of other Army units.

The 35th Signal Brigade's mission was to provide tactical command and area communications to XVIII Airborne Corps. The brigade had four battalions and a headquarters element. The brigade headquarters contained an element called the Corps Signal Office that functioned as a part of the corps staff and, in fact, had actually been a part of the corps staff until it was transferred on paper to 35th Signal Brigade.[1] During the "Blue Spoon" phase of planning for operations in Panama, the Corps Signal Office was led by Lieutenant Colonel Gordon Call, who prepared the "Annex K" to SOUTHCOM OPORD 7-88 (BLUE SPOON). Call was transferred to United States Army Special Operations Command in August 1989, and he was replaced by Colonel William L. Mason. Since Mason had preceded Call in his position at Corps Signal, he had both experience and credibility with the commanders and staff.

35th Signal Brigade had four battalions (see figures 3-2 through 3-6 at the end of this chapter). The 50th Signal Battalion was an airborne battalion. Its job was to provide

[1]During this period (1988) several corps staff sections went through the same thing, easily identified by the change in unit shoulder patches. Officers and men on the Corps Signal Staff replaced the XVIII Airborne Corps "dragon patch" with the 35th Signal Brigade "lion patch", while some members of the various intelligence sections wore the 525 Military Intelligence Brigade patch.

command communications for the corps forward command posts, to include communications down to divisions and separate brigades in the corps. The 327th Signal Battalion was only partially airborne, and their responsibility was to provide communications for the corps main command post, the corps rear command post, and the 1st Corps Support Command (COSCOM). The 327th also had all of the corps' high capacity tropospheric-scatter multichannel radios, capable of carrying 144 channels for 100 miles on a single link, plus all of the brigade's high frequency multichannel radios. The 426th Signal Battalion was an area battalion, designed to provide tactical communications to any units in their geographical area. Their equipment was very heavy in comparison with the 50th Signal Battalion's equipment, as their mission allowed them to be less rapidly deployable. The 50th Signal Battalion typically planned for air movements, while the area battalions often relied upon ships. The 25th Signal Battalion was designed in exactly the same fashion, but custom and usage had given it an additional role. The 25th devoted one company to establishing "sustainment base" communications on Fort Bragg, interfacing the tactical communications network with the DCS through the post telephone system and through the Automatic Digital Network (AUTODIN) entry point at the Space Activities Office on Macomb Street, Fort Bragg.[2]

[2] 35th Signal Brigade (Corps) (Airborne), Corps Command & Area Communications System Standing Operating Procedures Vol. I, (Fort Bragg: 1112th Signal Battalion Field Printing Facility, 12 June 1990), pp. 1-7 - 1-17.

In addition to the four battalions of the 35th Signal Brigade, Fort Bragg had two other signal battalions with whom the 35th cooperated either formally or informally, as the case required, to such an extent that officers and soldiers would sometimes be reassigned from one to the other over a period of years. The 82d Signal Battalion belonged to and supported the 82d Airborne Division, and the 112th Signal Battalion belonged to and supported First Special Operations Command.

FM 100-5 defines contingency operations as "military actions requiring rapid deployment to perform military tasks in support of national policy."[3] The "rapid deployment" requirement is the characteristic that most influences contingency communications. The usual method of moving troops to the objective area is by aircraft, and the initial forces are either landed on an airstrip or parachuted in. For the purposes of planning, everything must go by air, and everything includes artillery, vehicles, ammunition, and all supplies. Due to the limited availability of aircraft for any mission, competition for space on the aircraft is always a serious matter, and nothing may be brought along that is less important to the mission than something that might still be waiting behind.

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[3]U.S. Department of the Army, Field Manual 100-5, Operations (Washington, D.C.: U.S. Government Printing Office, 1986), p. 169.

This requirement to prioritize all men and material going forward led the 35th Signal Brigade at Fort Bragg to design echelons of communications support for the Corps or JTF headquarters to coincide with the gradual availability of aircraft, beginning with the bare minimum of communications capability and building up as the situation required and allowed. Contingency communications plans were therefore built around three standard echelons, known as "A echelon," "B echelon," and "C echelon." The A echelon assumed that there was to be no secure airstrip for the initial arrival, and so everything in the A echelon was designed to be delivered by parachute. In its basic form, the A echelon contained at least three secure single-channel tactical satellite radios, one secure short-wave or "high frequency" single-channel radio, and three secure FM radios for short range use. These items were all carried in soldiers' rucksacks, which generally weighed over one hundred pounds before they were through packing them. In addition, a facsimile machine, a small "Honda" electrical generator, and some other odds and ends might be packed in an A-21 "door bundle," which would be kicked out of the aircraft on its own parachute to be recovered on the ground. Finally, if there was enough aircraft space, the A echelon would also include two 5/4 ton trucks (called HMMWVs) that were specially designed for the A echelon. The first vehicle was called the "FM Special," and it carried three FM

radios with greater power and range than the small ones in the soldiers' rucksacks, one high frequency radio with over ten times the power of the rucksack version, a small Honda electrical generator, and anything else that could be fitted in. The second vehicle was called variously the "HF Special" or the "Ratt Special." This was nothing more than a locally fabricated high frequency radio-teletype. Both the HF Special and the FM Special were designed to stand a parachute delivery, or "heavy drop," and were thus both simple and rugged. Everything in the A echelon came from the 50th Signal Battalion, and the A echelon was kept in constant readiness for immediate deployment on short notice or no notice.[4]

The A echelon permitted the Corps or JTF Commander to control his subordinate units on the ground via single channel radio. The FM radios allowed him to communicate to other stations within "radio line of sight," or anything from fifteen to twenty-five kilometers for planning purposes. The satellite radios could reach stations at any distance and were used not only for subordinate units out of FM range, but also to communicate with ships, home station, or higher headquarters all the way up to the National

[4] 35th Signal Brigade, The Corps Command and Area Communications Systems (CCACS), Vol. I (Fort Bragg, North Carolina: 1112th Signal Battalion Print Plant, 1990), pp. 1-1, 1-7; see also an unpublished draft of the 35th Signal Brigade "Readiness Standing Operating Procedures," maintained by 35th Signal Brigade, Fort Bragg, North Carolina.

Command Authority. All services used satellite radio communications, which by 1989 had become the most important and widely used long range tactical communications means in the American military establishment. The high frequency radios were generally intended as a redundant means to the satellites, relying as they did on ionospheric propagation (bouncing the radio signals off the ionosphere) rather than upon satellites that could be jammed or even destroyed by a sophisticated enemy. The HF Special was the only equipment in the A echelon that could enter directly into the Defense Communications System, bringing world wide teletype communications to the JTF or Corps Commander. In practice, this radio-teletype link to the Defense Communications System was seldom practiced because the HF Special was usually used for teletype communications with subordinate units in the objective area, with the B echelon effecting the Defense Communications System entry.

The A echelon was the bare minimum, and it was only intended as a temporary measure to support the JTF or Corps until equipment could be brought in with higher capacity. As soon as C-130 aircraft could be landed in the objective area, the B echelon communications package would arrive. Equipment qualified for inclusion on the B echelon if it was able to drive onto and drive off of a C-130 on a dirt airstrip, and if it was absolutely essential to effect entry into the Defense Communications System. The first piece of

equipment to come on the B echelon was always a multichannel satellite communications van, the TSC-93A. This equipment was mounted in two Chevrolet pick-up trucks with two trailers. One truck carried the communications shelter with all of the radio equipment in it, while the other carried the eight-foot parabolic antenna, often referred to as the "eight foot dish." The shelter itself was very heavy, actually heavier than the trucks were rated to carry. Each of the two trailers carried a diesel power generator. Two C-130 aircraft were required to move this assemblage. Once the TSC-93A set up, the commander could have a teletype station with access into the Defense Communications System's world-wide Automatic Digital Network (AUTODIN) and telephones that could call into the Automatic Voice Network (AUTOVON). From this moment on, the objective area had access to the strategic communications networks and commercial networks. Other B echelon equipment could be added to the TSC-93A, such as a small SB-3614A switchboard and some STU-III secure telephones, to allow the JTF or Corps to talk secure all the way up to the National Command Authority if need be. At times, but not very often due to the inevitable shortage of space on aircraft, a TSC-60 high frequency multichannel van from the 327th Signal Battalion was added to the B echelon to effect DCS entry for teletype as a redundant means apart from the satellite system. Besides this TSC-60, everything in the B echelon came from the 50th Signal Battalion.

B echelon communications were intended to allow the Corps or JTF to talk back to its sustainment base (Fort Bragg) or to adjacent and higher headquarters, with the single channel radios of the A echelon still providing communications to the local subordinate units. C echelon communications were designed to improve local communications to subordinate units. The C echelon contained whatever line-of-sight multichannel radio equipment, additional radio-teletypes, and other equipment the situation required for bringing subordinate ground units into the tactical telephone system. Since all of the C echelon equipment was intended to improve command communications to subordinate combat units, the 50th Signal Battalion provided the C echelon as well.

The Corps or JTF network did not cease development with the installation of the C echelon. Much heavier and bigger equipment from the other battalions in 35th Signal Brigade could be brought in as the situation demanded. The purpose for the echelonment of communications was to have fairly standardized and simple communications solutions for the initial days of the operation. Every operation was different, so the communications support that followed the C echelon would be designed against the specific requirements of the mission. One of the few things that most missions had in common was a shortage of airplanes relative to the

requirements, and it was this common problem that the echelonment of communications was designed to overcome.

Unlike the XVIII Airborne Corps, most of the Army did not have to concern itself with these rigorous deployability requirements. Army units in Germany or Korea were already located within driving distance of their expected area of operations, and the heavy divisions and corps based in the United States relied upon ships to deploy to their expected wartime locations. These heavier units made up the bulk of the United States Army, so standard doctrine was generally designed with them in mind. Air movement and parachute delivery were low on the requirements list for standard Army communications.

Other differences between XVIII Airborne Corps communications and communications in support of heavier military formations, such as V Corps and VII Corps in Europe and III Corps in Texas, resulted from the differences in the sort of missions that these organizations faced. The heavy corps concentrated their efforts on a limited number of operations plans dealing with large-scale wars. Force structure in support of these plans was well known and did not change very often or very much. XVIII Airborne Corps had to be prepared to face anything from a general war against the Soviet Union in Iran to a non-combatant evacuation in a small Caribbean island. Force structure was

varied and changing, and so could not be planned for in detail.

This disparity between XVIII Airborne Corps requirements and the requirements of the rest of the Army resulted in a similar disparity between communications practices in XVIII Airborne Corps and the rest of the Army. This included some significant procedural differences. Radio operating procedures, communications security measures, and telephone communications were all modified to suit the peculiar requirements and desires of XVIII Airborne Corps.

Radio operating procedures were governed by a document called a Signal Operating Instruction (SOI) in the Army, and called a Joint Communications Electronics Operating Instruction (JCEOI) in joint and combined operations. SOIs and JCEOIs were usually pocket-size booklets that prescribed radio frequencies for single channel radio networks and assigned "callsigns" or radio names to the stations in the networks. The JTF-South JCEOI used to support Operation Just Cause was the product of a long evolution, beginning with Army signal operating instructions used as early as the Second World War. The Second World War was fought against a sophisticated adversary, and radio operating procedures were accordingly strict, but in the years following the war the threat receded from memory. During the Vietnam war, the

Signal Corps rediscovered that periodically changing frequencies and callsigns greatly improved communications security, and the Army standardized the practice. This was not without criticism, even at the time that the practice was adopted. Many commanders agreed with Colonel Sid Berry, commander of the First Brigade, First Infantry Division, from June 1966 to February 1967, when he complained that: "It simplifies communications for units and individuals to keep the same frequencies and particularly callsigns. Frequent changing of callsigns confuses friends more effectively than enemies."[5]

In spite of the criticism, the enemy eavesdropping threat was considered serious enough to warrant the added complication of changing callsigns and frequencies, so the practice continued after the Vietnamese War and was standardized throughout the American Army. The National Security Agency (NSA) produced the standard Army SOIs. These SOIs had ten time periods designed into them, with daily frequency and callsign changes. These SOIs were also made to support standard Army organizations, with stations from other services not usually addressed. If a unit wanted to change the SOI, it had to submit the change to NSA, where it might take months to effect. This was not a serious problem to most units, however, where known units were

[5]Lieutenant General Charles R. Myer, Vietnam Studies: Division-Level Communications 1962-1973 (Washington, D.C.: Department of the Army, 1982), p. 64.

organized in support of known war plans that did not change very often. Contingency operations, however, presented a very different sort of problem.

Operation Urgent Fury, the American invasion of Grenada in 1983, suffered from the failure to integrate the radio operating procedures of the services involved, most notably the Army and the Navy.[6] XVIII Airborne Corps and other organizations tried to remedy this systemic problem in the years following Urgent Fury by addressing the JCEOI issue and by peacetime training with the other services. Colonel Robert E. Gray, commander of the 35th Signal Brigade, and Colonel William L. Mason of the XVIII Airborne Corps Signal Office took the lead in the development of the XVIII Airborne Corps' version of the JCEOI. Captain Marilyn M. McAllister of Mason's operations section worked many months almost exclusively to develop a contingency JCEOI, coordinating with unified commands and trying to fit the JCEOI to war plans. The only unified command to support the project was United States Atlantic Command (CINCLANT), no doubt as a result of their painful experience in Grenada. The format that Captain McAllister developed became the

[6]Major Mark Adkin, Urgent Fury: The Battle for Grenada (Lexington, Massachusetts: Lexington Books, 1989), pp. 221, 229, 272, 285; see also Colonel Steven E. Anno and Lieutenant Colonel William E. Einspahr, "Command and Control and Communications Lessons Learned: Iranian Rescue, Falklands Conflict, Grenada Invasion, Libya Raid," Research Report, 1988, on file with the Air War College, Maxwell Air Force Base for a good unclassified digest of communications interoperability problems on Urgent Fury.

XVIII Airborne Corps standard for JCEOIs and was refined in a number of joint exercises before its successful use in Operation Just Cause.[7]

The XVIII Airborne Corps JCEOI was different from the standard NSA produced Signal Operating Instructions (SOI). Callsigns and radio frequencies were not changed daily. Non-changing callwords were often substituted for the standard NSA-style callsigns that changed every day. The justification for these practices, often denounced as dangerous to communications security, was that since the VINSON (KY-57) voice radio encryption device prevented enemy eavesdropping, there was not sufficient benefit to offset the added complexity of frequency and callsign changes. Put plainly, the risk of confusing friendly forces was considered greater and more significant than the risk of enemy communications intelligence.[8]

[7] When this author reported to Corps Signal (at that time called Corps C-E) in October 1986, McAllister had been working on the project for some time, and continued to work on it for as long as she was assigned to the section. This author and the other officers in the section used McAllister's formats for JCEOIs, at least until Just Cause. This is not to say that other formats were not used, but her JCEOI was the best and most commonly used.

[8] This procedure became common in XVIII Airborne Corps beginning in 1986, having been championed by the 82d Airborne Division against the resistance of most officers in the Corps Signal Office, including this writer. Lieut.Gen. Carl Stiner fully supported this technique as the 82d Airborne Division Commander and, later, as XVIII Airborne Corps Commander.

During the development of the prototype JCEOI, it soon became apparent that a separate JCEOI would have to be made for every contingency, as force structure varied from contingency to contingency. This was another area in which the standard NSA SOI failed to meet the requirements, due to its fixed and inevitably generic nature. Because it took so long to coordinate changes in the SOI with NSA, the document was neither flexible nor responsive enough for contingencies, where changes are made until the end of the mission. Between 1984 and 1989 JCEOIs were designed to meet some CINCLANT contingencies, but they were either opposed or ignored by other unified commands. On most joint exercises during this period, XVIII Airborne Corps produced the JCEOI for its own forces, based upon whatever operating instructions that the unified command was using.

XVIII Airborne Corps often modified other communications security procedures, always in the direction of greater simplicity. Cryptographic keys were often "frozen," or not changed as normally prescribed, to avoid the danger and confusion of losing communications in the middle of an operation due to a botched keying material change. Changes were postponed until the most complicated phases of the operation were through. Another departure from standard cryptographic practice was the use of a single "variable" or code for all radios in an operation.

The KY-57 VINSON secure device was designed to be used with different keys on different radio networks. The theory behind this was that the capture of a key or of a VINSON device would not compromise more than one net. Once again, XVIII Airborne Corps found this practice too inflexible to be able to respond to unplanned changes during an operation. For example, if the Third Brigade's 1-508th Infantry Battalion was on the Third Brigade's crypto key, and if the battalion was put under First Brigade due to some emergency or change in plan, the 1-508th would have to get the crypto key from First Brigade and then load it into all of its VINSONs before they could have secure communications with their new headquarters.

XVIII Airborne Corps solved this problem by the simple expedient of putting many units on the same key. Commonly, the Division key was used by all subordinate units, but at times the key of an even higher headquarters might be used. This practice was also imposed upon JTF-Panama by Major General Loeffke, who had previously served at Fort Bragg. Communications officers in Southern Command, more bound to doctrine than some of their counterparts at Fort Bragg, disagreed with Loeffke's imposition. Lieutenant Colonel Kay Witt, commander of the 154th Signal Battalion at Fort Clayton, spoke for many when he said that "it rubs counter to everything I have ever been taught," but he also noted

that "we will probably get away with it" owing to what he considered an unsophisticated electronic warfare threat.[9]

XVIII Airborne Corps approached telephone communications pragmatically, and differently from many other Army organizations. The corps had already gone through the Protected Distribution System (PDS) evolution and virtual abandonment already described in Chapter II. Newly assigned personnel learned that "doctrine is not blindly followed without a thought as to its actual utility," and "no rule, standard, regulation, or procedure relieves the individual signal officer or soldier of the responsibility to apply common sense at all times."[10] Because they were fast and reliable, magneto telephone hotlines or "point-to-points" were still commonly used for command communications, in spite of widespread condemnation by school-trained signal officers who considered them obsolete. The 82d Airborne Division had led the way with experiments using the STU-III secure telephone in the field with the small SB-3614A tactical switchboards, even though the STU-IIIs were designed exclusively for indoor use, and XVIII Airborne Corps adopted this technique on a small scale. Finally, the XVIII Airborne Corps commonly connected its telephone network with the Defense Communication System

[9]Lieutenant Colonel Kay Witt, interview with Dr. Lawrence Yates, Fort Clayton, Panama, 28 April 1989.

[10]35th Signal Brigade (Corps) (Airborne), Corps Command & Area Communications System Standing Operating Procedures Vol. I, (Fort Bragg: 1112th Signal Battalion Field Printing Facility, 12 June 1990), pp. i-ii.

and with commercial civilian telephone networks. One could call into the tactical network from an ordinary pay telephone if one wanted, and the corps staff could call literally anyone with a telephone.[11]

These communications procedures and standards were practiced in a series of exercises. After the Grenada operation, joint communications training was the rule rather than the exception in XVIII Airborne Corps. Immediately following Urgent Fury, the 82d Signal Battalion began high frequency radio training with the Navy, thus gaining experience in these techniques for the corps as a whole. By the time of Just Cause, high frequency DCS entry exercises into Navy stations were frequently practiced in the 35th Signal Brigade. "Sand Eagle" exercises gave 12th Air Force, XVIII Airborne Corps, and special operations forces practice in staff coordination and communications that would have direct application in Just Cause, while "Solid Shield" exercises had the same effect with XVIII Airborne Corps, the Marines, and the Navy.

XVIII Airborne Corps was therefore well prepared for joint operations by 1989, with routine training with all of the services and with communications procedures and in some cases even equipment designed specifically to support joint

[11] 35th Signal Brigade (Corps)(Airborne), Corps Command & Area Communications System Standing Operating Procedures, Vol. IV, pp. i-ii.

contingency operations. The 35th Signal Brigade commander, Colonel Jackson Moss, was respected and experienced with over a year in command by fall of 1989. His Corps Signal Office was capably led by Colonel Mason, whose personal experience in XVIII Airborne Corps predated and included Urgent Fury, and was manned by experienced signal officers, most notably the Operations Officer Major Steve Witt. These were the officers who would devise the tactical communications plan for Operation Just Cause.

FIGURE 3-1

XVIII Airborne Corps Organization Chart

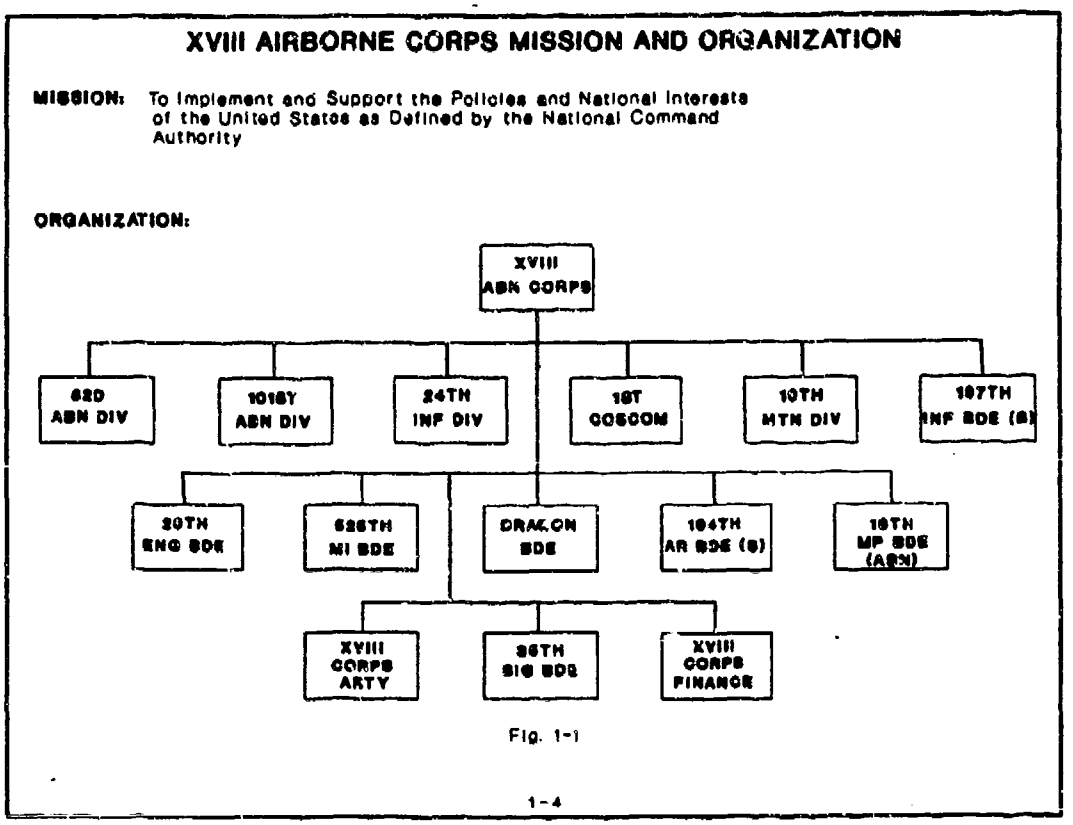


FIGURE 3-2

35th Signal Brigade Organization Chart

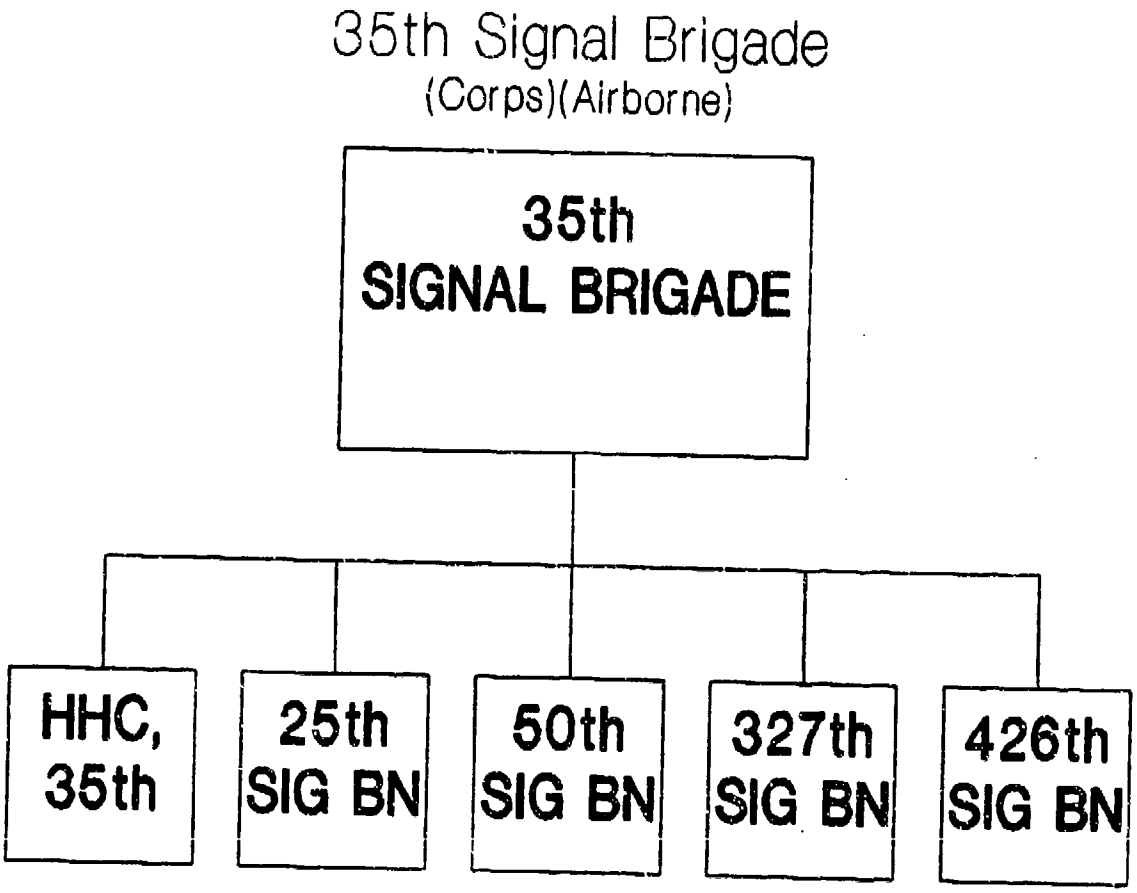
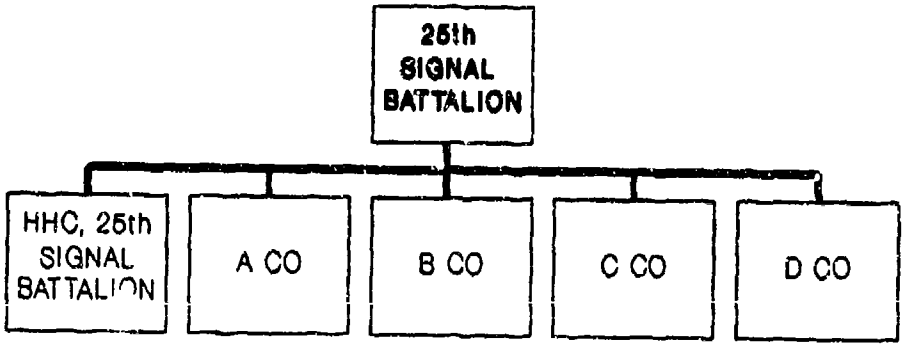


FIGURE 3-3

25th Signal Battalion Organization Chart

25th SIGNAL BATTALION MISSION & ORGANIZATION

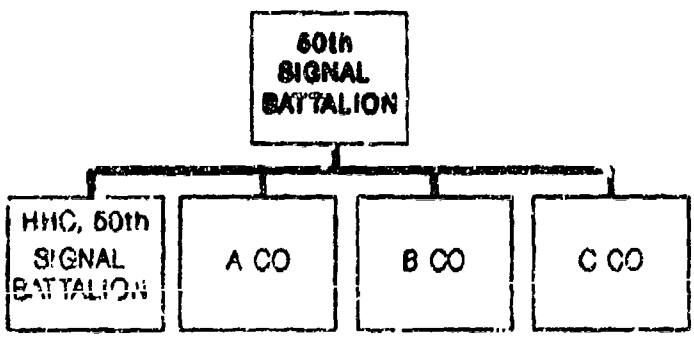


MISSION: To provide an area signal node and related multichannel communication facilities as part of a corps area communications system providing communications services and access to the area systems for designated geographically located units.

FIGURE 3-4

50th Signal Battalion Organization Chart

50th SIGNAL BATTALION MISSION & ORGANIZATION

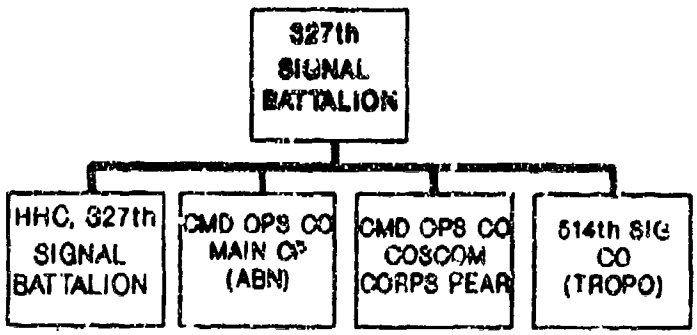


MISSION: To provide forced entry communications capability for the XVIII Airborne Corps Commander in a variety of contingency operations. To provide communications support for the Corps tactical command post and communications links to the subordinate divisions, separate brigades and attachments as required.

FIGURE 3-5

327th Signal Battalion Organization Chart

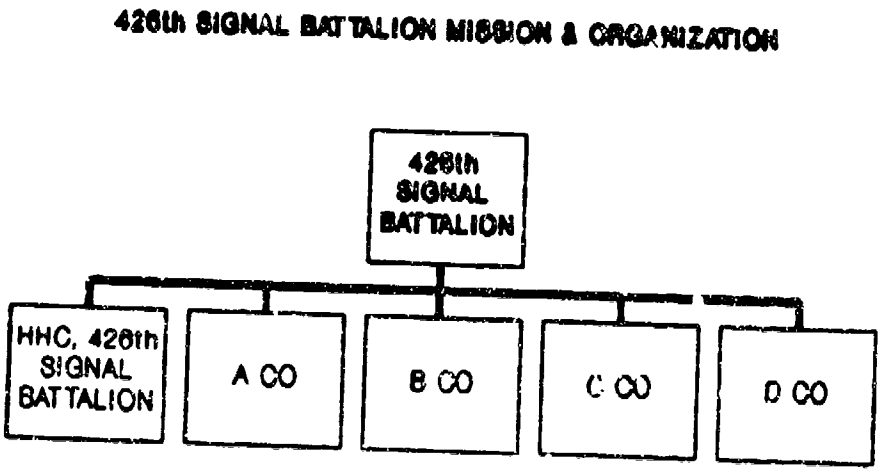
327th SIGNAL BATTALION MISSION & ORGANIZATION



MISSION: To install, operate, and maintain tactical communications for XVIII Airborne Corps Main Command Post, the 1st Corps Support Command (COSCOM), and Corps Rear. To provide command and area tropospheric scatter communications support as required.

FIGURE 3-6

426th Signal Battalion Organizatiou Chart



-CHAPTER IV-

OPERATIONS PLAN 90-2

The purpose of this chapter is to examine the communications support that was planned under JTF-South Operations Plan (OPLAN) 90-2. OPLAN 90-2 was the final version of the plan to defeat the Panamanian Defense Force (PDF), depose General Noriega, and install a government friendly to the United States. Prior to any inquiry into communications support for OPLAN 90-2, however, it will be instructive to review briefly the operational plan that preceded it and to look at communications support planned for earlier versions of the plan for offensive operations in Panama in order to understand the logic behind the measures that were finally agreed upon and taken.

Planning for hostile action against the Noriega regime began in earnest with the "Elaborate Maze" operations plan described in Chapter 1. In April 1988, Elaborate Maze was broken down into several plans under the "Prayer Book" series, with the plan for offensive operations against the PDF being known as "Blue Spoon." Under the Blue Spoon scenario, JTF-Panama was to conduct "joint offensive operations to neutralize the Panama Defense Force (PDF) and other combatants as required, to protect U.S. lives,

property, and interests in Panama, and to assure the full exercise of rights accorded by international law and the United States-Panama treaties."[1] General Woerner intended this operation to bring the war to a swift and decisive end, while protecting American property, lives, and interests. Blue Spoon was to "leave no doubt in the enemy's mind that we acted purposefully, professionally, and with minimum force required to remove threats to U.S. citizens, the Canal, and the Panamanian people."[2] Simultaneously with the execution of Blue Spoon, SOUTHCOM was to initiate SOUTHCOM OPORD 6-88, "Blind Logic." Blind Logic consisted of civil-military operations to stabilize Panama and to rebuild the Panamanian government so that it could "assume its legal responsibilities concerning the Canal and related treaties with the USG [U.S. Government]."[3]

As mentioned previously, the principal communications planners at that time were Colonel Torres-Cartegena on the SOUTHCOM J-6 (communications) staff at Fort Amador, Colonel Van Steenburg, the J-6 of JTF-Panama and the commander of the 109th Signal Brigade, and Lieutenant Colonel Witt the commander of the 154th Signal Battalion. In early 1989 XVIII Airborne Corps was brought into the planning, and Lieutenant Colonel Gordon Call of the Corps Signal Office

[1] JTF-Panama, "JTF-PM OPORD 7-89, BLUE SPOON."
[2] Ibid.
[3] Ibid.

led the communications planning effort at Fort Bragg for what would later become JTF-South.

Call and several of his officers, most notably Major Don Mueller (a former Air Force communications officer) and Chief Warrant Officer Raymond Frison (who had written a study for SOUTHCOM several years before identifying the vulnerability of the strategic communications network in Panama), made several trips to Panama to meet with communications planners. Based upon this coordination, Call assembled a thirty-seven page Annex K (communications) to JTF-Panama OPLAN 7-88.

This voluminous communications annex had thirteen appendices and went into great detail. Planning was based on the assumption that the Panama Defense Force (PDF) would disrupt United States access to Panamanian controlled telecommunications facilities, such as the commercial INTEL satellite link out of Utive and its associated terrestrial communications systems, and that this loss would significantly reduce SOUTHCOM's ability to carry on its intelligence functions and command and control of its forces.[4]

In spite of the anticipated enemy threat to the 1109th Signal Brigade's strategic communications infrastructure,

[4] JTF-Panama, "Annex K" to JTF-PM OPORD 7-88, BLUE SPOON.

Blue Spoon anticipated using these facilities to the maximum possible extent, with tactical communications to provide redundancy over the most vital links. Initial systems engineering for the tactical network was to be the absolute responsibility of the 154th Signal Battalion. The establishment and testing of this network occupied the resources of the 154th from April 1988 onwards.[5]

Command, control, and integration of the various communications networks included in the Blue Spoon plan bear close attention because these relationships would be similar to those in the final OPLAN 90-2, although they would change in the actual execution (see figure 4-1). Under OPLAN 7-88 for Blue Spoon, "the joint command and control communications management structure is based upon USCINCSO J6 providing for centralized control of theater-wide assets. Execution is decentralized through component communications control centers. These centers are established to control internal component communications."[6] The line between USCINCSO J6 and JTF-Panama J6 (which would later be replaced by JTF-South J6 under 90-2) was blurred even at this early date, as Blue Spoon specified that "JTF-PM JCCC (Joint Communications Control Center) will centralize control in Panama and will be established by the USARSO DCSIM (United States Army, South, Deputy Chief of Staff for Information

[5] Lieutenant Colonel Witt interview with Dr. Lawrence Yates, 29 April 1989.

[6] JTF-Panama, "BLUE SPOON Annex K."

Management) in conjunction with the 1109th Signal Brigade, the 35th Signal Brigade, and the 154th Signal Battalion...(to) provide for the interface between the strategic and tactical systems. It [the JCCC] provides centralized direction and management to the JTF-PM and subordinate SYSCONs (Systems Control)."[7]

Below the JCCC were the "Systems Control" (SYSCON) and the "Technical Control" (TECHCON). SYSCON was responsible for the control of the tactical communications network. Under Blue Spoon, the commander of the 154th Signal Battalion was absolutely responsible for SYSCON, to include planning, engineering, and directing all communications system changes. Under the Blue Spoon plan, the 154th Signal Battalion was to be assisted in this by augmentees from the 35th Signal Brigade, who would arrive with the equipment specified in the plan and be integrated into his battalion SYSCON.

The term "technical control" (TECHCON) ordinarily refers to the actual connecting and sorting of communications circuits. In tactical communications this takes place in a signal van called a "patch panel" or "technical control facility" (TCF). In the Blue Spoon plan, the term TECHCON did not apply to tactical communications at all, but to the fixed station strategic technical control

[7] Ibid.

facility at Corozal, which was placed directly under the JCCC. The technical control facility at Corozal routinely worked under the direction of its parent headquarters, the 1109th Signal Brigade. The JCCC, being mostly an institution of the 1109th Signal Brigade, would serve as the SYSCON for strategic communications, for which it was well qualified.[8]

It should be emphasized that neither the JCCC nor the SYSCON were to be manned entirely by any single organization under Blue Spoon. The JCCC, although it was the responsibility of the 1109th Signal Brigade, was to have augmentation from 154th Signal Battalion and from 35th Signal Brigade. Likewise, the JTF-Panama SYSCON belonged to the 154th Signal Battalion, with augmentation planned from 35th Signal Brigade.[9]

35th Signal Brigade was required under Blue Spoon to keep a quantity of equipment and men in readiness at Fort Bragg to be flown to Panama if they were needed during the course of the operation. This requirement was to be realized only if the primary systems that were planned should fail; for example, a massive failure of the strategic system due to enemy action would constitute such an emergency. Unless such a failure took place this equipment would stay on call at Fort Bragg, requiring as it would a

[8] Ibid.
[9] Ibid.

great many airplanes to bring it in, as well as several days to install after it arrived.[10]

Communications security was addressed in some detail under Blue Spoon. All joint radio nets were to use the "Intertheater Communications Security Package" (ICP) to secure voice communications. This ICP was a response to the inter-service communications problems of Urgent Fury in Grenada, 1983. ICP was designed to allow all services in an operation to communicate by putting the component headquarters and the joint headquarters all on the same cryptographic key. Internal component nets were still supposed to be on their service's key, so that a compromise at a lower level would not compromise the entire theater.

For example, to explain this concept, if the enemy were to capture a jeep belonging to Third Brigade, 82d Airborne Division, and the jeep had a radio with a VINSON secure device in it, whatever key that VINSON held would be considered compromised unless the driver was able to destroy or "zero" the key. If the VINSON held a Third Brigade key, then the Third Brigade would have to either change all of its radios with VINSONs to a new key, or it would have to live with the very good possibility that enemy intelligence

[10] Ibid; the plan specified two multichannel satellite vans (TSC-85A and 93A), six TRC-145 multichannel radio vans with six TRC-113 relays, one large TTC-39 telephone switchboard (including 3 five-ton trucks), a Tech Control (TSQ-84), an SB-3614A switchboard, and miscellaneous telephone and teletype equipment.

could understand their communications. The doctrinally correct answer would be to change the key for the brigade, which might be spread out over a large area. It was difficult to effect such a change without interruption in secure communications unless the unit in question was well trained in executing this procedure.

Now let us assume that this hypothetical Third Brigade jeep carried a key from division or even corps level. In this case, it would not merely be a question of whether or not to change the key for a single brigade, but rather of whether to change the key for a whole division or corps, a much more serious matter. ICP was kept for use only on joint nets, covering as it did the joint communications for the entire theater, to prevent an incident at a relatively low tactical level from necessitating a COMSEC change involving the entire theater.

Another communications security question addressed by Blue Spoon was the protected distribution system (PDS). PDS is explained in detail in Chapter II. Blue Spoon specified that PDS would not be used for joint communications systems, as the joint network would connect with AUTOVON and commercial networks. The plan further specified that if a component wanted to use PDS for its internal communications, then their internal communications systems must be isolated from the joint network. Since PDS was not permitted for the

joint network, then secure instruments would be needed for secure tactical telephone communications.[11]

This created a problem. The 154th Signal Battalion had only the analog SB-3614 and TTC-41 switchboards, for which the Army had no secure tactical telephones. As a part of the Army shift to digital communications, the standard secure tactical telephone was the KY-68 "digital secure voice terminal" or DSVT. The DSVT could not be connected to a strictly analog switchboard like the SB-3614, nor were the 154th's TRC-145 transmission systems particularly well suited to carry digital circuits, although the TRC-145s could be made to do so using additional equipment with which the 154th had no experience at all.

Blue Spoon attempted to make the best out of this bad situation by requiring the Air Force to put a large, mostly digital TTC-39A switchboard at Howard Air Force Base, while the 35th Signal Brigade was to put a TTC-39A at Fort Clayton. These two locations would be the major nodes for the network, with the smaller TTC-41 and SB-3614 switchboards spread around to other locations. Secure KY-68 DSVTs would be run as "long-locals" off the two TTC-39As, being carried over the 154th's TRC-145 systems to every important location. A "long-local" was a telephone line carried from a switchboard to a telephone over a radio link

[11] Ibid.

rather than over wire as the local telephones are. Since the TRC-145 was not designed with DSVTs in mind, it could not handle the fast data rate of the DSVT, and so had to be modified to do so. This modification was accomplished by the addition of a data buffer TD-1065 to the TRC-145s. The TD-1065 worked well for the 35th Signal Brigade at Fort Bragg, but it took a long time and a lot of training and experimentation to make it reliable. The 154th had no opportunity to train with the TD-1065 because the unit would have needed a TTC-39 type of switchboard to run the long-locals from, and they had no such switchboard. Obviously this was a problem, but security demanded some sort of secure tactical telephone, and so secure tactical telephone communications in Blue Spoon were based upon the hope that the 154th could get these long-locals to work.[12]

The final area of communications security in JTF-Panama OPORD 7-88 (Blue Spoon) was the joint communications operating instructions (JCEOI). Blue Spoon specified that all radio callsigns, frequencies, and communications security keying material should be "frozen," or kept unchanged, beginning thirty hours before the United States initiated hostilities and lasting until JTF-Panama J-6 directed a change.[13] The JCEOI spoken of in Blue Spoon was not the JCEOI that would be implemented under OPLAN 90-2

[12] This is based upon my recollection of conversations with LTC Call and others of his staff during the planning of Blue Spoon.

[13] JTF-Panama, "BLUE SPOON Annex K."

(see below), but was rather a version that JTF-Panama put together under SOUTHCOM J-6 direction. This version was produced in standard Army format by the National Security Agency (NSA).[14]

In early 1989 XVIII Airborne Corps became the executive agency for planning. After several planning sessions during the summer and fall the corps produced JTF-South OPLAN 90-2, superseding OPORD 7-88. The XVIII Airborne Corps Signal Office reconsidered JTF-Panama OPORD 7-88 and decided that the communications plan was too complicated and too fragile for the type of operation being contemplated. As soon as Colonel William L. Mason replaced Lieutenant Colonel Gordon Call at the Corps Signal Office in August 1989, he made the revision of the plan his top priority, building an *ad hoc* special staff to accomplish it quickly and surely. Major Steve Witt, the Operations Officer for the Corps Signal Office and brother of Lieutenant Colonel Kay Witt who commanded the 154th Signal Battalion until late spring 1989, led the group. Captain Roderick MacLean, the Plans Officer for the Corps Signal Office, was responsible for actually writing the plan. Captain Jared Kline was brought up to Corps Signal from the Operations Section of 35th Signal Brigade to plan the multichannel radio network.[15] Security considerations required that the number of people who knew

[14]Colonel Torres-Cartegena interview with Dr. Lawrence Yates, 29 June 1990.

[15]I was assigned to this task at Corps Signal from August 1989 to October 1989.

about the OPLAN be kept to a minimum, so little of the work was delegated any lower. The product of these labours was Annex K (Communications) to OPLAN 90-2, approved on 3 November 1989. It was only eleven pages long, with two appendices; in conformance with Colonel Mason's requirements, it was kept as simple as possible.

OPLAN 90-2 itself envisioned a phased operation, with communications requirements for each phase. Phase one was "pre-deployment and crisis action," and depended upon the strategic systems already in place to support planning and coordination. Phase two was called "in-place force operations," involving combat forces already positioned in Panama under JTF-Panama. These forces were to rely upon the strategic systems already in Panama, single channel radios, and the 154th Signal Battalion multichannel communications network that OPLAN 90-2 specified. Phase three was "assault force operations," involving parachute operations to seize important locations and link-up with forces already on the ground. OPLAN 90-2 planned for communications from JTF-South at Fort Clayton to these airborne forces enroute, with an Air Force Joint Airborne Command and Control Communications Platform (JACC/CP) to control initial actions by the paratroops and other forces on the ground using single channel radio. Phase four was "stability force operations," to be controlled by all of the above. Phase

five was "redeployment" of the various components to home station.[16]

OPLAN 90-2 relied primarily upon single channel radio. Blue Spoon had included a single channel radio plan, but emphasized the strategic and tactical telephone systems. OPLAN 90-2 was designed in such a way that command and control could survive problems in any area of communications support except for single channel radio. The operation could be carried out as long as single channel radio would work. Single channel radio communications were governed by a completely rewritten JCEOI, constructed by Major Witt along the lines of McAllister's JCEOI mentioned in Chapter III above. Security considerations, once again, restricted Major Witt's assistance in this project to only a single sergeant, Sergeant Thomas Sasser. Major Witt was the "mastermind" behind the JCEOI.[17]

Witt began work on the JCEOI on 5 October 1989. He received instructions from Lieutenant General Carl Stiner, XVIII Airborne Corps Commander and commander of JTF-South, that the JCEOI had to be "small, inclusive, (and) user friendly."[18] General Stiner was not satisfied with the NSA produced JCEOI that had been built to support the Blue Spoon

[16]XVIII Airborne Corps, "Annex K to JTF-SO OPLAN 90-2",3 Nov 89.

[17]Major Steve Witt, "JCEOI-Operation Just Cause," an article prepared for XVIII Airborne Corps, but not published at the time of this writing.

[18]Ibid.

plan. Accordingly, Witt set forth to put together a JCEOI "that would have to fit into a Battle Dress Uniform (BDU) pocket, and that all the required information; units, call signs, call words, nets, and supplemental instruction would have to be easily understood by everyone without lengthy explanations by Signal Officers. As it turned out, what made the JCEOI a success was the fact that it was small, easily understood, and contained accurate, all inclusive information."[19]

Major Witt spent time questioning Lieutenant Colonel Tim McMahon, the G-3 Plans Officer of XVIII Airborne Corps, to learn the projected force structure in detail, and he continued coordination with G-3 Plans to keep abreast of force structure changes for future JCEOI editions. Those organizations within the force structure that knew what their requirements were going to be gave Witt detailed information; others gave none and were supported in the JCEOI according to Witt's best judgment.[20]

The JCEOI format was McAllister's format, with unit, callsign, callword, net and frequency listed left to right. Witt improved on the format by color-coding the multi-layered document. There were a total of eleven layers, as follow:

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[19] Ibid.
[20] Ibid.

SECTION I - Contained an Index, Instructions, COMSEC Short Titles, Joint Suffixes, Sign - Countersigns, Medevac Procedures, Laser codes, and Identification Friend - Foe Codes.

SECTION II - Joint Task Force South.

SECTION III - Joint Special Operations Task Force.

SECTION IV - Joint Intelligence Task Force.

SECTION V - Joint Psychological Operations Task Force.

SECTION VI - Air Force Forces.

SECTION VII - Task Force Pacific.

SECTION VIII - Task Force Atlantic.

SECTION IX - Task Force Aviation.

SECTION X - 7th Infantry Division, 2d Division Ready Brigade (DRB).

SECTION XI - 16th Military Police Brigade.[21]

SOUTHCOM J-6 had the responsibility for frequency management in Panama, and so the radio frequencies assigned in the JCEOI came from a block of frequencies provided by Master Sergeant Bethea, the SOUTHCOM frequency manager. The block of frequency modulation (FM) frequencies amounted to roughly one-third of the available FM spectrum. This was unacceptable because it would have made it necessary to assign the same frequencies to different units in a great many cases.[22] Witt realized that SOUTHCOM would not be forthcoming with any additional FM frequency authorizations, so he disregarded SOUTHCOM's instructions and used the

[21] Ibid.

[22] JTF-South, "JULLS Long Report," Fort Clayton Panama, 9 January 1990.

entire spectrum of FM frequencies anyway. Frequencies for the Joint Special Operations Task Force (JSOTF) were "fenced" or kept absolutely separate from the others, and enough frequencies were left so that duplication was kept to an absolute minimum, and even then it was limited to the least important nets. It was hoped that the expected geographical dispersion between the units to whom duplicate frequencies were assigned would prevent interference. As USARSO had no frequency manager of their own, Bethea was the sole military frequency manager in Panama, and there was no appeal from his decision except to disregard it.[23]

The first edition of the JTF-South JCEOI (Edition A) was published in 350 copies by 27 October 1989, following numerous all-night sessions beginning on 5 October.[24] There was an initial controversy between Corps Signal and G-3 Plans about the classification of the JCEOI. Because the JCEOI contained almost the entire force structure of JTF-South, G-3 Plans wanted to classify it "Top Secret." Corps Signal recognized that such a classification would keep the JCEOI out of the hands of the people who needed it most, remembering the debacle of Grenada where radio operating instructions came down from CINCLANT in a message so highly

[23] Colonel Torres-Cartegena Interview, in which Torres notes that USARSO had no frequency manager if its own, and so it had to rely upon Bethea; Major Witt told me about his decision to ignore SOUTHCOM's frequency restrictions (which he told nobody about at the time) during my visit with him at Fort Bragg in December 1990.

[24] 35th Signal Brigade, Internal After Action Report for Operation Just Cause," p.3.

classified that, even if the document was in such a format that the Army could use it (which it was not), and even if it had arrived early enough to be disseminated (which it did not), the radio operators could not legally look at it. Finally, G-3 Plans realized the impracticality of a "Top Secret" JCEOI, and they permitted it to be classified "Secret." This problem of classification and the implications it portended show how important it was that communicators were brought in on the planning early and had free coordination with the operations planners.[25]

The JCEOI was constantly updated and refined as OPLAN 90-2 was updated and refined, and it was in its third edition (Edition C) at the time of Just Cause, with a fourth edition (Edition D) printed but not distributed. Edition D was held in readiness in case a compromise made promulgation of a new JCEOI necessary.[26]

Extraordinary attention to detail went into the construction of the JCEOI. Critically important single channel radio communications relied absolutely upon the JCEOI, and nothing could have made up for a poor JCEOI. Single channel radio was to be the primary means of controlling combat operations, to include a very large parachute operation. OPLAN 90-2 envisioned a fast moving

[25]The account of the classification problem is based entirely upon my own memory, as it took place while I was working on OPLAN 90-2.

[26]35th Signal Brigade, Internal AAR, p.3.

operation involving multiple simultaneous objectives, so simplicity and speed of the single channel radio communications were essential.[27]

The major radio nets planned in OPLAN 90-2 and the JCEOI to support JTF-South were as follow:

1) USCINCSO High Command Net JTF-1 (UHF TACSAT).[28] This was to be a VINSON secured single channel radio net for command and control. It was to link United States Commander-in-Chief, South (USCINCSOUTH), JTF-South, and selected subordinate commanders. The plan specified that these commanders would be notified of the requirement to enter this net by secure telephone or warning order message.

2) JTFSO Command Radio Net JTF-11 (UHF TACSAT). This was to be the primary VINSON secured single channel radio net for command and control of JTF-South.

3) JTFSO Intelligence / Data Net JTF-12 (UHF TACSAT). This was to be a VINSON secured single channel radio net utilizing UXC-7 facsimile machines to pass written traffic and intelligence. The plan specified that this net would be deleted if sufficient satellite support was not available; by this it is obvious that this data net was of less importance than the voice nets. Although this net was called a "data net," it was never intended to pass computer traffic. It was common practice in XVIII Airborne Corps to call a facsimile radio net a data net.

4) JTFSO Command Voice Net JTF-11A (HF). This was to be a PARKHILL secured single channel radio net designed to provide a redundant means for the JTF-11 net, in the event that something happened to the satellite.

5) JTFSO Command Net JTF-23 (VHF-FM). This was to be a VINSON secured single channel FM voice radio net designed to provide command and control for JTF-South.

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[27] Ibid, p.5.

[28] These abbreviations require explanation. UHF TACSAT means "ultra-high frequency, tactical satellite." HF means "high frequency", formerly called "short-wave." VHF-FM means "very high frequency, frequency modulation." UHF-AM means "ultra-high frequency, amplitude modulation", often used by aircraft.

6) JTFSO Operations / Intelligence Net JTF-23A (VHF-FM). This was to be a VINSON secured single channel voice radio net designed to provide operational control and intelligence dissemination for JTF-South.

7) Supporting Arms Coordination Net JTF-81 (VHF-FM). This was to be a VINSON secured single channel radio net used to coordinate supporting arms requests for fires which would impact in the Joint Operations Area.

8) Joint Air Coordination Net AC-1 (UHF TACSAT). This was to be a VINSON secured single channel radio net to link military air control agencies.

9) Joint Tactical Air Request Net AC-10 (HF). This was to be a PARKHILL secured voice radio net to coordinate the provision of immediate air support.

10) JTFSO Force Artillery Net (VHF-FM). This non-secure voice net was intended to link units without organic fire support assets to artillery units.

11) JTFSO Special Intelligence (SI) Radio Teletype Net JTF-10 (HF). This top secret secure radio-teletype net was designed to disseminate SI traffic to JTFSO major commands. In fact, this net was never implemented because the 525th Military Intelligence Brigade never brought the radio-teletypes into Panama, and there were no radio-teletypes to support this net within the Military Intelligence community already in Panama.

12) Joint Medical Regulating Net JTF-7 (VHF-FM). This non-secure voice radio net was designed to support administrative medical requirements.

13) JTF-7A (HF). This was to be a non-secure HF version of JTF-7, making use of HF radio's the greater range to reach those stations beyond the reach of VHF-FM.

14) Tactical Air Direction Net AC-4 (UHF-AM). This VINSON secured net was planned to provide for the direction of aircraft in the conduct of close air support missions.

15) JTFSO General Purpose Radio-Teletype Net JTF-90 (HF). This radio-teletype net was planned to cover administrative and record traffic requirements to areas not covered by other means. This net was eliminated in the final version of the plan because of a lack of equipment in Panama to support it and because it was not anticipated that XVIII Airborne Corps would have enough space on aircraft to bring radio-teletypes in.[29]

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[29] 35th Signal Brigade, Internal AAR, pp.4-5.

A final point about single channel radio communications as planned in OPLAN 90-2 was the fact that a single ICP code or variable was to be used by every FM and satellite radio in the theater. This decision was made in the interest of simplicity, to avoid communications failure due to a station having a non-compatible COMSEC variable. This measure, although a significant departure from normal operations, had been used by Major General Loeffke to improve the reliability of JTF-Panama's radio communications as noted in Chapter II. Its use in Just Cause would have a major effect upon JTF-South's ability to change task organization of units rapidly.

While single channel radio was intended to be the primary means of communications during the initial assault and during the fast moving attacks on the several objectives identified in OPLAN 90-2, single channel radio was not considered sufficient to conduct the entire war, with all of the normal sustainment and reporting functions. As mentioned above, longer term operations were to rely to the maximum extent possible upon the fixed station strategic communications system that the 1109th Signal Brigade and the 1978th Communications Group had maintained in Panama for many years, with AUTOVON and AUTODIN to carry the main burden. It was expected that AUTODIN would cover enough of the country so that radio-teletype would not be needed for

record traffic, with the JTF-12 facsimile data net available to those components of JTF-South that might be temporarily out of reach of AUTODIN. All tactical multichannel communications and telephone switching systems were intended in the plan to be laid down as redundant means to the strategic systems, in the event that these strategic systems suffered significant damage. The planners at Corps Signal considered the risk to the strategic systems to be serious indeed, as they were very vulnerable to enemy action. As a result, in addition to the tactical communications explained in the following paragraphs, the 35th Signal Brigade investigated the civilian communications infrastructure in Panama, with the aim of perhaps using parts of it if feasible. Captain Istvan Kalnocky, the brigade intelligence officer, took three weeks to put together a splendid survey of in-country communications.

Under OPLAN 90-2, the 154th Signal Battalion had almost exclusive responsibility for the tactical communications network, unlike the Blue Spoon plan which had put big TTC-39 switchboards from the Air Force and the 35th Signal Brigade at Howard Air Force Base and Fort Clayton. This change was made not because the planners did not want to have those kinds of assets at those critical nodes, but rather because it was not known for certain whether OPLAN 90-2 would ever be executed. The usual lack of space on airplanes would preclude bringing such large assemblages to Panama on short

notice, not to mention the amount of time that it would take to install such complicated systems, so it was not practical to count on these systems unless they were pre-positioned ahead of time in Panama. The 35th Signal Brigade commander Colonel Jackson C. Moss III, perhaps remembering the fashion in which the 154th Signal Battalion kept the SB-3614 switchboards that III Corps loaned to them, did not want to pre-position such important equipment in Panama for a mission that might not ever take place. He did not expect ever to get back any equipment that he sent to Panama in such a way.[30] As a result, all tactical switchboards in OPLAN 90-2 were either SB-3614s or TTC-41s; small, analog, division-level switchboards belonging to the 154th Signal Battalion.

The JTF-South tactical multichannel network was based around one major node at Fort Clayton (see figure 4-3). Five line-of-sight multichannel radio systems fanned out of Fort Clayton under OPLAN 90-2, all of them over the 154th Signal Battalion's TRC-145 radios. The plan called for five TRC-113 radio relays, made necessary by the terrain, which was a problem because the 154th Signal Battalion only had four of these relays, even assuming that all of them worked.

[30] This author recommended pre-positioning large technical control facilities and TTC-39A switchboards in Panama while he was at Corps Signal working on OPLAN 90-2, and while the incident with the III Corps' SB-3614s was not mentioned, the command made it plain that they would not pre-position anything that they did not absolutely have to because "the 154th would probably never give it back."

The intent of the planners was to overcome this by using a TRC-145 terminal for one of the relays. While this was not the sort of thing that signal engineers like to do, because such a configuration leaves no redundant radio equipment at the TRC-145 "relay," there was nothing else to be done. The network was already so austere that literally nothing else could be taken out of it.

All line-of-sight tactical multichannel systems were planned to be twelve-channel systems. Two systems were planned to be relayed through a site on Gunn Hill (also called "Dog Pound Hill" by the soldiers, because the Military Police had a working dog kennel up there) to terminate at Task Force Pacific (which would be located initially at Tocumen-Torrijos Airport) and Task Force Champion (to collocate initially with 193d Infantry Brigade on Fort Clayton). Another system was planned to relay through a site at San Juan Hill on Rodman Naval Station to terminate at Albrook Air Force Station, headquarters for the Air Force component of JTF-South (AFFOR). A fourth system was planned to relay through Cerro Corozal to Howard Air Force Base, with the fifth system going directly from Fort Clayton to SOUTHCOM Headquarters at Quarry Heights. Finally, a sixth system went directly from Fort Clayton to Corozal, to support the 470th Military Intelligence Brigade and the 41st Area Support Group (ASG). All systems out of Fort Clayton were terminated at the distant end by 154th

Signal Battalion TRC-145s, except for the link going to Task Force Pacific, which was to be terminated by a MRC-127 radio belonging to the 82d Signal Battalion (82d Airborne Division). The MRC-127 was nothing more than a TRC-145 built to be "heavy-dropped" out of an aircraft via parachute, so it was perfectly compatible with the TRC-145s.

The plan also required the 154th to put in a system linking Howard Air Force Base with Quarry Heights, relayed through Ancon Hill. Ancon Hill was also the site of many fixed-station microwave antennas in support of the strategic network, owing to its commanding position over that whole section of the canal. Quarry Heights also had a TRC-145 system linking them to Naval Forces (NAVFOR) headquarters at Fort Amador.[31]

OPLAN 90-2 called for multichannel satellite systems from Fort Clayton to Fort Bragg and to Task Force Atlantic. Task Force Atlantic was planned to be further connected with Fort Davis by a line-of-sight TRC-145 multichannel system. Another multichannel satellite system was planned to link Howard Air Force Base with the Defense Communications System, bringing AUTOVON and AUTODIN into the tactical network. Finally, a local cable run was to serve the Joint Special Operations Task Force headquarters at Hangar 3 from the switchboard at Howard Air Force Base.[32]

[31] OPLAN 90-2.
[32] Ibid.

Some readers will be surprised that such a skeletal network was planned to support such a complicated and risky plan as OPLAN 90-2. Certain facts and assumptions drove the planning to this conclusion. First, it was expected that the fighting would be of fairly short duration. This expectation, along with the usual inability to bring in additional heavy communications equipment on a short contingency operation, meant that communications would have to be austere and would, at any rate, rely heavily upon single-channel radio for command and control while units were rapidly moving about the battlefield.

Second, the expected speed at which this plan was likely to be executed, coupled with the probable short notice to execute the plan, convinced the planners that outside help from the Joint Communications Support Element (JCSE) at MacDill Air Force Base would arrive too late to be of any use. JCSE had already set up once before in support of JTF-Panama during one of the crises in 1988, but had been sent back to MacDill when tensions eased. It was considered simpler to plan the operation without JCSE, even though it was doctrinally available to support joint headquarters such as JTF-South.[33]

[33]This is based upon my memory of our discussions at Corps Signal during the planning.

Under OPLAN 90-2, the entire tactical multichannel communications network in Panama was based upon the 154th Signal Battalion for two reasons. In the first place, it was already in Panama and so would not have to compete for scarce aircraft when the decision was made to execute the plan. The 154th would thus be able to set up the network in advance of the operation, given enough warning. In the second place, tactical telephone communications were seen as a redundant means to the strategic network, and so would only be really important to the extent that the enemy damaged or destroyed strategic systems. Given the severe personnel shortages in the 154th Signal Battalion, especially among junior non-commissioned officers, and given the poor maintenance support available for some critical items of equipment, most notably the non-standard twenty-foot parabolic antennas for the multichannel satellite vans, it was recognized that there was some risk in relying so heavily upon them. The 35th Signal Brigade commander's decision not to pre-position heavy communications equipment in Panama, as noted above (see note 30), left no option but to rely entirely upon the 154th Signal Battalion.[34]

OPLAN 90-2 would have been executed very much as written if it was not for a rather routine looking tasking, which ostensibly had nothing to do with OPLAN 90-2 itself, but which forced the 35th Signal Brigade to pre-position

[34] Ibid; also see 35th Signal Brigade, Internal AAR, pp. 19, 26.

heavy communications equipment in Panama. This was to have a profound effect upon tactical communications in support of JTF-South. The following chapter will examine this mission in detail.

FIGURE 4-1

Communications Systems Control Under "Blue Spoon"

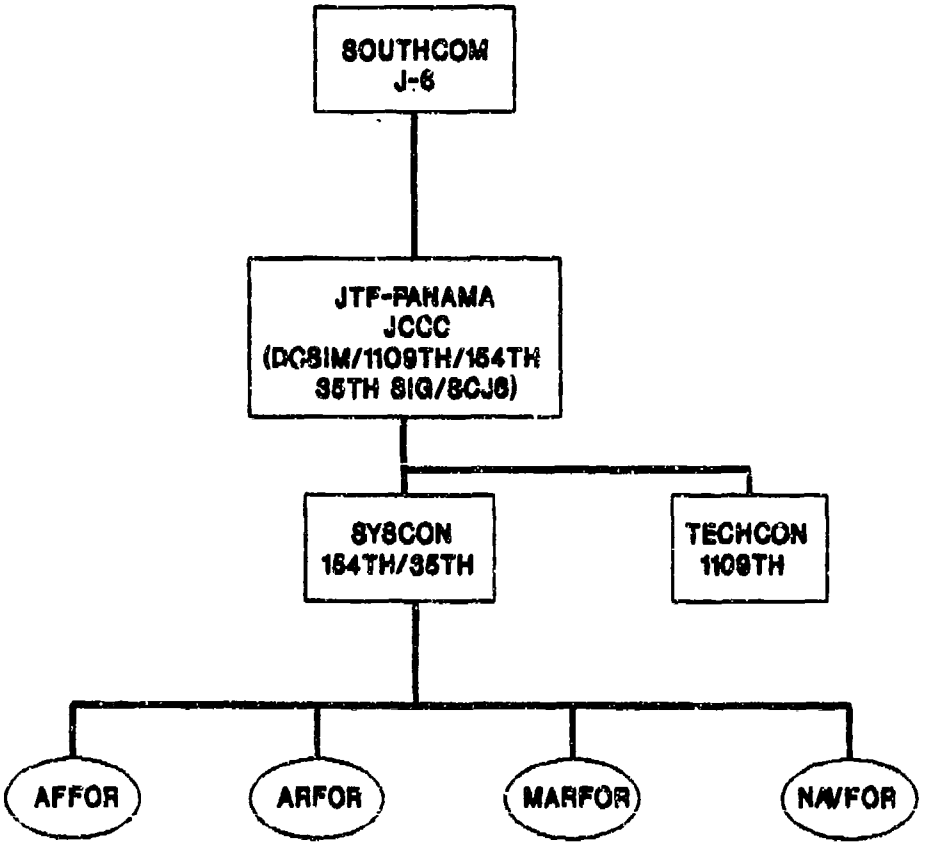


FIGURE 4-2

Communications Systems Control Under OPLAN 90-2

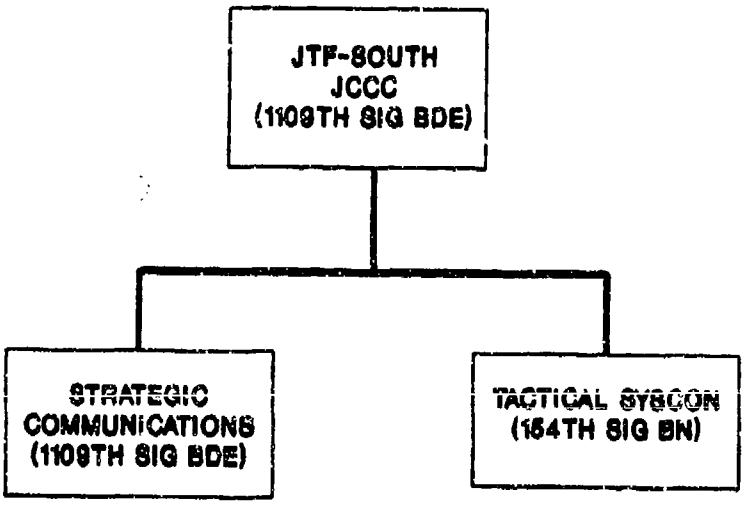
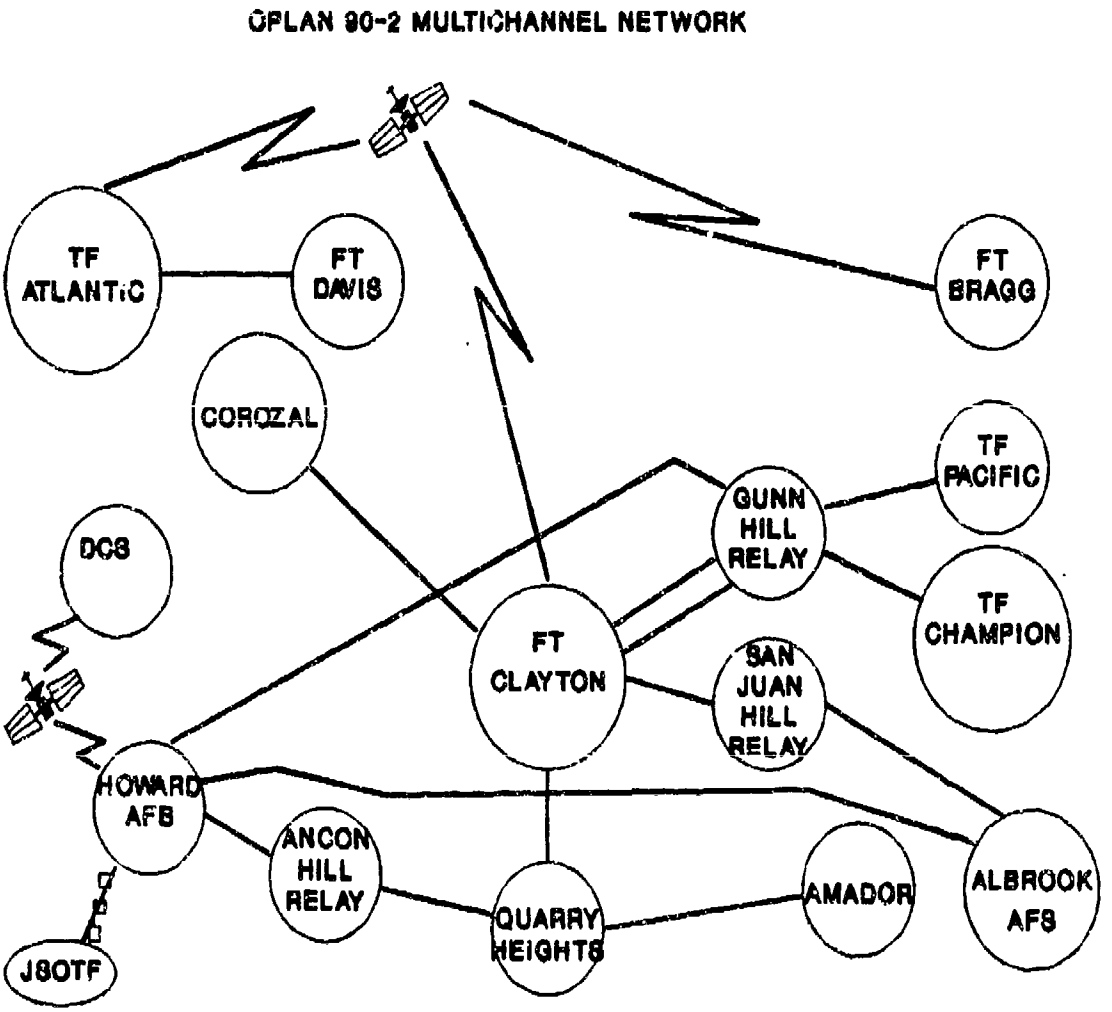


FIGURE 4-3

OPLAN 90-2 Tactical Multichannel Radio Network

(Planned)



-CHAPTER V-

THE SOUTHERN COMMAND ALTERNATE COMMAND CENTER MISSION

General Maxwell Thurman as CINCSOUTH determined that the SOUTHCOM headquarters at Quarry Heights was in a vulnerable position, given the rising tensions and deteriorating relations with the Panamanian government, and decided to prepare an "alternate command center" in Building 703 at Howard Air Force Base, to be occupied if the primary headquarters at Quarry Heights became tactically untenable. The SOUTHCOM staff estimated that this alternate command center (ACC) could be prepared well enough to use by 16 December 1989. Fixed-station strategic communications, however, could not be made ready to the degree required by then, so SOUTHCOM J-6 was faced with the problem of providing tactical communications support for the new facility until sufficient strategic communications could be installed. Colonel Torres-Cartegena solved this immediate problem by recalling part of the 31st Combat Communications Squadron (31 CCS), which had returned to its base at Tinker AFB in Oklahoma only a few months before from a previous mission at Howard AFB in support of Nimrod Dancer. This element of the 31st CCS, under the command of Captain Diane English, arrived and set up at Howard AFB behind Building

703 in October 1989.[1] This was merely a temporary measure, however, and it was left to JTF-Panama to try to find a more permanent solution.

Major Samuel Higdon was with JTF-Panama when the Alternate Command Center problem arose, and he recognized that it could be used as a solution to the weakness of the tactical network in OPLAN 90-2.[2] XVIII Airborne Corps would not voluntarily pre-position valuable equipment in support of a plan that might not be executed, but it might be possible to commit some heavy equipment in support of the Alternate Command Center, since its support would be a mandatory mission, leaving little discretion to the unit tasked to accomplish it.[3] Major Higdon did not expect XVIII Airborne Corps to receive the mission. Because the equipment was to be used to compensate for the lack of strategic

[1]This is based upon what Captain English told me while we were at Howard AFB before Just Cause.

[2]After XVIII Airborne Corps had been designated as JTF-South for the purpose of executing OPLAN 90-2, XVIII Airborne Corps kept staff officers with JTF-Panama at Fort Clayton on a continuous basis. For the signal staff, Colonel Mason required that a field-grade signal officer from Corps Signal be kept with JTF-Panama at all times, beginning in August 1989. Most of the time, Major Sam Higdon (Colonel Mason's Deputy) and Lieutenant Colonel Samuel Lambert (on loan to Corps Signal from Forces Command Deployable Joint Task Force) took turns at it, each of them staying in Panama on temporary duty for a few weeks at a time. I was working at Corps Signal on OPLAN 90-2 when this practice began, and Colonel Mason continued it until Just Cause.

[3]It is fair to remark that Colonel Moss' reluctance to pre-position any equipment in Panama was largely due (in my opinion) to the possibility that the equipment might be needed more someplace else. At this time, Honduras was also considered a likely spot for trouble.

communications support for the Alternate Command Center, he assumed that Forces Command would assign the mission to an Information Systems Command (ISC) brigade, as strategic communication is ordinarily an ISC responsibility. Higdon expected that most likely the 11th Signal Brigade at Fort Huachuca, Arizona would be tasked to support the ACC.[4]

Major Higdon accordingly drafted a message for SOUTHCOM to JCS requesting every item of equipment, with crews, that he thought would make up for the 35th Signal Brigade Commander's previous determination not to pre-position any heavy equipment. He asked for the best and most capacious equipment that he could think of, to include two big TTC-39A switchboards, one TYC-39 automatic teletype switchboard, one TSQ-84 technical control facility, eight teletypes, and two TRC-170 tropospheric-scatter multichannel radios (capable of 144 channels).[5]

The tasking went through the usual channels, and on 17 November 1989, JCS tasked Forces Command (FORSCOM) to provide the specified tactical communications equipment and personnel to replace the 31st CCS in the execution of the mission to support the CINC's ACC. The tasking further specified that these assets were to be in place by 10 December 1989, and that they were to be prepared to remain

[4]Major Samuel Higdon told me this while we were together on the JTF-South J-6 staff during Just Cause.

[5]35th Signal Brigade, "Internal After Action Report," Fort Clayton, Panama, 1990, p. 7.

at Howard AFB for a minimum of 179 days. The message explained that the mission would last "until the minimum communications upgrade for the ACC would be completed." This was estimated to be about one year. USARSO was "requested" by DA to coordinate with USCINCSO airlift planners to arrange air transportation to support the mission.[6]

Instead of tasking the 11th Signal Brigade, as Major Higdon had expected, FORSCOM sent a priority message to Commander, XVIII Airborne Corps with this tasking on 20 November 1989. Since the 35th Signal Brigade was the only organization in the Corps with the specified equipment, Corps forwarded the mission to them immediately. With no idea of what this mission was all about, except for the incomplete information in the tasking itself; with no prior coordination of any kind; and with a deadline of 10 December to have this support in Panama, 35th Signal Brigade immediately warned all of its battalions about the mission and gathered details about what was actually required. By 22 November the brigade published an operations order.[7] This was especially difficult because telephone calls to USARSO and others in Panama failed to clarify very much as far as specific requirements went.[8]

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[6] Ibid.

[7] Ibid.

[8] It was difficult to make AUTOVON calls to Panama from Fort Bragg at this time, and it was even more difficult to find somebody who knew anything about the ACC mission.

The 35th Signal Brigade's operations order established a company-sized task force under the 426th Signal Battalion. 25th Signal Battalion would provide a TTC-39A switchboard to the task force which would be positioned at Fort Clayton to provide local service to JTF-Panama in Building 95, along with service to other subscribers as needed. The 426th was to bring test equipment and eight teletype machines with operators.[8] 35th Signal Brigade was unable to discover the intended use of these teletypes, but the machines were specified in the tasking message, and it was hoped that the advance party from the brigade would be able to find out where they were intended to be used when they arrived in Panama. The 426th was also required to bring thirty power-supplies for the 154th Signal Battalion's KY-68 digital secure telephones because local power-supplies are required when KY-68s are used as "long-local" telephones over a radio system. While the 154th had a number of KY-68s, they had no switchboards compatible with these instruments, no power supplies for them, and no practice in their employment and use. The 50th Signal Battalion and the 327th Signal Battalion provided a total of five "remote multiplexer combiners" (RMC), which allowed up to eight KY-68s to be connected to the TTC-39A switchboard over a single run of coaxial cable (often called "video cable" or "PCM cable"). The RMCs also allowed KY-68s to be placed much farther from

[8] Signal Generator SG-1139, and UGC-74 teletypes.

the switchboard than would ordinarily be the case, as they acted as repeaters. Since neither the 25th Signal Battalion nor the 426th Signal Battalion had very much experience with RMCs, the 426th Signal Battalion received one soldier apiece from the 327th and 50th Signal Battalions to serve as technical experts. Everything else that went to support the ACC mission came from the 426th Signal Battalion.[10]

426th Signal Battalion's mission at the ACC site at Howard AFB was to relieve 31 CCS and establish a signal site consisting of a TTC-39A telephone switchboard, a TYC-39 teletype switchboard, a SB-675 technical control facility, and local service for about thirty KY-68 secure telephones. The SB-675 was substituted for the TSQ-84 specified in the FORSCOM tasking message because the brigade commander did not want to keep as valuable an asset as a TSQ-84 in Panama for such a long period of time. The SB-675 would still be a better tactical technical control facility than any other in Panama, where the only other Army tactical technical control facility was a tiny TSC-76 belonging to the 154th and handling technical control for the site at Fort Clayton. The SB-675 was provided with extra test equipment to make up in some measure for its reduced capabilities as compared with the TSQ-84.[11]

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[10] 35th Signal Brigade, "Internal AAR," p. 7.
[11] Ibid, pp. 7-8.

USARSO and the 35th Signal Brigade at Fort Bragg were able to work out some details about the radio systems over the telephone. The 154th Signal Battalion was to install a TRC-145 radio system between the TTC-39A at Howard AFB and SOUTHCOM at Quarry Heights. This system was to carry seven long-local KY-68 telephone circuits and a teletype circuit, replacing the 31 CCS microwave system.[12] A second TRC-145 radio system was to extend the radio link to Quarry Heights out to Fort Amador, to carry three long-local KY-68s to the Naval Operations Center and to the SOUTHCOM J-6, whose office was also at Fort Amador.[13]

Because most of the TRC-170 tropospheric scatter radios specified in the tasking were committed to a mission in Europe, and because the requirement was really for shorter range line-of-sight communications rather than for a true tropo shot, and also because the command did not want to commit so important an asset as the TRC-170s to this mission, the TRC-170s were replaced by TRC-138 microwave radios with TCC-73 multichannel vans. These TRC-138s were intended to carry two 18-channel digital trunk groups (DTG) between the TTC-39A switchboards at Howard AFB and Fort Clayton, as well as an additional 24 analog channels for various uses. The TRC-138 shot required a relay, and 35th

[12]The 31 CCS used a small microwave digital radio called a "tropo scatter support radio" (TSSR) to carry all of their long-local telephone circuits. It had no crew, being set up and merely checked on from time to time.

[13]JTF-South, "Special Circuits; Long Locals," Fort Clayton, Panama, 1990.

Signal Brigade planned to put it on Cerro Galera, on the western edge of Howard AFB. Most of the equipment and soldiers from the 35th Signal Brigade were intended to go to Howard AFB, with only one TRC-138 microwave radio van, one TCC-73 multichannel van, and one TTC-39A switchboard to set up at Fort Clayton. Technical control at Fort Clayton was planned to be managed by the 154th Signal Battalion's TSC-76, already in position and taking care of the 154th's TTC-41 switchboard and the TSC-85A multichannel satellite radio (at that time supporting JTF-Panama as noted in Chapter II).[14]

The practical result of this coordination and planning was that the preponderance of the 426th's equipment would be at Howard AFB, along with the 426th's headquarters element and technical control. The signal site at Howard AFB was therefore largely to be run by the 426th, even though the 154th had several signal vans there, while A Company of the 154th would run the Fort Clayton site, notwithstanding the radio equipment from the 426th at that location.

It was not possible at Fort Bragg to write the extensive data bases that the TTC-39A telephone switchboards and the TYC-39 teletype switchboard needed to operate because very little was known at Fort Bragg about the actual requirements, such as numbers of telephones, types of

[14] 35th Signal Brigade, "Internal AAR," p. 8.

instruments, identity and location of subscribers.[15] There was no central agency in Panama or anywhere else that had consolidated communications requirements or could tell exactly what was needed. Logistical support had not been worked out by anyone owing to the suddenness of the mission, and except for the "request" for USARSO to arrange for aircraft to bring the equipment and people to Panama, there had been no arrangements made for transport. USARSO ultimately did nothing to solve this problem, considering it to be the responsibility of XVIII Airborne Corps to arrange for transport. Air transport was judged to be too expensive, so an Army Transportation Corps ship was used instead.[16]

Because Captain Jared Kline of 35th Signal Brigade had worked on OPLAN 90-2 and so presumably knew something about the communications situation in Panama, 35th Signal Brigade put him in charge of the advance party.[17] Kline wanted to bring a TTC-39A/TYC-39 technical expert as well as a logistician, as all coordination in both operational and

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[15] The TTC-39A and the TYC-39 were each controlled by its vast and complicated computer. The computer operated according to a data base that contained all of the information about every telephone or teletype subscriber, including telephone number, type of instrument, class of service, etc. Writing the data base was a long, tedious, and difficult job. Any mistake could result in problems to the operation of the network that might be very difficult or even impossible to find.

[16] 35th Signal Brigade, "Internal AAR," p. 9.

[17] Although this Captain Kline is the author of this work, I shall refer to him in the third person in the text for the sake of clarity with reference to the other actors.

logistical areas would have to be accomplished *in situ* in a very short time. The brigade commander denied the logistician, in spite of the best efforts of the 35th Signal Brigade S-4, Major Gwendolyn Hays, because other possible contingencies had to be covered by a limited number of people. Captain Kline and Chief Warrant Officer Michael Donahue, the 35th's "Tri-Tac," or voice and message switching technician, comprised the entire advance party.[18] Donahue was within a year of retirement and was easily the best and most experienced telephone and teletype switching warrant officer in the brigade.[19] Both officers arrived in Panama via C-5A aircraft on the night of 5 December 1990, with the mission to coordinate with all supported elements on the ground, learn all of the requirements, and make all preparations. At the same time, 426th Signal Battalion replicated the expected network as closely as possible at Fort Bragg to rehearse and test the equipment.

When Captain Kline and CW2 Donahue arrived at Howard AFB on 5 December they were met by Lieutenant Colonel Samuel Lambert, representing XVIII Airborne Corps on the JTF-Panama J-6 staff. On the following morning at Fort Clayton they met with Major Sam Betterson of USARSO. Betterson's title was "Assistant Division Signal Officer," even though there

[18]Once again, it is fair to point out that other contingencies threatened 35th Signal Brigade at this time, so support for the ACC mission, while ultimately adequate, was quite properly not limitless.

[19]My opinion.

was no division in USARSO.[20] This meeting began coordination between the advance party from the 35th Signal Brigade and the 154th Signal Battalion. Far from knowing what the requirements would be for the 426th Signal Battalion, USARSO rather hoped that Kline could tell them.[21]

A further meeting was scheduled with SOUTHCOM J-6 for that afternoon. This meeting, chaired by Major Manuel Fuentes of SOUTHCOM J-6, yielded specific results. Kline and Donahue arranged the details for the transfer of the Defense Communications System (DCS) AUTOVON and AUTODIN circuits from the 31st CCS TSC-100 multichannel satellite radio van to the 154th Signal Battalion's TSC-85A satellite van with Captain English of 31st CCS, Major Bennet (USAF) of the Defense Communications Agency (DCA), and Sergeant First Class Haga of the 154th Signal Battalion. These details included circuit numbers and priorities, and the DCS portion of the 426th Signal Battalion's mission was clearly delineated and understood.[22]

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[20] USARSO was set up very much as if it was actually a division because it had two brigades (one infantry and one aviation).

[21] In my opinion, the reason for this was that the ACC support mission had not been worked out in detail at JTF-Panama; the most important thing from their point of view was to get the equipment into Panama and set up before hostilities so that the admittedly austere OPLAN 90-2 communications concept would be strengthened. If this was the plan, then they were successful.

[22] 35th Signal Brigade, "Internal AAR," p. 8.

The 31st CCS was very anxious to transfer the mission in an efficient and quick manner, and Captain English was concerned that the original suspense date of 10 December for all of the 426th's equipment to be in place was not going to be met. In contravention to the air movement specified in the tasking message, the fact that it would have taken four C-5A aircraft to move the 426th's equipment to Panama led to a decision for sea movement as an economy measure, and the ship was not expected until 14 December. Given this fact, Captain Kline briefed the following time sequence for planning:

7 DEC 89	154th Signal Battalion TRC-145 systems replace 31st CCS microwave systems from Howard AFB to Quarry Heights and Fort Amador.
8 DEC 89	154th Signal Battalion TSC-85A replaces 31st CCS TSC-100 at Howard AFB.
12 DEC 89	426th Signal Battalion personnel arrive by air.
14 DEC 89	Ship arrives with equipment.
15 DEC 89	Unload ship, position equipment at Howard AFB and Fort Clayton.
15-16 DEC	Clean, service, and test all equipment.
16 DEC 89	Install TRC-138 radio system between Howard AFB and Fort Clayton. Test TTC-39A/TYC-39 switchboards.
17-19 DEC	Install trunks between switchboards and assume local telephone service responsibility for ACC at Howard AFB.
20 DEC 89	System completely assumed by 426th Signal Battalion; 31st CCS released.

Captain English and the 31st CCS were not at all content with this projection, both because they were anxious to return to Tinker AFB before Christmas and also because they did not believe that it should take such a long time to do this work. Kline insisted upon this schedule because of the probable poor condition of the equipment following its long ocean voyage; bad weather had forced the USS LTG Bunker (LSV-4), an open Army Transportation Corps vessel with no shelter for its cargo, to lay over in Savannah for a day, and the ship and its load had been subjected to heavy seas throughout the voyage. Major Fuentes, as the SOUTHCOM J-6 representative in charge of this conference, agreed upon the timeline, and the 31st CCS's redeployment airflow was based upon it.[23]

The following days were spent visiting sites and identifying requirements. The 31st CCS had a very excellent site cable plan for Howard AFB, with a perfect grasp of the lay-out. They had modified their original plan to suit the slightly different equipment that the 426th was bringing in, so that the transfer of support would go easily. In fact they had even rewritten the data base for their TTC-39A switchboard so that the tapes from their TTC-39A could be loaded directly into the 426th's TTC-39A. Captain Kline

[23] Ibid, pp. 8-9.

agreed to this non-standard measure because it was reckoned that an entire day could be saved in this fashion.[24]

Subscriber requirements at Fort Clayton, however, were much less well identified. Since the 426th's large TTC-39A would be replacing the 154th's much smaller TTC-41, the new switchboard could handle many more telephones. Major Samuel Higdon of JTF-Panama J-6 put together the basic requirements and CW2 Donahue wrote the data base for the Fort Clayton TTC-39A.

At the same time, radio sites were reconnoitered to support the microwave radio system between Fort Clayton and Howard AFB. Major Sterling Ingram, S-3 of the 154th Signal Battalion, advised strongly against using Cerro Galera for a relay because the road leading to it was not secure, should hostilities arise. He recommended that the relay use Gunn Hill, a much more secure site located on Fort Clayton itself. This proved to be an excellent site.[25]

The soldiers from the 426th Signal Battalion, led by Captain Theresa Coles, arrived at Howard AFB on 11 December 1989 (barely ahead of the SOUTHCOM J-6 schedule) after three days delay at Pope AFB in North Carolina due to bad weather.

[24] Ibid, p. 9. This is an important point, because it is possible (perhaps even likely) that the later trouble with the digital trunk groups between Howard AFB and Fort Clayton resulted from this decision.

[25] Ibid, p. 10.

The equipment arrived at Rodman Naval Station on the Panama Canal on the night of 13 December, and it took the entire following day to unload it. Captain Calhoun (Transportation Corps) had contracted a civilian crane from Balboa to unload the ship, and only the large TTC-39A and TYC-39 vans had to be lifted separately from their trucks. A total of eighteen trucks, seventeen trailers, and two "conex" containers arrived. The exterior surfaces of all trucks and equipment were very badly corroded by salt water, but the rubber seals on all doors and openings for the signal vans effectively protected the delicate communications equipment inside.[26] Captain Marie Bazubick, the Logistics Officer (S-4) of the 154th Signal Battalion, had arranged for fuel from the Navy, and all equipment was safely driven to either Howard AFB or Fort Clayton that evening.[27]

The seventy soldiers who arrived with Captain Coles, were attached on orders to the 1109th Signal Brigade, which further attached them to the 154th Signal Battalion. Lieutenant Colonel Andre Francis, commander of the 154th, treated Captain Coles and her troops as a company in the 154th, and she established her command post at Howard AFB, the site of most of her equipment and the site of her SB-675

[26] I saw this, and it was dramatic evidence that the expense and care that went into the design and manufacture of the S-250 and S-280 shelters were effective. There was literally no damage to the contents of any of the shelters, in contrast to the severe damage to the trucks and electrical generator trailers.

[27] 35th Signal Brigade, "Internal AAR," p. 10.

technical control facility. The Army assemblages under Captain Coles began to replace the Air Force equipment, according to the schedule worked out during the SOUTHCOM J-6 meeting. The 31st CCS transferred the ten AUTOVON trunks and one AUTODIN circuit that the Air Force TSC-100 was carrying into the DCS to the 154th's TSC-85A on 15 December. This caused an almost immediate deterioration in the formerly outstanding circuit quality. The TSC-100 satellite van used a twenty-foot parabolic antenna, while the TSC-85A had to use its eight-foot parabolic antenna because the two twenty-foot antennas owned by the 154th Signal Battalion were broken. Operating with the smaller antenna meant that the TSC-85A had to transmit at a much higher power than the TSC-100 had required, increasing both circuit noise and the burden upon the satellite itself. Both of the 154th's twenty foot antennas were non-standard models, and there was no repair capability in theater for them. The 426th's analog SB-675 replaced the digital TSQ-111 technical control facility that the 31st CCS used to control circuits, while the TYC-39 teletype switchboard took over the AUTODIN circuit from the Air Force TGC-27A teletype facility and the 426th's TTC-39A took over telephone service.[28]

Company A (Command Communications Company), 154th Signal Battalion, was responsible for the site at Fort Clayton. Captain Ijames, who had only assumed command of

[28] Ibid, p. 19.

the company the previous week, initially established his command post in his barracks orderly room, across post from the site. The 154th Signal Battalion maintained its normal garrison headquarters, without establishing any kind of systems control (SYSCON). The battalion headquarters would establish no field headquarters to cover the ACC mission, and did not establish one until 21 December, the day following the invasion.[29] Such an arrangement left a lot to be desired mainly because of the lack of supervision at the most important node in the network.

By 16 December it was obvious that technical control at Fort Clayton was inadequate for the mission. The physical condition of the 154th Signal Battalion's TSC-76 technical control facility was nothing short of atrocious. Old mud and corrosion were everywhere apparent, most of the patchcords (the connecting cables used to route communications circuits) were bad, the operators did not know which circuits they were supposed to be controlling, or where these circuits were to be routed because there were no accurate circuit routing lists, and the small SB-22 manual switchboard that was a part of the TSC-76 technical control facility had even had its operator's answer cord cut off to use the jack as a pin to hold the door of the van

[29] 154th Signal Battalion, "Sequence of Significant Events, Operation Just Cause," unpublished chronology.

open.[30] There was no cable plan for the Fort Clayton site, nothing about site cabling was even written down, and the multichannel radio operators did not have any better circuit routing lists than the technical control facility had, nor did their lists agree with the technical control's lists.[31] The mission was larger than anything that the 154th had ever done before, and their organization was not prepared to support it. Technical control at Fort Clayton became an ever growing problem as the network became more complex.

A second significant problem was that the digital trunk groups that were to ride the 426th Signal Battalion's TRC-138 microwave system between the TTC-39As at Howard AFB and Fort Clayton would not work. Analog trunks worked well, but the digital trunks would not. This was a real problem, because without a working digital trunk group, KY-68 digital secure telephones could not communicate in the secure mode between Howard AFB and Fort Clayton, as KY-68s needed a digital path for secure (although not for non-secure) communication. Secure KY-68s were in place and working at Fort Clayton, but these were long-locals connected to the TTC-39A at Howard AFB by Air Force microwave radio (TSSR). KY-68s served by the TTC-39A at Fort Clayton could only talk secure to local telephones; they were non-secure only to Howard AFB. Thus, there was no way for JTF-Panama to talk

[30] 35th Signal Brigade, "Internal After Action Report," Fort Clayton, Panama, 1990, p. 10. I saw the referenced problems with the TSC-76 myself.

[31] I saw this myself.

secure to Howard AFB except for the few Air Force long-locals and the STU-IIIs. Since STU-IIIs could only talk in the secure mode to other STU-IIIs, and since the Air Force made much use of KY-68s at Howard AFB and elsewhere, this condition lent itself to the confusion and frustration of the staff officers trying to use the telephones. It was finally decided not to install KY-68s from the Fort Clayton TTC-39A in the JTF-Panama headquarters, but rather to use STU-IIIs and the 31st CCS KY-68 long-locals from the Howard AFB TTC-39A until the digital trunk groups were made to work. Naturally, a great deal of importance was attached to the solution to this problem. By 17 December, all 31st CCS equipment had been replaced by Army systems except for the TSSR microwave system carrying long-local KY-68s from Howard AFB (see figure 5-1).[32]

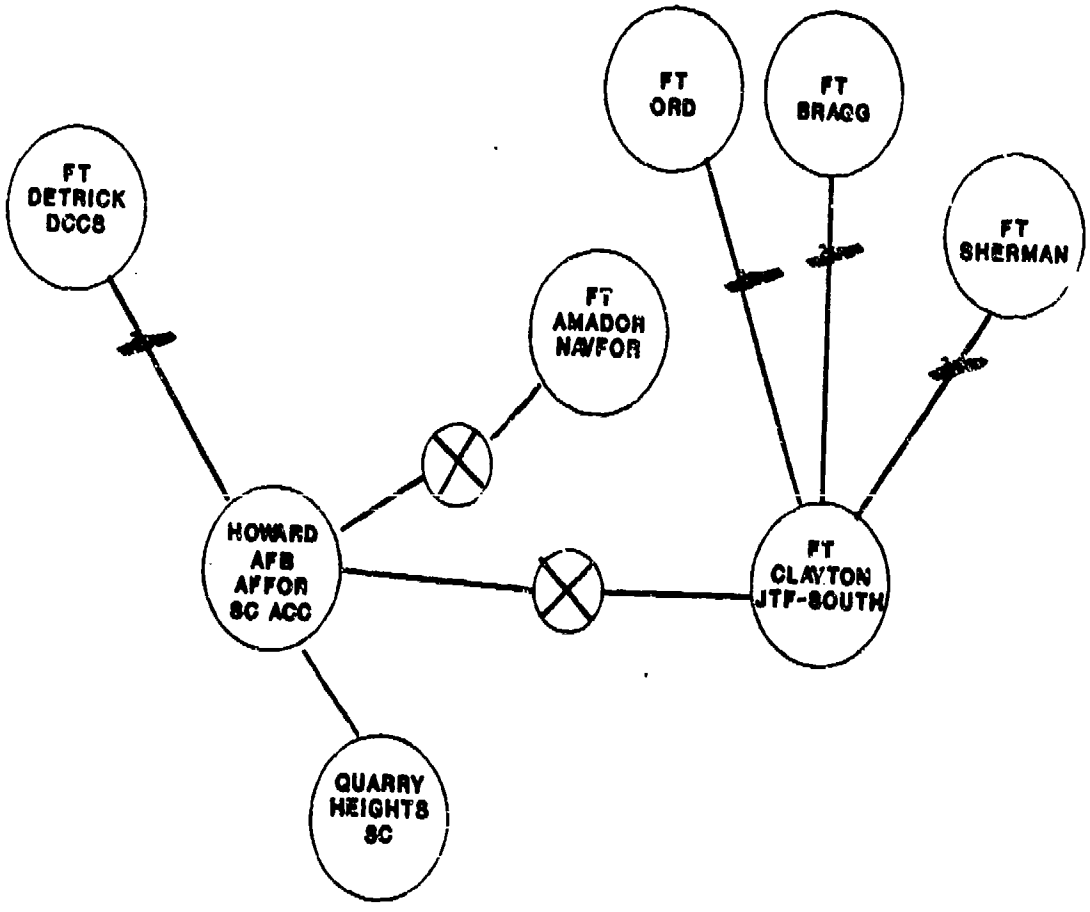
The 154th Signal Battalion had its second TSC-85A multichannel satellite van at Fort Clayton. It served as the hub of its network, with spokes going out to Seventh Division at Fort Ord, Task Force Atlantic at Fort Sherman, and XVIII Airborne Corps headquarters at Fort Bragg. All satellite links were analog systems; there would be no digital trunking over any satellite systems controlled by JTF-Panama or JTF-South. This configuration conformed to OPLAN 90-2, which had relied upon all analog (TTC-41) switchboards in Panama.[33]

[32] 35th Signal Brigade, "Internal AAR," pp. 10-11.
[33] Ibid, p. 19.

The most important aspect of the Alternate Command Center Mission was that it caused XVIII Airborne Corps to put heavy tactical communications equipment in Panama prior to the initiation of hostilities. In fact, with reference to JTF-South communications during Operation Just Cause, this was the ACC's only significance. The ACC would never actually be used by CINCSOUTH as a headquarters, but JTF-South and many other agencies benefited from the fact that all of this equipment had been set up prior to Just Cause. The actual conduct of the operation illustrated how important Major Higdon's initiative, when he decided to use the ACC requirement as a means to pre-position equipment useful for Just Cause, would be to the final outcome. The greatest problems, at this point, were the technical control situation at Fort Clayton and the failure to work in a digital trunk group between Fort Clayton and Howard AFB.

FIGURE 5-1

Tactical Communications Network as of 18 December 1989



-CHAPTER VI-

SINGLE CHANNEL RADIO COMMUNICATIONS DURING THE WAR

At 2100 hours on 16 December 1989, United States Marine Lieutenant Robert Paz was shot and killed as the automobile in which he was riding ran a roadblock established by the PDF's *Macho de Monte* near Noriega's headquarters. The PDF detained and assaulted a Navy couple who witnessed the killing.[1] This incident proved to be the final provocation, and on 17 December the Joint Chiefs of Staff issued a warning order to execute OPLAN 90-2. Sustainment base communications at Fort Bragg were made fully operational, and JTF-Panama was redesignated JTF-South, under the command of Lieutenant General Carl Stiner.[2]

Colonel William L. Mason flew from Fort Bragg to assume the position of Deputy J-6 under Colonel Jorge Torres-Cartegena, the J-6 for JTF-South. Colonel Mason brought Major Samuel Higdon with him. The original J-6 staff of JTF-South consisted of Colonel Mason and Major Higdon of XVIII Airborne Corps, Major Samuel Betterson and Master Sergeant Coleman of USARSO, and Captain Jared Kline of 35th Signal Brigade (who had been taken by Colonel Mason, his

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[1] Frederick Kempe, Divorcing the Dictator, (New York: G.P. Putnam's Sons, 1990), pp. 8-10.

[2] 35th Signal Brigade. "Internal After Action Report for Just Cause," Fort Clayton, Panama, January 1990, p. 13.

former boss, from his duties with the Alternate Command Center mission to serve on the staff). Lieutenant Colonel Samuel Lambert of FORSCOM DJTF, formerly another of Colonel Mason's subordinates on the corps staff, and Chief Warrant Officer Raymond Frison of XVIII Airborne Corps would join the staff after H-hour on 20 December, completing the JTF-South J-6 (Signal) staff.[3]

JTF-South used three major categories of communications during Operation Just Cause: single channel radio, the tactical network, and strategic fixed-station communications. For the purposes of clarity and simplicity, the next three chapters will follow the progress of each of these communications means separately through the course of the war, beginning with single channel radio.

OPLAN 90-2 relied most of all upon single channel radio for initial combat communications. Because of the previous construction and distribution of the JTF-South Joint Communications Electronics Operating Instructions (explained in Chapter IV), all major headquarters were able to establish radio communications before the start of the operation, beginning at 0600 hours and complete by 1200 hours 19 December.[4] The joint radio nets were configured

[3]Captain Kline's notebook, entry for 19 December.
[4]Ibid., entries for 18 and 19 December.

based upon OPLAN 90-2 (as explained in Chapter IV; see also figure 6-1).[5]

JTF-South used a JCS provided Airborne Command and Control Communications Platform (ABCCC) to monitor the battle, beginning with the parachute operations that began at 0045 hours 20 December.[6] It was not decided until late on 18 December that an ABCCC would be used in support of JTF-South. Joint Special Operations Command (JSOC) had requested three ABCCCs from JCS, of which two were to be active in supporting JSOTF missions, with the third one as a stand-by aircraft. One of these was diverted to support JTF-South, with a fourth ABCCC being provided to JSOC as a stand-by. Because the Air Force required two complete crews on the ABCCC, given the expected duration of the mission, the number of men that JTF-South could put on the airborne battle staff was reduced from its usual ten or twelve to seven. The decision was made to leave behind the G-2 (Intelligence), a fire support element officer, and the general's aide-de-camp.

The purpose of the ABCCC was threefold: to monitor conventional and special operations, to be available as an alternate JTF-South command post to assume full control of

[5] 35th Signal Brigade, "Internal AAR," pp. 16-17.

[6] All information concerning the ABCCC comes from Lieutenant Colonel Thom Tuckey's "ABCCC Communications Supporting Just Cause," unpublished after action report, Fort Bragg, 1990.

the battle should the need arise, and to acquire and relay information as required.[7] Major General William Roosma, deputy commander of the XVIII Airborne Corps, monitored four radio nets from his position on the aircraft. These nets were the JTF-South satellite command net JTF-11, FM command net JTF-23, the 82d Airborne Division's internal satellite command net, and the Joint Special Operations Task Force's "A" net (JSOTF A).

Roosma commanded a battle staff of seven men, each of whom monitored those radio nets that most affected their area of responsibility. Commander Porter was the liaison officer for the Joint Special Operations Task Force, monitoring JTF-11, JTF-23, JSOTF A, and the 82d's command satellite net. Major Trotti was the 82d Airborne Division's liaison officer on the ABCCC, monitoring JTF-11, JTF-23, the 82d's command satellite, and the 82d's FM command nets. As the JTF-South G-3 (operations) representative on the ABCCC, Lieutenant Colonel Burgdorff monitored JTF-11, JTF-23, JSOTF A, and the 82d's command satellite net. Colonel McFarren was the fire support element representative, monitoring JTF-11, JSOTF A, the 82d command satellite net, and the supporting arms coordination FM net JTF-81. The Air Force liaison officer was Lieutenant Colonel Ward. He monitored JTF-11, JSOTF A, tactical air request net AC-10, and ABCCC operations VHF-AM net AF-91. Lieutenant Colonel Tuckey was

[7] Ibid.

the signal officer for the ABCCC, responsible for the best use of the ABCCC's communications means. He generally monitored JTF-11, JTF-11A (HF version of JTF-11), JSOTF A, and JTF-23.

The Director of the Airborne Battle Staff was Lieutenant Colonel Hewitt. As the senior ABCCC crewman, he was positioned to provide assistance to the senior battle staff members and assist with the communications consoles as required. He changed nets often to monitor quality and usage.

De-icing requirements delayed the ABCCC's departure from Pope Air Force Base by thirty minutes; however, the aircraft was on station thirty minutes before the airborne operation. With two exceptions, the airborne battle staff maintained secure communications with the JTF-South headquarters at Fort Clayton, the XVIII Airborne Corps rear headquarters at Fort Bragg, and the Air Force from the time of their departure from Pope AFB at 192325Z December until their return to Keesler AFB at 201800Z December. The two exceptions were each twenty to twenty-five minute periods when the ABCCC aircraft was being refueled, during which no radio transmissions were allowed for safety reasons. These refuelings were done without regard for the ongoing actions, and operations were merely carried on with the ABCCC in a monitor-only status during these times.

The JTF-South command satellite net JTF-11 received the heaviest usage on the ABCCC. The JSOTF A net was used extensively by JSOTF, and monitored by the ABCCC. The 82d Airborne Division command satellite net was monitored, but received little use during the initial hours of the operation. The 82d relied upon its line-of-sight "secure enroute communications package" (SECOMP) for communications between their C-130 aircraft on the way to Panama, switching to FM radio communications after they parachuted in. The SECOMP was an old radio, consisting of an Air Force ARC-51 VHF-AM radio mounted in an aluminum box that could be strapped to a seat in the back of a C-130. It plugged into the C-130's "iron lung" power receptacle, and it used the airplane's VHF antenna. It was big and clumsy, but it worked well, and it allowed the various commanders in each aircraft to talk to each other en route to the drop zone.

By monitoring JTF-11, JSOTF A, and JTF-23, the ABCCC was able to track the airborne operation. The high frequency (HF) JTF-11A was not used because interference rendered it useless, even on alternate frequencies. This was not a critical issue because JTF-11A was a back-up net for JTF-11, and JTF-11 worked well. The ABCCC was well worth while during the parachute assault. As the 82d Airborne Division flew in four separate sorties, the ABCCC

passed changing information about "no-fire zones" and JSOTF link-up points to the incoming aircraft via SECOMP.

The only serious problem that developed with single channel radio communications at this stage concerned the KY-57 VINSON crypto keying material. The Intertheater COMSEC Package (ICP) had been prescribed for use on all radio nets in the operation, with the same crypto keying material at all levels. VINSON keying material is ordinarily changed every ten days, and JTF-South planned and ordered that all joint nets change to segment eight of the keying material at 1900 hours (EST) on 19 December, so that the normal ten-day schedule could be adhered to without changing keying material in the middle of the expected chaos of initial operations. The next change would then have to be made on 29 December. The 82d Airborne Division was already preparing to load aircraft when it was discovered that special operations forces already operating in Panama were operating on segment seven and could not be reliably expected to change to segment eight with the rest of the JTF.[8]

At 2300 hours on 18 December, Colonel Mason passed instructions via STU-III to Major Bill Clingempeel, the Assistant Division Signal Officer, to put the 82d on segment seven. This was a difficult order, as much of the equipment

[8]Colonel Torres-Cartegena interview with Dr. Lawrence Yates at Fort Clayton, Panama, 29 June 1990.

was already packed and many units might have already destroyed segment seven. Fortunately, Clingempeel and his commander, Lieutenant Colonel John Woloski, were somehow able to get the entire division back on segment seven. Segment seven, which had already been in use for its normally allotted time, would continue to be used until 2 January 1990.[9]

The JTF-Panama radio room in building 95 on Fort Clayton supported the JTF-South Commander and staff. This was a permanent facility with several types of radios, all of which were connected by wire to remote sets in the operations area. The GRA-39 radio set control device was used for this purpose. The radio room itself was manned by operators from the 154th Signal Battalion, whose responsibility was to ensure continuous communications by making required frequency changes, battery changes in the remote devices, and cryptographic code changes for the secure devices. A variety of satellite radios were used, all of them more or less interchangeably. Motorola URC-101 and 110 radios predominated, with a Motorola LST-5B being used occasionally. All of these radios were secured with the KY-57 VINSON communications security device. The URC-101s used a power amplifier, which was very useful during periods of interference and also of compensating for the long run of coaxial cable that was needed to connect the

[9]Captain Kline's notebook, entries for 24 and 25 December 1989.

radios to the Dorne and Margolin antennas on the roof of Building 95. In addition to the satellite radios, the radio room had two Harris Corporation commercial high frequency (HF) or "short wave" radios, modified for use with the KY-65 PARKHILL secure device. These were connected to dipole antennas on the roof of the building. Finally, the radio room used two types of FM voice radios; both the old RT-524/VRC-46 radios and the new International Telephone and Telegraph SINCGARS "frequency hopping" radios. The frequency hoppers were used only in the single channel mode, both to avoid frequency management complications and because most FM radios in Panama were of the old single channel type.[10]

The airborne operations that began early on the morning of 20 December 1989 initiated conventional warfare in Panama. As planned, single channel radio was the primary means of communications for the invading units; only single channel radio had the mobility and reliability to meet the initial requirements. Command and control for JTF-South initially relied most of all upon two radio nets: the JTF-South command tactical satellite net JTF-11 and the command FM net JTF-23. Both nets worked very well, and radio communications were reliable throughout the critical early phases of the operation.[11]

[10]This is based upon my recollection of the physical layout of the radio room and the joint operations center in Building 95.

[11]35th Signal Brigade, "Internal AAR," pp. 13-17.

The reliance upon single channel radio, while unavoidable, was not without risk. Panama was not considered a sophisticated enough enemy to warrant undue concern about electronic warfare, but radio communications in support of the JTF-South headquarters itself were vulnerable to more primitive measures. All radios in the headquarters, as well as the fixed station telephone key system and all of the tactical telephones except for the magneto point-to-points, depended upon the same industrial electrical power grid that ran everything else on Fort Clayton. There was no assurance that anything was available to replace this power quickly if it should be lost. This was a real concern, especially with sporadic enemy mortar fire coming into the JTF-South headquarters area during the first days of the war. In part to counter this threat, the 50th Signal Battalion sent Captain James Duffy with a contingent of single channel radio operators and equipment, including one of its "FM Special" radio trucks described in Chapter III, to stand by in case they were needed. The FM Special had its own power generators. In fact, electrical power was never lost, and the FM Special and its crew were sent to the 82d Airborne Division to replace one of their "assault CP vehicles" that had been parachuted into a swamp during the airborne operations on 20 December.[12] The other radio operators and equipment were kept busy in support of

[12] Ibid., p. 13.

General Stiner, who nearly always traveled with at least one satellite radio and operator, and in support of numerous other operations as noted in this chapter.

By the end of 20 December 1989, all of President Bush's military objectives had been met, with the exception of General Noriega's capture. Single channel radio had been the most important and most used means of communications during this initial period. As the operations continued, single channel radio continued to be used to control aircraft and units in the field.

As previously noted, all units in Panama were using the JTF-South Joint Communications Electronics Operating Instructions (JCEOI), and all units were using the same Intertheater Communications Security Package (ICP) cryptographic keying material for security. On 24 December a military police (MP) HMMWV truck was ambushed by the PDF two miles from Fort Clayton. The MPs abandoned their vehicle and took cover. When they returned to the HMMWV, they found that their M-60 machine gun, their VRC-46 radio, and their KY-57 VINSON secure device had been taken by the enemy. Since the KY-57 contained segment seven of the ICP, this compromised every KY-57 secured radio net in JTF-South, including JTF-11, JTF-23, and all of the other satellite and FM voice radio nets. Doctrinally, the proper response for such a compromise is to change to another segment; however,

JTF-South J-6 made the decision to remain on segment seven until 2 January because the confusion that was expected to result from making the change before then would have had a worse effect than any use to which the PDF was likely to put the captured material.[13]

On 25 December the 50th Signal Battalion provided two URC-101 satellite radios with operators to the 7th Division. Shortly thereafter, it provided a third. The requirement for doing so pointed to a perceived shortcoming in that division's organic equipment for contingency operations. Operation Just Cause spread the 7th Division out between the Panama Canal and the Costa Rican Border, an area of approximately 14,000 square miles dotted with widely dispersed company and platoon-sized elements on "search and clear" missions. Most of these units moved daily for much of the operation. With only ten PSC-3 satellite radios for the entire division, JTF-South had to augment their organic communications even to begin to meet the requirement to maintain the standard of constant and continuous communications to which the American Army has, by and large, grown accustomed.[14] The division also ran short of HF radios and received a man-portable PRC-104 HF radio with

[13] Capt. Kline's Notebook, entry for 24 December.

[14] 7th Infantry Division After Action Report: "Long Range C3 Requirements in a Light Infantry Division," submitted to JTF-South J-6, 10 January 1990.

operator from the 50th to work at David near the Costa Rican border.[15]

The Navy and Air Force component headquarters in Panama had received FM radios to operate in the JTF nets from JTF-Panama in January 1989.[16] The Naval Operations Center operated in those JTF-South nets that were required of them, JTF-1, JTF-11, JTF-11A, JTF-23, and JTF-23A, as well as in five internal Navy nets. No problems were reported at any time with Naval single channel radio communications.[17] Communications with the Air Force were likewise effective, although some pilots complained that the JCEOI was different from the JCEOI with which they had previously trained. There was no complaint about its effectiveness, but these pilots were used to reading communications instructions from the Air Tasking Order on purely Air Force missions, and they did not like using something different for joint operations.[18]

Aside from this arguable objection to the JCEOI in actual use, the only other complaints noted by operators had to do with frequency management. Captain Case, the signal

[15]Capt. Kline's Notebook, entry for 1 January 1990.

[16]Colonel Van Steenburg, Commander 1109th Signal Brigade, Fort Clayton, Panama, interview with Dr. Lawrence Yates at Fort Clayton, 12 June 1989.

[17]Lieutenant Commander Freeny, NAVFOR communications officer, in a note to Colonel Mason that was incorporated into the "JTF-South J-6 After Action Report," Fort Clayton, Panama, January 1990.

[18]Captain Grove, USAF,1978 Communications Group, "Just Cause Lessons Learned Worksheet," January 1990.

officer for the 193d Infantry Brigade complained that "the incidents of nets interfering with each other were too numerous."[19] This complaint was quite rare and quickly remedied by assigning different frequencies, but it does point out a controversy that arose about frequency management. SOUTHCOM had a single frequency manager, Master Sergeant Bethea, who was responsible for the allocation of all frequencies in Panama. When Major Steve Witt of XVIII Airborne Corps was working on the JCEOI for Just Cause, Bethea denied him the use of roughly one-third of the FM spectrum of frequencies, as these were set aside for use by other agencies. Bethea's frequency management plan also included frequencies assigned to the PDF, since the PDF operated in the same area as USARSO. Bethea stubbornly refused to release this block of frequencies, theoretically forcing JTF-South to operate on only about 66 percent of the FM spectrum. If this was the case, Captain Case's objections were certainly valid, and frequencies could have been better managed. Colonel Mason, the JTF-South Deputy J-6, asked

> Who else in Panama were we obligated to share with other than the Panama Canal Commission? While our Joint CEOI was a success, we now believe we could have done a much better job in allocating frequencies to our units. The U.S. Military (JTF) should of (sic) had priority for all frequencies. Joint doctrine is vague on this issue....we should plan to utilize the full FM frequency spectrum in future contingencies....The JTF-J6 will assume

[19]Captain Case, "193d Infantry Brigade (L) After Action Comments for JUST CAUSE," submitted to JTF-South J-6 10 January 1990.

> total control of frequency management in future contingencies; and we will plan for full use of the FM spectrum.[20]

Unknown to either Master Sergeant Bethea or Colonel Mason, however, Major Witt had taken it upon himself to use the entire FM spectrum for his JCEOI in spite of SOUTHCOM's direction not to do so, which accounts for the fact that, other than the 193d Brigade, there were few if any frequency complaints during the course of the operation.[21] Taken in this light, the small problems that occasioned Captain Case's complaints were the inevitable result of many units using many radio nets and often moving near each other. These things will never be perfect, and the fact that the 82d Airborne Division, the 7th Division, the Marines, the JSOTF, and the Air Force had no complaints in this regard, although there were over 700 separate radio nets in the theater, given a true picture of the frequency plan's effectiveness, in spite of SOUTHCOM's interference.[22]

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[20] JTF-South J-6, "Frequency Management and the Use of the Entire FM Spectrum," JTF-South J-6, Fort Clayton, Panama, 10 January 1990.

[21] During an office visit with him at Fort Bragg in January 19[illegible], Major Witt told me that he had used the entire FM spectrum for the JCEOI, saving only those frequencies that he knew were being used by the JSOTF for internal nets.

[22] Colonel Jorge Torres-Cartegena, in his DA Form 67-8-1 (an Army document in which every officer is required to list his accomplishments and his evaluation of his own merit) dated February 1990, notes that "over 700 secure nets were established from the CINC's High Command...[down to] platoon level networks."

Another related procedural shortcoming resulted from the peacetime requirement to request satellite communications channels from the Joint Chiefs of Staff (who control the communications satellites as national assets) through the SOUTHCOM J-6. This procedure was too slow and cumbersome for comfort. Major Higdon of JTF-South J-6 noted that

> During the planning phase for this operation we anticipated that it may go down quickly. Therefore we took special care to prepare our SAR [satellite access request], get it validated by SOUTHCOM J-6 and preposition it for rapid release to JCS. When XVIII Airborne Corps Signal Staff arrived in country on 18 Dec 89, we attempted to activate the SAR. The SOUTHCOM frequency manager was on Christmas leave to CONUS and no one in the office could find the pre-positioned message. JTF-SO then received the Execute Order but SOUTHCOM J-6 was not yet aware of any crisis and took the position that no SAR request from XVIII Airborne Corps, no action from J-6. We then had to prepare a new proper SAR which consumed more time. We eventually received our TACSAT (tactical satellite) frequencies from Fort Bragg over the STU-III long before we officially got them from SOUTHCOM.[23]

How needless this bureaucratic impediment imposed by SOUTHCOM J-6 actually was can be judged by the fact that, during crises, satellite access is often arranged by telephone with Defense Communications Agency, which clears the matter with JCS and assigns satellite channels based upon the call, asking only for a teletype message to follow at some point for their records.[24]

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[23] JTF-South J-6, "TACSAT Frequency Request Procedures," JTF-South J-6, Fort Clayton, Panama, 10 January 1990.

[24] I have done it this way myself, and in fact this was basically how Major Witt solved the problem from Fort Bragg in this instance.

The only other single channel radio shortfall had to do with teletype rather than voice communications. Partly because of an incompatibility between the obsolete KW-7 secure equipment used by the 154th's radio teletypes and the new KG-84 secure equipment used by all radio teletypes from Fort Bragg, JTF-South J-6 decided not to deploy any radio teletype equipment to Panama for use on joint nets, deleting the JTF-90 net that had been originally planned in OPLAN 90-2. All record communications that needed to be sent via radio were planned to go via the JTF-12 JTF-South satellite intelligence/data net. This net used the UXC-7 facsimile and a single channel satellite radio. In practice, this means proved much too slow to carry all of the traffic and very susceptible to interference. Radio teletype would have alleviated this problem, which caused some discomfort until 23 December, when reliable facsimile was finally established over the tactical telephone network at JTF-South. The 82d Signal Battalion had an internal radio teletype net for use within the 82d Airborne Division, and throughout the operation JTF-South used this radio teletype station at Fort Clayton to pass messages to the 82d's command post.[25]

In spite of these small difficulties, single channel radio communications were a success by all accounts, largely

[25] There is no written record of this use of the 82d's radio teletype by JTF-South as far as I know, but I often sent out messages that way that were in danger of delay.

due to the JCEOI. In an address to the JTF-South staff on 29 December, General Stiner pointed out that the single biggest factor in communications success for Just Cause was the JCEOI.[26] The reliability of satellite communications was such that the JTF-11A HF net planned as a redundant means to the JTF-11 satellite net was never needed and, except for radio checks, was never used. The movement of troops on the ground, the calls for air strikes, and the quick reactions to unforeseen circumstances in the initial days of the operation were all largely handled over single channel radio nets.

[26]Capt. Kline's Notebook, entry for 29 December.

FIGURE 6-1

Single Channel Radio Net Matrix

STATION	UHF C	UHF 1	UHF 2	UHF 3	AM 1	HF 1	HF 2	HF 3	FM 1	FM 2	FM 3	FM 4	FM 5
JTF-SO	2	1,2	1,2			1,2			1,2	1,6			3
JTF FSE				2	4		3				1,2	1,2	
JSOTF	4	3	3			3		3	4	4			3
JSOTF FSE				3	4		4				3	3	
TF ATLANTIC		3	3			3		3	3	3			3
TF ATL. FSE				3	4		4				3		
TF PACIFIC		3	3			3		3	3	3			3
TF PAC. FSE				3	4		4				3	3	
TF BAYONET						4			4	4			
TF SEMPER FI		3	3	3		4			4	4			
SMP FI FSE		3	3		4		4				3	3	
TF AVIATION				3	3	3	3		3	3	3	3	
AFFOR	4	3	3	3		3		3	3	3	3		3
NAVFOR	4	3	3			3		3	3	3	3		3
NAVFCC				3	3		4				3	3	
MARFOR	4	3											
JINTF[27]											3		
JPOG[28]		3	3			3			3	3			
JCCP[29]								1,3					1,3
AOC				1,3	1,3		1,3				3	3	
TACP				3	3		3						
ANGLICO				3	4		3						
ABCCC	4	4	4	4	3		3		3	3	4	4	
GORGAS								3					3
JTF REAR	2	2				2							

1-Net Control Station
2-35th Signal Brigade
3-User Installed
4-User Installed,if needed
5-470th MI Brigade
6-154th Signal Battalion

UHFC:JTF-1
UHF1:JTF-11
UHF2:JTF-12
UHF3:AC-1
AM1:AC-4
HF1:JTF-11A

HF2:AC-10
HF3:JTF-7B(MED)
FM1:JTF-23
FM2:JTF-23A
FM3:JTF-81
FM4:FORCE ARTY
FM5:JTF-7 (MED)

[27] "JINTF" means "Joint Intelligence Task Force."
[28] "JPOG" means "Joint Psychological Operations Group."
[29] "JCCP" means "Joint Casualty Collection Point."

-CHAPTER VII-

THE TACTICAL COMMUNICATIONS NETWORK DURING THE WAR

Arguably, the tactical communications network was not as important as either single channel radio or fixed station strategic communications in the successful prosecution of Operation Just Cause. The operational plan had been designed to succeed as long as the single channel radio nets continued to function. Key logistical support relied most of all upon the strategic network, for which the tactical network was a redundant means, under the guidelines of OPLAN 90-2. In spite of what may be inferred from what had been planned, however, the tactical network was the object of the most intensive attention and work by the signal officers and soldiers of JTF-South, and it was used a great deal. Tactical communications, by their very nature, require a greater effort to establish relative to the maintenance of fixed-station communications that have already been installed. The purpose of this chapter is to follow the progress of the tactical network through th course of the war.

As noted in Chapter V, the failure of the TTC-39A switchboards at Fort Clayton and Howard Air Force Base to establish any digital trunks between them meant that the

only means for KY-68 digital secure telephones to communicate in the secure mode between those locations was by means of the long-local KY-68s installed by the 31st Combat Communications Squadron (CCS) across their tropo-scatter support radio (TSSR) microwave radio system from Howard. Only non-secure KY-68 calls could be placed across the analog trunks between the two TTC-39As. With the escalation of the emergency, however, the 31st CCS volunteered to leave these long-locals in place for as long as they were needed. This permitted the JTF-South staff to continue to use KY-68s for secure telephone traffic to Howard. To avoid confusion resulting from staff members having to distinguish between the 31st CCS KY-68s, which could communicate secure to JSOTF and other stations at Howard AFB, and the Army KY-68s, which could not do so without the digital trunks, all Army KY-68s were replaced with TA-954 digital non-secure telephones. Naturally, there was no problem with using STU-III telephones in the secure mode across the analog trunks, but not all stations had STU-IIIs at the start of the operation, although nearly all important subscribers would have access to them by the end of the operation.

The 31st CCS further agreed to leave their TSC-100 multichannel satellite van, which had been replaced by the 154th Signal Battalion's TSC-85A, at Howard Air Force Base in case it was needed. This was an important decision,

because it would eventually carry five of the ten AUTOVON trunks from the Defense Communications System (DCS) station at Cedarbrook to the 426th Signal's TTC-39A at Howard, with a second "spoke" carrying eight long-local KY-68 circuits to 12th Air Force at Bergstrom Air Force Base in Texas (later converted to a digital trunk group between the TTC-39A at Howard and an Air Force TTC-39A at Bergstrom).

On 18 December the 426th's SB-675 tactical technical control facility at Howard Air Force Base assumed technical control from the 31st CCS. Captain Theresa Coles, the 426th's commander at Howard, and Lieutenant John Perro, her deputy, had good control of tactical communications at that site.[1] All signal vans had current circuit lists and the SB-675 was well organized. Because the company command post (CP) was only a few steps from the technical control facility, there was little opportunity for delay or misunderstanding between them. Technical control and operations personnel were well practiced and trained for the situation in which they were employed. Fort Clayton, however, was another story. On 18 December the 154th Signal Battalion was still trying to control its signal site outside Building 95 from its garrison headquarters building across the post, and even A Company, 154th Signal Battalion, had no control element at the signal site.[2] This lack of

[1] My evaluation, made by inspection of the site.

[2] 154th Signal Battalion, "Sequence of Significant Events, Operation Just Cause," Fort Clayton, Panama, 2 January 1990.

supervision did nothing to improve the poor technical control situation noted in Chapter V; quite the opposite, for as the network grew more complex and as requirements from JTF-South multiplied in preparation for the execution of OPLAN 90-2, the technical control at Fort Clayton fell even further behind.

The tactical telephone network was the single greatest communications problem during the early days of the operation. Captain Case, signal officer for the 193d Infantry Brigade, would later comment that "the tactical telephone system was virtually unusable."[3] The 1st Corps Support Command (COSCOM) signal officer complained that "the tactical phone system took too long to install to be combat effective. Once it was installed it was too intermittent to be depended on as the primary communications system....Mission failure would have resulted without the use of the commercial (DCO) system and STU-III's."[4]

These comments from officers who had to use the network emphasize two facts. The first fact is that telephone communications relied upon the fixed-station strategic telephone system maintained by the 1109th Signal Brigade, and without this system both the quantity and the quality of

[3] 193d Infantry Brigade, "193d Infantry Brigade (L) After Action Comments for JUST CAUSE," submitted to JTF-South J-6 January 1990.

[4] 1st Corps Support Command, "Communications Operations of COSCOM during JUST CAUSE," submitted to JTF-South J-6, January 1990.

telephone communications would have suffered. The second fact is that the tactical telephone system initially did not achieve an acceptable standard of speed or reliability. The reader has already seen one reason for this in Chapter V, where the 154th Signal Battalion's TSC-76 technical control at Fort Clayton had neither a cable plan nor any supervision on site. But there were other reasons as well.

When JTF-South was activated on 18 December, the 154th Signal Battalion still had no operational command and control element at their main node near Building 95 on Fort Clayton, even though support for JTF-South was undeniably its most important concern. Captain Ijames, the company commander responsible for the site, kept his command post in the barracks a few yards from the 154th Signal Battalion headquarters, located across the post. Neither the company nor the battalion were in any position to supervise the activities at the Building 95 site, nor had they provided circuit routing lists or even site cable diagrams to the soldiers who were supposed to manage all of the circuitry coming in to the site.[5] This last condition, unlike the improper placement of the command and control elements, cannot have been the result of a conscious decision, as such lists and diagrams were so basic to the installation of tactical communications that no possible justification for their omission could exist, save only error.

[5] I verified these conditions myself during several inspections of the site.

By the evening of 18 December, the 25th Signal Battalion's TTC-39A switchboard, which had been brought to Panama with the 426th Signal Battalion, had completely replaced the 154th Signal Battalion's small TTC-41 switchboard at the Building 95 site, and the TTC-41 was removed.[6] This TTC-39A had analog trunks to the 426th's TTC-39A at Howard Air Force Base, carried by a TRC-138 microwave radio system that the 426th had installed between Fort Clayton and Howard AFB, relayed through Gunn Hill, but still had not managed to make any digital trunks work. The system worked well for all types of telephones except for the digital secure KY-68s, which needed a digital path for secure operation.[7]

On Tuesday, 19 December the 31st CCS reinstalled its TSC-100 multichannel satellite van at Howard AFB. The unit put in a system carrying eight long-local KY-68 telephones from the TTC-39A at Howard AFB to 12th Air Force Headquarters at Bergstrom AFB in Texas, thus allowing 12th Air Force direct access into the local tactical network without having to compete for lines through the AUTOVON network.[8] It will be remembered that the 154th had replaced the TSC-100 with their TSC-85A for the system into the Defense Communications System (DCS) on 8 December, and

[6] 154th Signal Battalion, "Sequence."
[7] JTF-South, "Operation Just Cause Circuit Routing List F1J1MAD."
[8] Capt. Kline's notebook, entry for 19 December 1989.

that the TSC-100 was being kept by the 31st CCS at Howard for emergencies.

While all of this was going on, the 154th sent three more TRC-145 line-of-sight multichannel radio vans to the Building 95 signal site to install communications with other TRC-145s that the 154th sent to the Marine headquarters at Rodman Naval Station, the 41st Area Support Group at Corozal, and the 470th Military Intelligence Brigade, also at Corozal. That same afternoon, the 154th sent two TRC-145s, one radio-teletype, and a small TTC-41 switchboard to Building 200 on Fort Clayton to support the 193d Infantry Brigade headquarters.[9] The 193d's forward headquarters at Cerro Sosa in Balboa received its own TRC-145, while the 4/6th Mechanized Infantry Battalion at the Clayton NCO Club was given a radio-teletype for communications with the 193d's radio-teletype. During all of this activity by the 154th Signal Battalion, there was no company or battalion level command and control established at the main node at the Building 95 site. The 154th leadership operated from its garrison location.

Matters at Howard AFB were better under control, for Captain Coles had her command post at the signal site. The Joint Special Operations Task Force (JSOTF) was establishing its command post in Hangar 3 on Howard AFB, and the service

[9] 154th Signal Battalion, "Sequence."

of this establishment had the highest priority at that location. Initially, JSOTF received seven STU-IIIs, three KY-68s, and two magneto point-to-point telephones to JTF-South on the tactical network.

As requirements increased, the burden upon the network increased. On 19 December, the circuit quality of the 154th Signal Battalion's TSC-85A multichannel satellite van at Howard AFB became so poor that the AUTOVON trunks that it carried from the DCS to the 426th's TTC-39A could no longer be used. This can be at least partially explained by fact that the eight-foot antenna that the 154th had to use was no match for the twenty-foot antenna that the 31st CCS had. The twenty-foot antenna that the 154th sent to Howard AFB turned out to be broken and could not be used. Captain Coles of the 426th and Captain Diane English of the 31st CCS therefore moved five of the ten AUTOVON trunks to the 31st's TSC-100. This action was reported to the 154th, but the 154th Signal Battalion Commander, Lieutenant Colonel Andre Francis, did not learn of it until later. His response, rather than to establish a field command and control element to ensure that he and his staff kept matters in hand, was to complain to JTF-South J-6 that the 31st CCS was usurping his authority.[10] Nothing was immediately done to improve the quality of the satellite link. This response helps to explain at least some of the command and control problems

[10]Capt. Kline's Notebook.

noted so far. No battalion control element for the 154th would be established in the field until 21 December, the day following the invasion.[11]

Soon after the parachute operations early on 20 December, the 82d Signal Battalion sling-loaded a MRC-127 multichannel radio truck (the paratrooper's version of the TRC-145) from Johnson Field at Fort Clayton to Tocumen Airfield, to support the 82d Airborne Division's command post.[12] This gave the 82d Airborne entry into the tactical telephone network. The first priority on the system was a point-to-point magneto telephone line from the 82d directly to JTF-South J-3.[13] This deserves some comment.

With the advent of tactical automatic telephone switching, the Signal Corps had tried for years to end the practice of installing "hotlines," or point-to-point magneto telephones, between headquarters. This communications means dated from the days of manual switching (which in the Army extended well into the 1980s), where long delays by switchboard operators made such "sole user circuits" imperative for the highest priority subscribers. They were used mostly, but not exclusively, for command and operations circuits. Subscribers tended to cling to these

[11] 154th Signal Battalion, "Sequence."

[12] Captain Campbell Cantelou, "Jumping into a Just Cause," Army Communicator, 15-1, Winter/Spring 1990, p. 10.

[13] JTF-South, Operation Just Cause Circuit Routing List J166PAA.

magneto telephones because of their reliability, speed, and simplicity, even though, theoretically, they were inefficient as they required a dedicated channel on whatever transmission system that connected the two ends. The JTF-South staff, being mostly from XVIII Airborne Corps where point-to-points were still in routine use, was used to the reliable speed and simplicity of the magneto point-to-points, and when the staff discovered problems with the tactical telephone system it demanded point-to-points to every subordinate headquarters that it could not quickly reach using the tactical telephone system. The 154th Signal Battalion's command and control problems were such that one such requirement, the 20 December installation of a point-to-point from Task Force Aviation to JSOTF, was personally installed by the battalion assistant S-3 officer and the operations sergeant because they could not find anyone else to do it.[14] The very next day, the 154th S-3 established a systems control element (SYSCON) at the Building 95 site.[15]

On 21 December the 154th installed a TRC-145 system from Howard Air Force Base to Albrook Air Force Station to support the 7th Division tactical operations center established at the Albrook Officer's Club. The 154th also installed a TRC-145 system from Howard to the Legislative Palace in Panama City, relayed through a TRC-145 on Ancon Hill. This system supported SOUTHCOM civil-military

[14] Capt. Kline's Notebook, entry for 20 December 1989.
[15] 154th Signal Battalion, "Sequence."

operations and was intended to be used by Endara's government until the commercial Panamanian telephone system was restored to service. This system carried long-local KY-68s from the TTC-39A at Howard Air Force Base.[16]

The fact that the 154th Signal Battalion finally established a SYSCON at the Building 95 site on 21 December did not solve the technical control problems at once. The communications system had been growing since the escalation on 17 December, and since there had been no SYSCON to manage this growth, there was no easy way to gain control of the network. Neither initial installations nor subsequent changes had been properly recorded. There was no written cable plan to refer to, neither were there accurate circuit lists. Technical control was still chaotic.[17] This had a terrible effect upon the tactical telephone system's reliability, and subscribers lost faith in the network. Quite correctly, on 22 December the JTF-South J-3 (operations) officer Colonel Thomas Needham demanded point-to-point magneto telephones to be installed from JTF-South to all subordinate task forces.[18] That the J-3, an infantry officer, found it necessary to give such instructions to his J-6 speaks volumes about the users' lack of confidence in the 154th's tactical automatic telephone system.

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[16] Ibid.

[17] This judgment is based upon my inspection of the technical control facility at the time.

[18] Capt. Kline's Notebook entry for 22 December 1989.

Captain Kline of the JTF-South J-6 staff went to the 154th Signal Battalion SYSCON at the Building 95 site to instruct the SYSCON about the J-3's requirement. Frustration at the SYSCON was already at a high level, and when Kline presented his instructions to the 154th Signal Battalion S-3 officer Major Sterling Ingram, the latter became so incensed at what he considered yet another unreasonable demand that he stormed out of the SYSCON, taking no action. The requirement was arranged through the assistant S-3 officer, Captain Thomas Gilbert, and the operations sergeant, Sergeant First Class Haga.[19]

In the face of this clearly impossible state of affairs, the JTF-South Deputy J-6 Colonel William Mason arranged with the J-6 Colonel Torres-Cartegena and the J-3 Colonel Thomas Needham to bring 35th Signal Brigade commander Colonel Jackson C. Moss with his brigade SYSCON, to assume tactical systems and technical control from the 154th. This decision generated additional resentment in the 154th, who had thus been relieved of their control over the tactical network as planned in OPLAN 90-2, but it was obvious that the intolerable situation that existed was not getting any better. At the same time, the 35th Signal Brigade was tasked to bring more heavy tactical communications equipment to Panama.[20]

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[19] Ibid.

[20] Ibid, entries for 22 and 23 December 1989; see also 35th Signal Brigade, "Internal After Action Report For

Meanwhile, JTF-South continued to work with what it had. Because the JTF-90 radio-teletype net had not been implemented (see Chapter IV), JTF-South relied upon the DCS Automatic Digital Network (AUTODIN) and upon facsimile traffic across the tactical telephone system for record or "hard-copy" communications. Facsimile was the only means available for those units with no fixed AUTODIN-capable facilities to support them, such as the 82d Airborne Division at Tocumen. The 82d, although they had been part of the tactical telephone network since the MRC-127 had been carried to Tocumen by helicopter on 20 December, still had no facsimile communication with JTF-South on 22 December because JTF-South did not have a single telephone line suitable for tactical facsimile use.[21] This deserves some explanation.

Several types of facsimile machines were in general use at the time of Just Cause. Non-secure commercial facsimiles of all types had been bought by various Department of Defense agencies for administrative use. Both RICOH and MITEK made facsimile machines that could be secured across a STU-III. The standard military facsimile machine was the UXC-7A, a heavy and durable machine that could operate easily over radio or over digital and analog telephones.

Operation Just Cause," Fort Clayton, Panama, 10 January 1990, pp. 20-21.

[21] Capt. Kline's Notebook, entries for 23 December 1989.

Most units had the UXC-7. JTF-South had both secure and non-secure commercial facsimiles as part of the fixed-station communications provided by the 1109th Signal Brigade. The problem was communications security. The facsimiles had to communicate with facsimiles secured by compatible secure devices. JTF-South had mostly KY-68 digital telephones, while the 82d had none because they had SB-3614A analog switchboards. The solution was to use STU-IIIs with the SB-3614A, and to hook the UXC-7 to the STU-III with a locally fabricated cable. This could be done at all locations, and it became the standard for the network.[22]

CW3 Raymond Frison of JTF-South J-6 solved this technical problem,[23] but implementing the solution at JTF-South itself was almost unbelievably difficult because of the technical control situation at Building 95. The 82d, for example, was ready to send facsimile traffic hours before JTF-South had a facsimile ready. The lack of a cable plan made it necessary to put a tone on a pair of wires in the building and follow it all the way through the technical control van to the TTC-39A switchboard in order to establish a line that could be used for facsimile with a STU-III in the tactical network. This was finally completed at 0050 hours 23 December, two days after telephone communications had been established with the 82d Airborne Division.[24]

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[22] 35th Signal Brigade, "Internal AAR," p. 23.

[23] Ibid.

[24] CW2 Michael Donahue of 35th Signal Brigade and myself worked this circuit in as described because at that time

On the evening of 24 December, after several bad weather delays at Pope Air Force Base, the contingent from the 35th Signal Brigade under Colonel Jackson Moss arrived at Howard Air Force Base in a C-5A Galaxy. Colonel Moss had put together a hand-picked SYSCON consisting of the best officers and sergeants in the brigade, all placed under his operations officer Major Carroll Pollett. In addition, Colonel Moss brought a TSQ-84 technical control facility to replace the 154th's TSC-76 at Fort Clayton, two TRC-151 multichannel radios with a TRC-152 relay to improve connectivity between Howard and Clayton, a TTC-41A analog switchboard for the new Panamanian government, and a MRC-127 belonging to the 82d.[25] They moved directly to Fort Clayton and, on Christmas morning established a SYSCON at the Building 95 site. It would take the SYSCON's Captain Ronald Pontius and his circuit engineers, most notably Sergeant First Class Charles Lynch and Staff Sergeant Michael Murray, over fifty hours of continuous work to sort out and correct the morass of misrouted circuits and wires at JTF-South, but this would finally solve the technical control problem and bring telephone communications up to acceptable standards.[26]

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there was literally no one at the 154th's technical control facility, nor in the battalion's SYSCON, who could do it.

[25] 35th Signal Brigade, "Internal AAR," pp. 22-23.

[26] Captain Pontius told me how long this process took and what was done to achieve the final engineering results while we were still in Panama; Major Pollett, the 35th Signal Brigade Operations Officer, reiterated this at a 35th Signal Brigade after-action review at Fort Bragg on 23 January 1990.

Meanwhile, also on Christmas day, the 154th installed yet another TRC-145 system from Fort Clayton to Fort Amador, where the 82d's division headquarters was moving from Tocumen.[27] The system that the 154th had previously installed for the 82d to Tocumen was left in place to support the 82d's First Brigade. The 154th had more than reached its limit for TRC-145s and were without any redundant equipment to speak of. To augment the battalion, the 50th Signal Battalion from Fort Bragg sent two TRC-145s to the 154th, arriving on 25 December.[28]

On 26 December, the 35th Signal Brigade established a staff message and communications center for JTF-South in Building 95. Under the direction of Captain Leah Patrick of the 426th, this establishment provided a centralized location for incoming and outgoing record traffic. This was past due, for as the volume of such traffic increased, the JTF-South staff began to lose track of messages; nor could the staff sections keep track of the changing and various means to pass messages to units moving in the field.[29] Record traffic could be passed from this message center as explained above by UXC-7 facsimile over the tactical network, by various commercial facsimile machines via AUTOVON to locations in the United States and elsewhere, by

[27] 154th Signal Brigade, "Sequence."
[28] Capt. Kline's Notebook, entry for 25 December 1989.
[29] I observed this daily on the JTF-South staff.

teletype through the AUTODIN, or by messenger. Captain Patrick ran both scheduled messengers via HMMWV truck to all task forces twice a day, as well as special messengers either by HMMWV truck or, occasionally, by air.[30]

The digital trunk group between the Howard Air Force Base and the Fort Clayton TTC-39As was still not working on 26 December, although the SYSCON devoted much effort to solving the problem. To make matters worse, the long-local KY-68s that the 31st CCS had kept in service from Howard AFB to JTF-South were steadily deteriorating in quality, and by this time less than half of them worked. As these KY-68s fell out of service, the staff tended to stop using them altogether, preferring instead to use the simpler and more reliable STU-IIIs. By now, sufficient STU-IIIs had been installed throughout the tactical network that, along with the STU-IIIs in the fixed station and AUTOVON systems, every headquarters could be reached well by STU-III. The STU-III proved to be much less critical of circuit quality than the digital KY-68, and systems that were too noisy to allow the KY-68 to work easily accommodated the STU-III. On 27 December, the JTF-South J-6 staff quietly removed the last of the KY-68s in Building 95. Everyone was using STU-IIIs and magneto point-to-points.[31] Captain Ronald Pontius,

[30]This is based upon my daily dealings with the JTF-South communications center.

[31]My observation at the time; see also 35th Signal Brigade, "Internal AAR," pp. 20, 24, & 26.

operations officer for the 35th Signal Brigade SYSCON, later commented that

> (the) STU-III is more versatile and easier to use than the existing tactical secure telephone known as a Digital Secure Voice Terminal (DSVT) or KY-68. The DSVT can presently go secure only to another DSVT, and only then if the complete circuit path between the two DSVTs is digital. The DSVT is also fairly complex and is intimidating to most tactical subscribers due to its size, use of dual electronic variables, and operational characteristics.[32]

The KY-68, never a popular instrument because of its size, complexity, and unreliability as compared with the magneto telephones and STU-IIIs, gained no supporters from the JTF staff on this operation.

On 27 December the 35th sent one of the TRC-145s from the 50th Signal Battalion to Tocumen to support the COSCOM element there that was assisting in the reestablishment of an operational airport.[33] This system was relayed through a 50th Signal Battalion TRC-113 on Ancon Hill, and in addition to telephone and teletype, it carried magneto point-to-points from Howard AFB Air Traffic Control to Tocumen Air Traffic Control and from the COSCOM headquarters at Corozal to the COSCOM liaison at Tocumen.[34]

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[32] Captain Ronald Pontius, "Contingency Communications Needs for XVIII Airborne Corps (with observations from Operation Just Cause)," unpublished paper submitted to 35th Signal Brigade, 7 February 1990, p. 5.

[33] Capt. Kline's Notebook, entry for 27 December 1989.

[34] JTF-South, "Operation Just Cause Circuit Routing List F1C2PAA."

On 29 December the digital trunk group between Howard AFB and Fort Clayton was finally brought into service. This digital trunk group was carried on the TRC-151 radio system that had arrived with the 35th on Christmas Eve, rather than over the TRC-138 microwave radio as originally planned; moreover, the TTC-39A at Howard AFB had been completely reprogrammed.[35] The reason for the long failure was never determined, although Captain Pontius, Sergeant First Class Lynch, and the other SYSCON circuit engineers thought that there was a good possibility that the problem had been imported from the 31st CCS TTC-39A when their data base had been transferred to the 426th's TTC-39A in an effort to save time. The chief weakness of this theory was that it did not explain why that same data base gave no difficulty to the 31st CCS. The data tapes from the TTC-39A at Howard AFB were turned over to General Telephone Electric (GTE) for analysis, but the results of that analysis are not known.[36]

By this time, however, subscribers were satisfied with the STU-IIIs, which could operate in the secure mode across either digital or analog trunks, so the only real result of the installation of the digital trunk group was to add

[35] 35th Signal Brigade, "Internal AAR," p. 22.

[36] Mr. Dana Thomas of GTE submitted the tapes to GTE laboratories for analysis, but the results were not known by the time I left Fort Bragg. Mr. Thomas and the other people who might address this question are with XVIII Airborne Corps in Saudi Arabia (Desert Storm) at the time of this writing (January 1991), and so are not available.

another eighteen trunks between Howard AFB and Fort Clayton, a useful but not critical achievement. In fact, confidence in the tactical network, now under proper technical and systems control and with the "user-friendly" STU-IIIs, had risen to the point where the J-3 authorized the removal of the point-to-point magnetc telephone lines between JTF-South and the Marines at Rodman Naval Station, the 193d Infantry Brigade, and the 7th Division.[37]

As the Panamanian commercial telephone system regained its previous reliability, tactical communications in support of civil-military operations became less important, and on 1 January 1990, the TRC-145 system that the 154th had installed to the Foreign Ministry in Panama City was removed.[38] On that same day, the 7th Division sent an artillery battalion back to Fort Ord. It was the first unit to be redeployed to the United States, and it was an indicator that Just Cause was nearing its end.[39]

On 2 January Colonel Torres-Cartegena held a meeting with Colonel Moss, members of the J-6 staff, Major Pollett of the SYSCON, and the commanders of the 154th and 127th Signal Battalions. The purpose of the meeting was to arrange for the assumption of the tactical communications mission by the 127th Signal Battalion of the 7th Division in

[37] Capt. Kline's Notebook, entry for 29 December 1989.
[38] 154th Signal Battalion, "Sequence."
[39] Capt. Kline's Notebook, entry for 1 January 1990.

preparation for the departure of XVIII Airborne Corps. 7th Division was to assume the responsibility of JTF-South. Colonel Torres-Cartegena wanted Lieutenant Colonel Thomas Armelli, the 127th Battalion commander, to take Colonel Mason's position as the Deputy J-6 to run the JTF-South J-6 staff because, while USARSO had some officers, they did not have enough personnel to sustain continuous operations. Lieutenant Colonel Armelli was not enthusiastic about this, but Colonel Moss supported Colonel Torres.[40] Moss also agreed to leave both TTC-39As and the TRC-138s in place, eventually to be replaced by 154th Signal Battalion equipment, as the 154th had a TTC-39A due in to them later that month. 12 January was settled upon as the date when control of the tactical network would pass to the 7th Division, as 12 January marked the time when 7th Division would assume responsibility for the JTF from XVIII Airborne Corps, although equipment from both the 35th and the 154th would continue to be used as needed.[41]

On 3 January General Manuel Noriega surrendered to the United States Army outside the Papal Nunciature in Panama City, completing all of President Bush's stated objectives for Just Cause. On 12 January XVIII Airborne Corps turned

[40]This observation that Lieutenant Colonel Armelli was not enthusiastic about the prospect of presiding over the dissolution of the tactical network is a subjective one, based upon my impression at the meeting. I was sure that, with his responsibilities to the 7th Division, he would rather have had someone else handle the task.

[41]Capt. Kline's Notebook, entry for 2 January 1990.

JTF-South over to the 7th Division and returned to Fort Bragg. Although Just Cause would continue officially until 31 January, the civil-military operations incident to Just Cause, code named Operation Promote Liberty, had been gaining in emphasis and importance from the very start of Just Cause and would now completely eclipse combat operations. The tactical network would grow smaller and smaller, finally disappearing altogether as it became evident that single channel radio and the fixed station network were adequate for the job. The last tactical system in support of Just Cause was taken out of service when the 7th Division's division tactical command post departed for Fort Ord on 4 and 5 February.[42]

It is obvious that the tactical network was a cause for concern during the first week of the operation, and it may have been well that it was not called upon to perform its primary mission as a limited restoral for the strategic network in the event of catastrophic failure. The friction and resentment between some of the officers of the 154th Signal Battalion and some of the officers of XVIII Airborne Corps can perhaps be partially related to the idea that outsiders had come to SOUTHCOM to impose their methods of operation. General Thurman, himself a paratrooper from Fort Bragg, had certainly shaken all complacency out of the

[42] Lieutenant Colonel Thomas Armelli, "Lightfighter Communications in Operation Just Cause," Army Communicator, 15-1, Winter/Spring 1990, p.52.

SOUTHCOM staff, and it is possible that this event set the tone for the manner in which other "outside help" was received. When JTF-South directed the 35th Signal Brigade to bring a tactical SYSCON from Fort Bragg to assume tactical systems control at Fort Clayton, in effect the 154th had been relieved of its position specified in OPLAN 90-2. This did nothing to assuage sensitivities in the 154th. On the other hand, the fact that it took the 35th's SYSCON over fifty hours of continuous work just to bring the technical control situation into a degree of order did little to inspire respect for the technical competence of the relieved unit that had made such a morass of elementary circuit control. But both units recognized the practical necessity for working together to solve the problems, especially in light of the gravity of the situation, and for the most part the officers, sergeants, and soldiers did work together with good grace.

It should not be concluded from this that the 154th was a total failure as a unit. Individual soldiers and teams often did very well. The perfect record for reliability of the TYC-39 message switch at Corozal represents the most impressive proof of this. Unfortunately, a communications network is utterly dependent upon technical control, and technical control requires both trained and diligent technical control operators as well as systems control in the form of circuit routing lists, cable plans, and other

measures that are the responsibility of the tactical SYSCON. Without proper systems and technical control, the best multichannel radio operators in the world would be useless.

FIGURE 7-1

Tacticel Network as of 19 December 1989

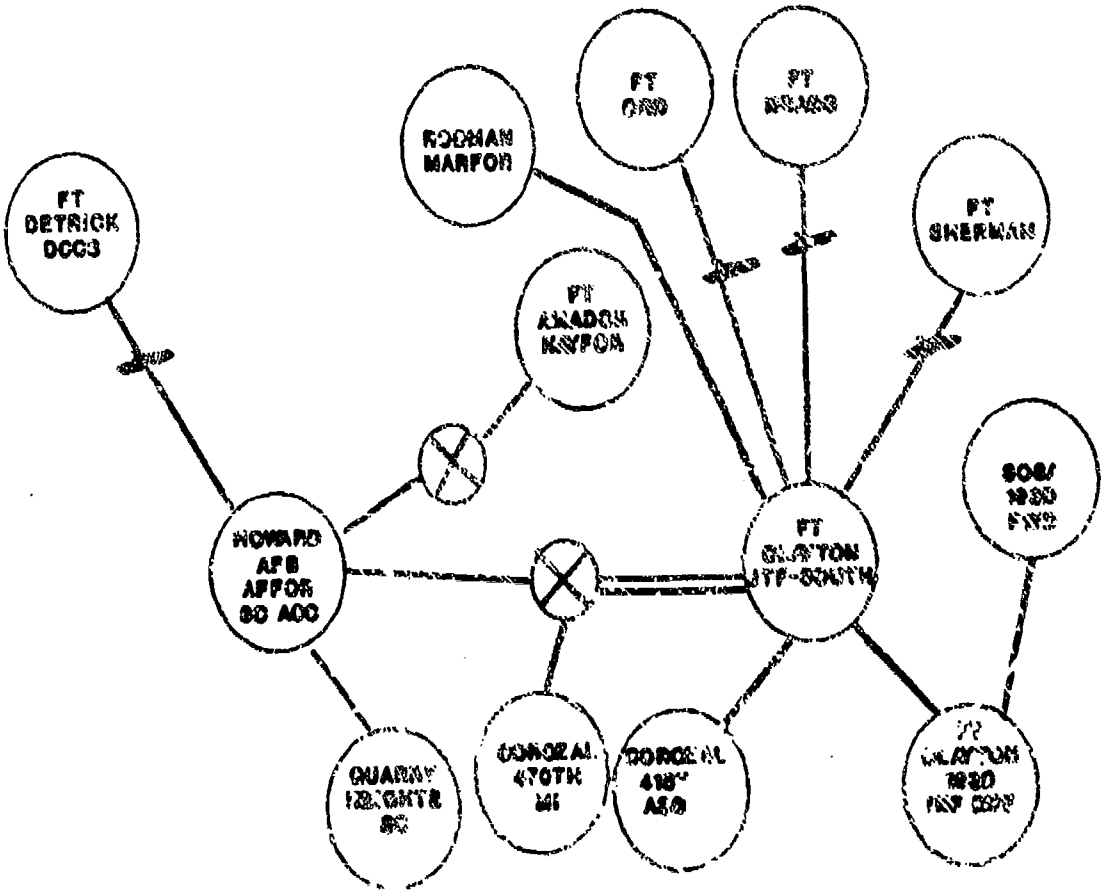


FIGURE 7-2

Tactical Network as of 20 December 1989

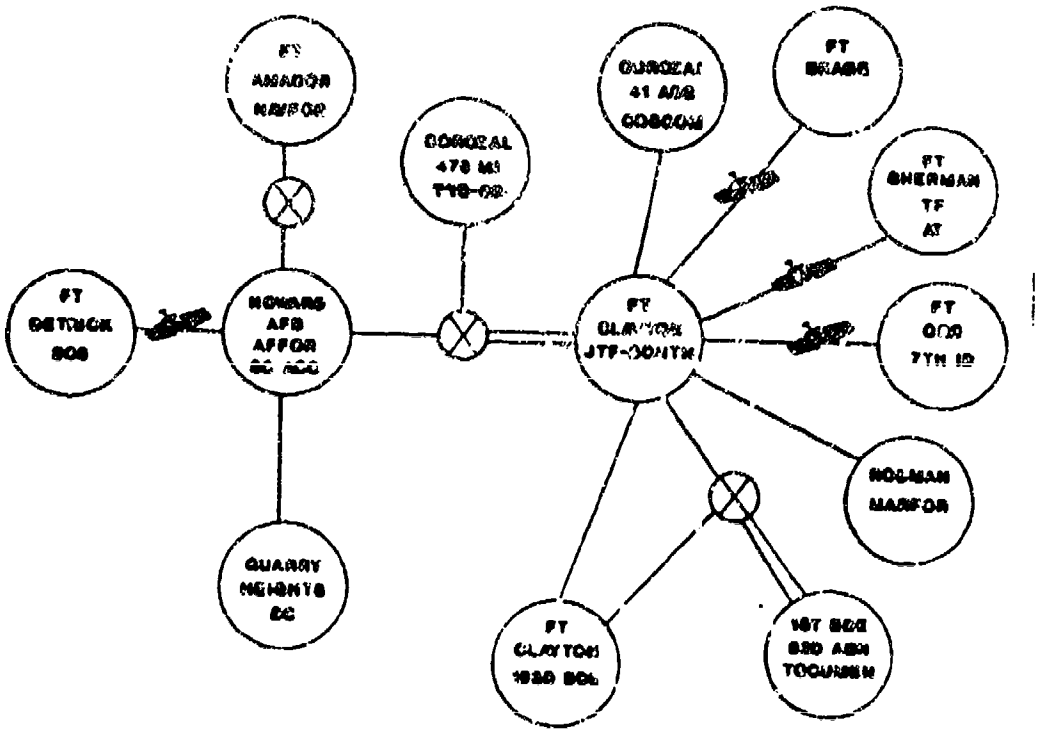


FIGURE 7-3

Tactical Network as of 27 December 1989

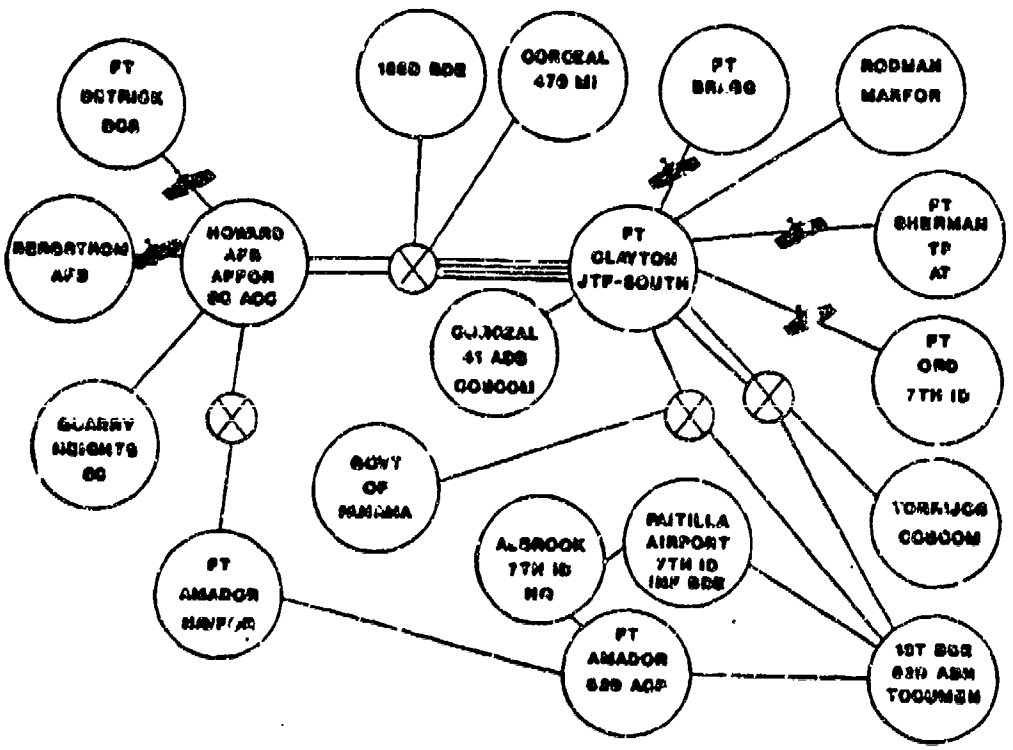


FIGURE 7-4

Mature Tactical Voice Switching Network (Telephone)

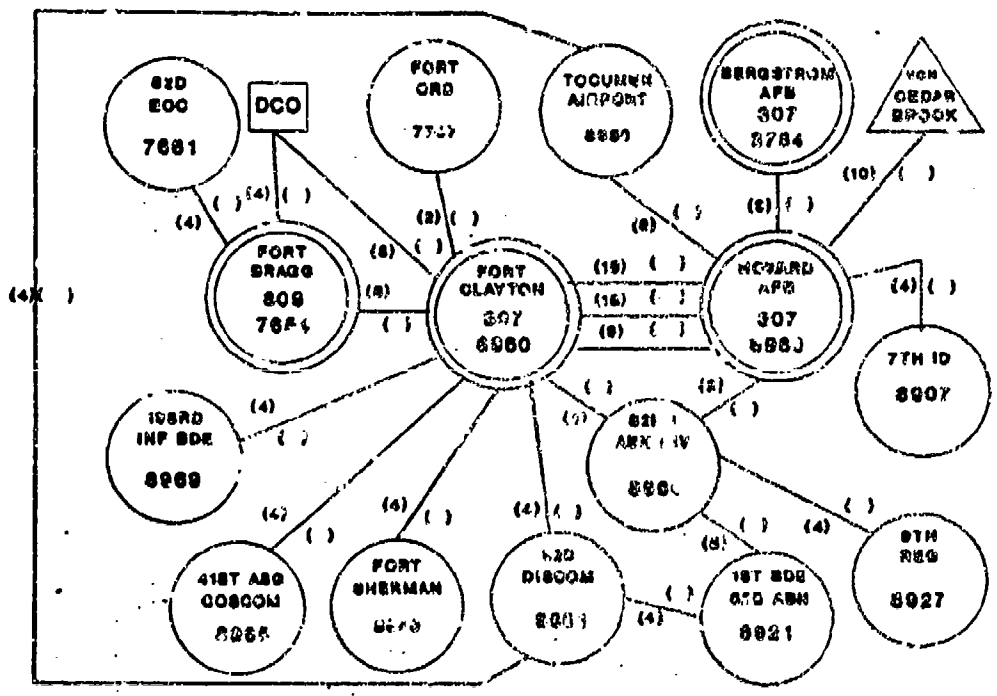


FIGURE 7-5

Tactical Network as of 12 January 1989

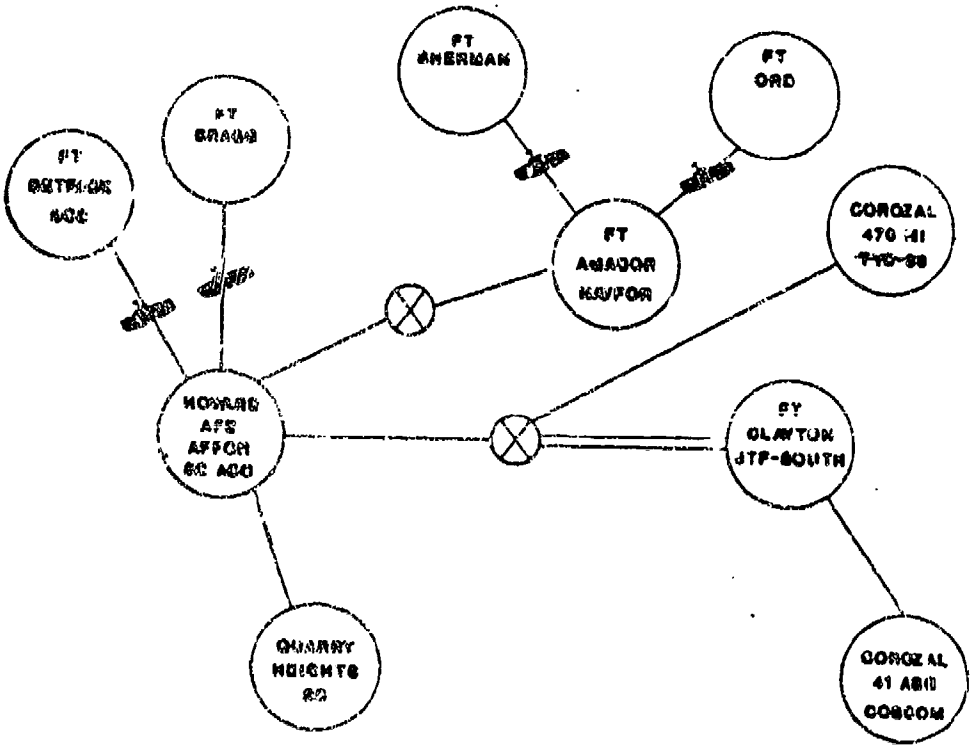


FIGURE 7-6

Communications Systems Control Prior to 24 December 1989

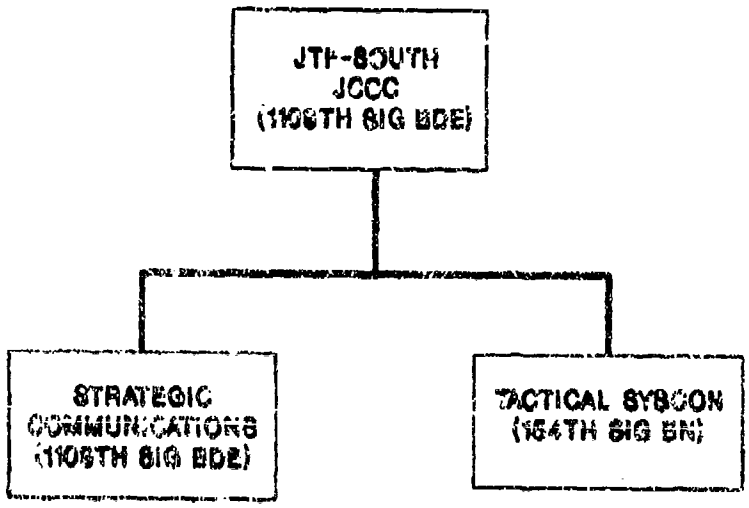
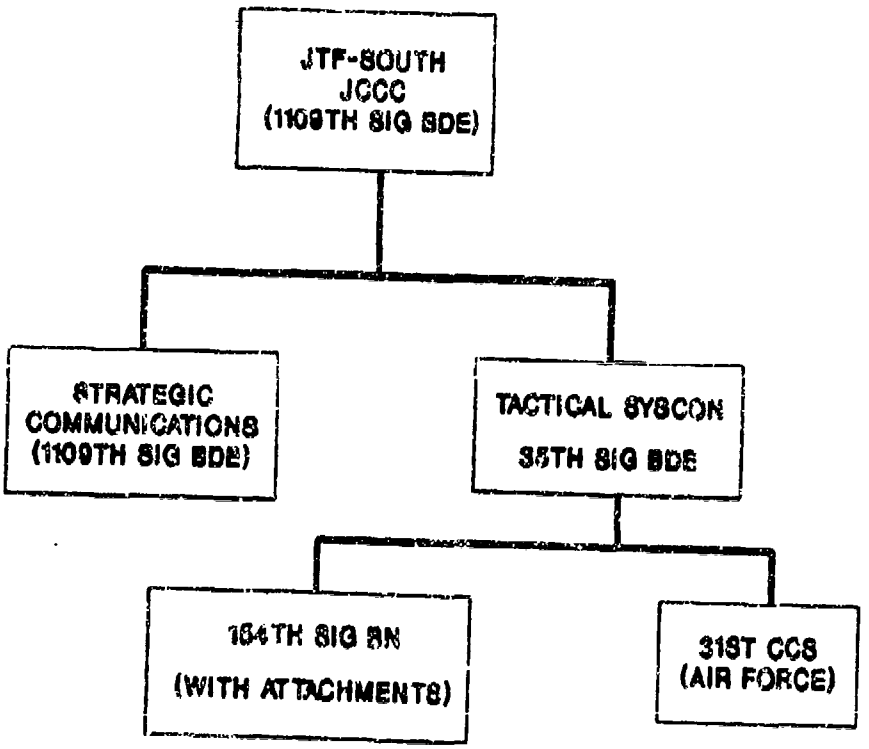


FIGURE 7-7

Communications Systems Control on 25 December 1983



-CHAPTER VIII-

FIXED STATION, STRATEGIC, AND COMMERCIAL COMMUNICATIONS DURING THE WAR

The 1109th Signal Brigade's fixed station and strategic communications network in Panama was probably the least glamorous of the three major categories of communications used by JTF-South during Just Cause. To a great extent, it merely continued to function as described in Chapter II, as it had for countless years. Traditionally manned largely by civilians, including many women, military retirees, and (in countries like Panama) foreign nationals, many tactical communicators tended to think of fixed station Information Systems Command (ISC) units as being somehow less than military. However, as previously noted, fixed station communications carry the bulk of military communications at echelons above Corps, and the fact that the 1109th's network continued to carry the load that it had for countless years without interruption was of almost inestimable value to JTF-South. Fixed station and strategic communications were second in importance only to single channel radio in the successful outcome of communications support for Just Cause.

Colonel Torres-Cartagena's primary focus was strategic communications. As the JTF-South J-6 he was the chief staff officer responsible for both strategic and tactical

communications, but because he was the commander of the 1109th Signal Brigade, which had only recently assumed command over the 154th Signal Battalion, and the main mission of the 1109th was strategic communications, the natural inertia of his organization and staff was in the direction of strategic communications. The officers and sergeants in his Joint Communications Control Center (JCCC), while theoretically responsible for coordinating both tactical and strategic communications, actually had very little expertise in the area of tactical communications. Their specialty was in fixed-station communications, so generally they merely passed tactical requirements to the tactical SYSCON. The S-3 officer of the 1109th Signal Brigade, in fact, was an Armor officer who knew very little about communications of any kind, relying upon his civilian and military fixed-station advisors.[1] The whole organization was oriented toward strategic communications.[2]

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[1] My evaluation at the time.

[2] 1109th U.S. Army Signal Brigade, "Augmentation to JCCC Personnel," an after action report submitted to JTF-South on 10 January 1990, complains that "the concept of JCCC activation was that the various signal activities would provide a staff member to assist in operations. This did not occur." The report states that the JCCC was manned by soldiers from the 1190th Signal Battalion and from the Deputy Chief of Staff for Information Management's office. Both of those organizations were oriented to fixed station responsibilities, and the JCCC had little or no background in tactical communications. See also Staff Sergeant Michael Murray's letter to this author dated 28 August 1990, where this evaluation is corroborated by the tactical teletype network manager.

Therefore, while the Deputy J-6 Colonel Mason closely managed tactical communications (his strongest area) Colonel Torres-Cartegena and his JCCC intensively managed the fixed station systems. As soon as the decision to execute OPLAN 90-2 had been made, Torres-Cartegena prepared his fixed-station 1109th Signal Brigade for the action to follow. He brought in soldiers to man the vital dial-central-offices (DCOs), which were usually operated by civilians. This was done in anticipation of the greater burden upon the DCOs, as well as against the probability that some of the civilians might not be able to get to their workplace once the invasion began.[3] For the switchboards connected with overseas locations, designated the Joint Overseas Switching System (JOSS), he called in five civilian operators without hinting anything about what was going to happen. He augmented these civilians with three soldiers from the 154th Signal Battalion, who knew nothing of the complicated JOSS or the switchboards and received one hour of training before their assignment. These operators would remain on the job for the entire first week of Just Cause "without so much as a toothbrush or a change of clothes."[4]

[3]Colonel Jorge Torres-Cartegena, interview with Dr. Lawrence Yates at Fort Clayton, Panama, 29 June 1990.

[4]U.S. Army South Information Management, Information Management Bulletin No. 7, April 1990, p. 26.

On 19 December 1989, Colonel Torres-Cartegena imposed MINIMIZE upon both the AUTOVON and AUTODIN users in Panama.[5] MINIMIZE is a restriction imposed upon all users of Department of Defense communications systems during periods of crisis or other unusual circumstances to reduce the volume of teletype and long-distance telephone traffic. Under MINIMIZE, such communications means could be used only if "the information to be forwarded is required to avoid a seriously detrimental impact on mission accomplishment or safety of life" and if AUTOVON or AUTODIN was the "only way to get the information to the addressee in sufficient time to accomplish its purpose."[6] In addition, Torres-Cartegena restricted telephones in the military housing areas to local calls only, to free the trunk lines for command and control traffic, as the telephone system had been overloaded during previous periods of heightened tension.[7] One effect of this action was, ironically, to increase the burden upon the JOSS switchboards. Calls that would not have made it through the local network to the JOSS found the local network clear, and the JOSS, which ordinarily handled 15,000 calls per week, now found itself handling that many every twenty-four hours during the first days of Just Cause.[8]

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[5]Colonel Jorge Torres-Cartegena, "Just Cause Briefing," delivered at Fort Clayton, Panama, 14 August 1990.

[6]United States Southern Command, U.S. Armed Forces Telephone Directory, Panama Canal 1938, 1109th Signal Brigade Field Printing Plant, Corozal, Panama, p. 2-5; see also Allied Communications Publication 121 US Supplement-1(E).

[7]Colonel Torres-Cartegena, Interview.

[8]U.S. Army South Information Management, Bulletin, p. 26.

Chapter VII noted that the analog STU-III telephone became the standard secure telephone for the tactical network, despite the fact that it was not designed to be used in a field environment. Captain Ronald Pontius, the senior circuit engineer and operations officer for the 35th Signal Brigade SYSCON, ascribed this to

> their versatility in placing secure calls not only to other STU-III subscribers in the tactical network, but also by entering the AUTOVON network and calling other STU -III subscribers worldwide. The STU-III is more versatile and easier to use than the existing tactical secure telephone known as a Digital Secure Voice Terminal (DSVT) or KY-68.[9]

The proliferation of STU-III telephones in the tactical network, while placing demands upon the 1109th Signal Brigade for more STU-III instruments than the brigade initially had available, had the effect of improving the compatibility between the tactical and strategic telephone networks. With the STU-III at the lowest levels, secure calls could literally be made "from the fox-hole to the White House."[10] The First Corps Support Command (COSCOM) signal officer noted that, as far as he was concerned, the STU-III and the strategic telephone system were so essential

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[9]Captain Ronald Pontius, "Contingency Communications Needs for XVIII Airborne Corps (with observations from Operation Just Cause)," paper submitted to 35th Signal Brigade, 7 February 1990, p. 5.

[10]Colonel Jackson Moss, comment at an internal 35th Signal Brigade after action review, 23 January 1990.

to the COSCOM's success that nothing else could have made up for their absence.[11]

The tactical and strategic teletype networks were integrated to an even greater extent than the telephone system. While the telephone system achieved secure interoperability from the lowest tactical level to the highest Defense Communications System (DCS) supported level by using STU-III telephones in a tactical role for which they were not designed, the UGC-74 and UGC-129 teletypes and the KG-84 secure devices used at the tactical level were already perfectly compatible with the Automatic Digital Network (AUTODIN) of the DCS. The tactical teletype network was very much built around the AUTODIN, with three TYC-39 tactical teletype switching facilities all connected to the AUTODIN (see figure 8-1). All teletype stations in the network had world-wide access via the AUTODIN.

The TYC-39 teletype switch at Corozal belonged to the 154th Signal Battalion, and it had nearly been installed permanently at that location, with the van set upon a concrete slab rather than upon a five-ton truck (see Chapter IX for the circumstances under which it was placed at Corozal). Circuits going into this TYC-39 were controlled by the 1109th Signal Brigade's fixed-station technical

[11] 1st COSCOM, "Communications Operations of COSCOM during Just Cause," after action report submitted to JTF-South J-6, 10 January 1990.

control facility at Corozal, and the most direct DCS entry from the Corozal TYC-39 went through that technical control facility to the strategic satellite link into the AUTODIN entry point at Fort Detrick, Maryland.[12] Teletype substations of this TYC-39 connected to the TYC-39 via either the fixed-station cable network or the tactical multichannel radio network, depending upon which means was the simplest. At the height of the operation, fourteen telecommunications centers depended upon this TYC-39, as indicated in figure 8-1.

The second TYC-39 in the network belonged to the 426th Signal Battalion at Howard AFB. This TYC-39 had been installed there to replace the 31st Combat Communications Squadron's teletype equipment in support of the projected Southern Command Alternate Command Center (see Chapter V). As it turned out, both the importance and the demands placed upon this TYC-39 were far less than was the case with the 154th's TYC-39 at Corozal because the Alternate Command Center at Howard AFB was never used. A tactical telecommunications center was installed at Howard AFB with teletype linked to the TYC-39, but the availability of a fixed station telecommunications center operated by the 1978th Communications Group on Howard AFB meant that most Howard subscribers continued to use the same teletype means that they enjoyed before Just Cause.

[12] 35th Signal Brigade, "Internal After Action Report for Operation Just Cause," 10 January 1990.

Including the tactical telecommunications center operated by the 426th Signal Battalion, three other stations depended upon the Howard AFB TYC-39. The 35th Signal Brigade SYSCON at Fort Clayton connected a station to it via the TRC-138 microwave radio system that connected Howard and Clayton, the JTF-South telecommunications center had a teletype connected to it, and the Arrival/Departure Airfield Control Group (A/DACG) at Tocumen depended upon the TYC-39 for AUTODIN communications. Of all these stations, only the A/DACG really needed this TYC-39. In all other cases, the Howard TYC-39 was a redundant means. The greatest contribution of this TYC-39 to the network was as a node for alternate routing. For example, if a problem developed with the AUTODIN link to the TYC-39 at Corozal, messages could be routed through the TYC-39 at Howard to enter the AUTODIN via the 154th Signal Battalion's satellite link into Fort Detrick, using the TSC-85A multichannel satellite van at Howard.

The third TYC-39 in the network belonged to the 25th Signal Battalion and was installed at the sustainment base at Fort Bragg. This TYC-39 connected to the AUTODIN at the fixed-station facility on Macomb Street at Fort Bragg, and it served all of the rear echelon elements at Fort Bragg.

Because it was linked via satellite to the TYC-39 at Howard AFB, it provided yet another AUTODIN entry point for alternate routing.

These TYC-39s were all tactical communications assemblages, but we have included them in this chapter because they were really an extension of the strategic AUTODIN. The fixed-station telecommunications centers in Panama maintained by the 1109th Signal Brigade and the 1978th Communications Group continued to serve those units that were located close enough to their facilities. For example, when the 82d Airborne Division moved their division command post from Tocumen to Fort Amador, they received "over-the-counter" service from the 1109th telecommunications center at that location.

Although extensive telecommunications facilities were available in Panama well in advance of Operation Just Cause, some units entering Panama encountered problems with record communications. Colonel Mason explained that

> During the planning phase OPLAN 90-2 was to be an operation of short duration with the flowing in of one follow on Brigade of the 7th ID and the immediate redeployment of the Rangers and the 82d. An extensive internal teletype and message plan was never really planned because of the short duration of the operation. The basic plan was to use in place fixed communications centers which currently support all the major subordinate units in Panama....For the most part this plan worked, but as the force on the ground grew larger and no redeployments occurred, the demand for internal message flow grew larger and larger. The message

> mission was much greater than could be supported by in-country assets....Message flow was initially a weak area. We had to bring in people and equipment from Fort Bragg (35th Signal Brigade) to operate a tactical Staff Message Center for JTF-SO. The PLA [plain language address] message was also late in going on the street. For future contingencies we need to plan heavier for message flowing and get a correct PLA message out quicker.[13]

This brings up an important point, because it was a common problem in exercises prior to Just Cause, as well as during the initial phases of this operation. The term "plain language addresses" (PLAs) referred to the names of the units that were served by the teletype network. Allied Communications Publication (ACP) 117 contained all fixed-station strategic addresses for units served by AUTODIN, but units in the field (being fairly mobile) had to have their PLAs promulgated by a message, so that recipients of the PLA promulgation message would know how to get teletype messages to the units in the field. This message would be sent to any organization that might need to send messages to the field locations, as well as to the AUTODIN and tactical message switches that would have to rout the messages. The PLA promulgation message was similar to a telephone directory, containing PLAs and routing indicators. The PLA for a unit corresponded to its name, with the routing

[13] JTF-South J-6, "Operation Just Cause Communications After Action Comments and Lessons Learned," submitted to Commander, 1109th Signal Brigade 10 January 1990, see section titled "Plain Language Addressee Message and Message Flow."

indicator serving the same function as a telephone number. Routing indicators were a code of seven letters that identified a specific teletype terminal to the switches. Simply put, the PLA identified the teletype station to the human users, while the routing indicator identified it to the switches.

Because the extensive number of tactical teletype stations shown in figure 8-1 had not been foreseen by the drafters of OPLAN 90-2, PLAs and routing indicators were not planned before the operation and had to be done after the operation began. This problem was not solved before 25 December 1989.[14] Once this problem was overcome by promulgating a PLA and routing indicator message, the teletype network served JTF-South very well, being used for both operational and logistics traffic.

Civil-military operations, or the political rehabilitation of Panama, began early in the operation, even though combat operations were still in progress. The 1109th Signal Brigade arranged for a portable commercial satellite system belonging to the National Communications System (a Federal agency) to be installed at Fort Clayton immediately following the invasion on 20 December, exclusively to serve the new Panamanian government under President Endara.[15]

[14] Staff Sergeant Michael Murray, letter to the author dated 28 August 1990.

[15] U.S. Army South Information Management, Information Management Bulletin No. 7, April 1990.

This provided the new government with world-wide telephone access. Many more communications requirements to support the new government would follow.

On 21 December the 1109th Signal Brigade installed ten telephone lines and two computers to support the refugee center at Balboa stadium, as well as STU-IIIs and facsimiles to the prisoner of war compound at Empire Range.[16] At the same time, the 154th Signal Battalion installed a tactical TRC-145 multichannel radio system to the Legislative Palace in Panama City to support civil-military operations associated with the new government, giving civil affairs personnel access to the tactical network and, through it, world-wide commercial and AUTOVON access. On 22 December the 1109th restored Panamanian television Channel 2 to service, provided four telephone lines to the new Panamanian Public Force headquarters in Ancon, and installed additional telephone lines to the Quarry Heights Officers' Club to support the Press.[17]

An important part of successful civil-military operations in Panama was the restoration of commercial telephone service in Panama City. Colonel Torres-Cartegena's personal knowledge of the Panamanian commercial

[16] Colonel Jorge Torres-Cartegena, "Just Cause Briefing," delivered at Fort Clayton, Panama, 14 August 1990.

[17] Ibid.

telephone system (INTEL) was of vital importance in this restoration. Lieutenant Colonel Andre Francis inspected the commercial INTEL control center next to the Marriot Hotel in Panama City early on the morning of 23 December. He found the complex intact, and he was able to locate the control center manager and bring him back to Fort Clayton.[18] Colonel Torres-Cartegena learned that the commercial telephone dial central offices (DCOs) had stopped functioning in some cases because electrical power had been lost, and in others because they had been more or less abandoned. The DCOs that were abandoned continued to function automatically for a time, but when the computer tapes that recorded billing data on long-distance calls filled up and were not replaced, the DCOs were designed to shut themselves down automatically to prevent subscribers from placing long distance calls without being billed for them.[19] Torres-Cartegena solved the electrical power problem by sending tactical power generators from the 154th Signal Battalion to the DCOs that lacked power. Soldiers kept these on site until reliable commercial power was restored. These troops acted as guards to secure the facilities. These measures were considered to be no longer needed after 27 December and were discontinued at that time.

[18] 154th Signal Battalion, "Sequence of Significant Events for Operation Just Cause," entry for 23 December 1989.

[19] Colonel Jorge Torres-Cartegena, Interview.

Torres-Cartegena was also able to replace the computer tapes.[20]

On 28 December a large contingent of contracted equipment arrived in Panama, under the auspices of the National Communications System. This equipment came from a civilian firm from Alaska known as ALASCOM, and although its main purpose was to support civil-military operations, some tactical units (such as the 82d) were able to make some use of it as well. ALASCOM established a multichannel satellite station on Ancon Hill, guarded by the 154th Signal Battalion. This satellite system went through the commercial AURORA I satellite, a geostationary satellite at 143 degrees west longitude, and downlinked into an earth station in Alaska, where it entered the commercial and AUTOVON networks. A small switchboard on Ancon Hill connected this satellite system both to the local fixed-station telephone station through the DCO at Quarry Heights, and also to mobile subscribers equipped with special radio-telephones. These mobile subscribers were JTF-South J-3, Brigadier General Gann, the Foreign Ministry, Tocumen-Torrijos Airport, the 1109th Signal Brigade's JCCC, and the ALCE at Howard AFB.[21] For several weeks, this was the primary support to President Endara.[22]

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[20] Ibid.

[21] Captain Kline's Notebook, hand-drawn network diagram for ALASCOM communications.

[22] Colonel Jorge Torres-Cartegena, DA Form 67-8-1 (Officer Evaluation Report Support Form), February 1990.

The importance of the STU-III telephone to both tactical and strategic subscribers in JTF-South has already been addressed in detail. STU-III telephones were equally important to civil-military operations. Because they could be used on military AUTOVON, tactical, and civilian commercial telephone lines with equal facility, the STU-III had the versatility to be carried with confidence by subscribers deployed to remote sections of the country and hooked up to whatever telephone lines were available, allowing secure voice communications from anywhere that had any sort of telephone service. Some STU-IIIs were used at interrogation stations, while others supported an intelligence network that spread throughout the country in support of civil-military operations.[23]

Colonel Torres-Cartegena's long service in Panama, his knowledge of both the civilian telecommunications systems and the people who ran them, added greatly to the speedy restoration of commercial facilities, which the new government and the people of Panama depended upon to such an extent that there was really no substitute for them. His knowledge of the commercial network was also put to use as a weapon against the Panama Defense Force. After Just Cause,

[23]U.S. Army South Information Management, Bulletin, p. 17.

Colonel Torres-Cartegena explained

> On several occasions I was personally called ... to assist U.S. agencies in the interdiction and denial of some key telephone trunks. Because of my in-depth knowledge of telephone systems and the Panamanian communications network, I was able to locate the proper junction boxes and lines used. These missions were classified and cannot be elaborated upon in this document, but I feel my efforts saved countless lives and contributed to a quicker termination of JUST CAUSE.[24]

This was a case of the right man being in the right place at the right time, for such a knowledge of the commercial telephone network in a foreign country can only come with long experience and personal involvement with people in the civilian telephone company. Needless to say, this is not common.

It is a truism that every war is different from every other war. Panama was an unusual theater of operations for a contingency mission such as Just Cause in that the United States had maintained a large presence there for over eighty years, with an extremely large and sophisticated communications network to support it. That such a massive communications infrastructure existed prior to the operation had a profound effect upon the manner in which Just Cause came to be supported. Without this strategic fixed-station communications infrastructure, the entire operation (to

[24]Colonel Jorge Torres-Cartegena, DA Form 67-8-1 (Officer Efficiency Report Support Form), February 1990.

include civil-military operations) would have had to be commanded and controlled over tactical means more or less exclusively. While it cannot be said that Just Cause would have failed as an operation without the strategic fixed-station communications network, it would certainly have been far more difficult.

FIGURE 8-1

Strategic Telephone Network with ALASCOM Overlay

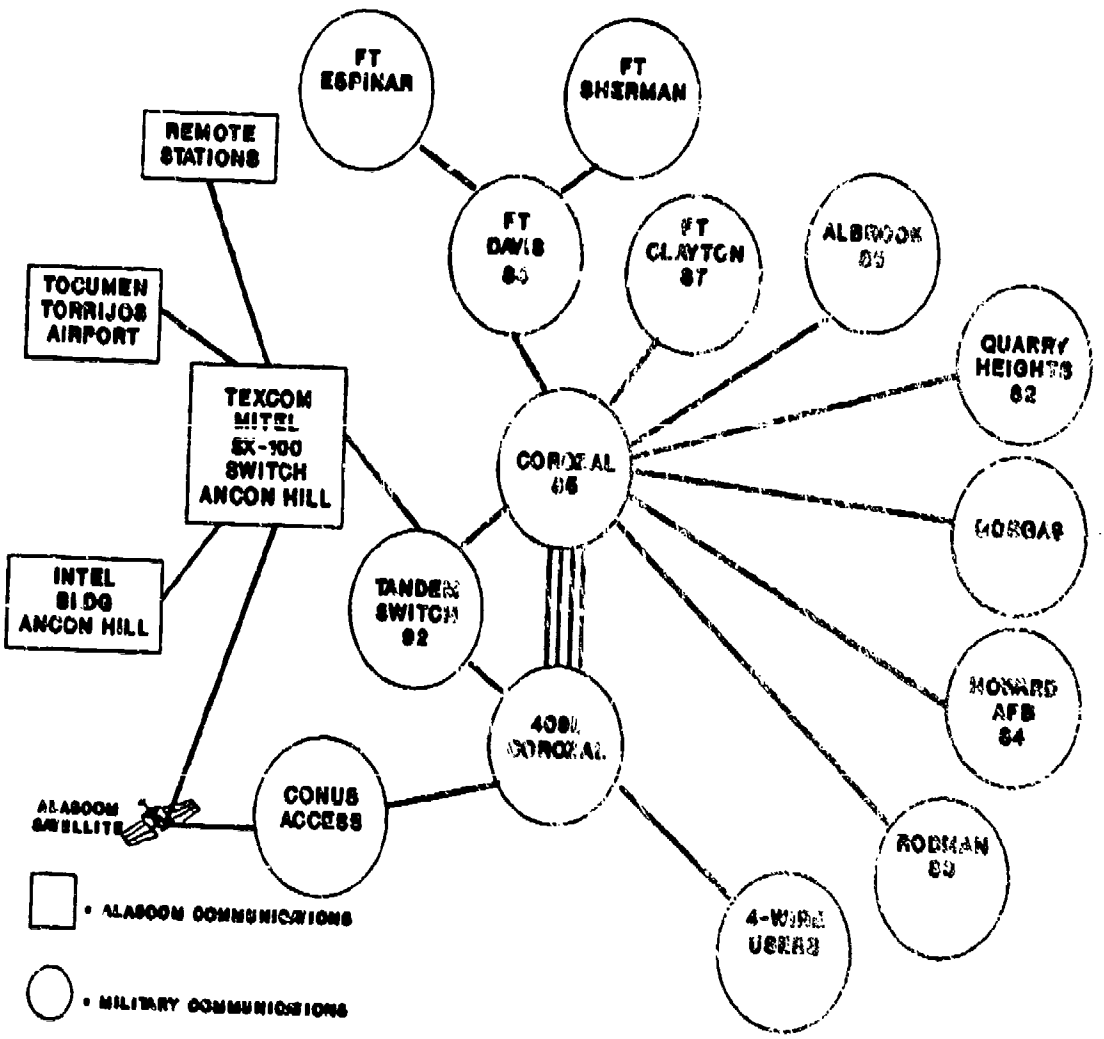
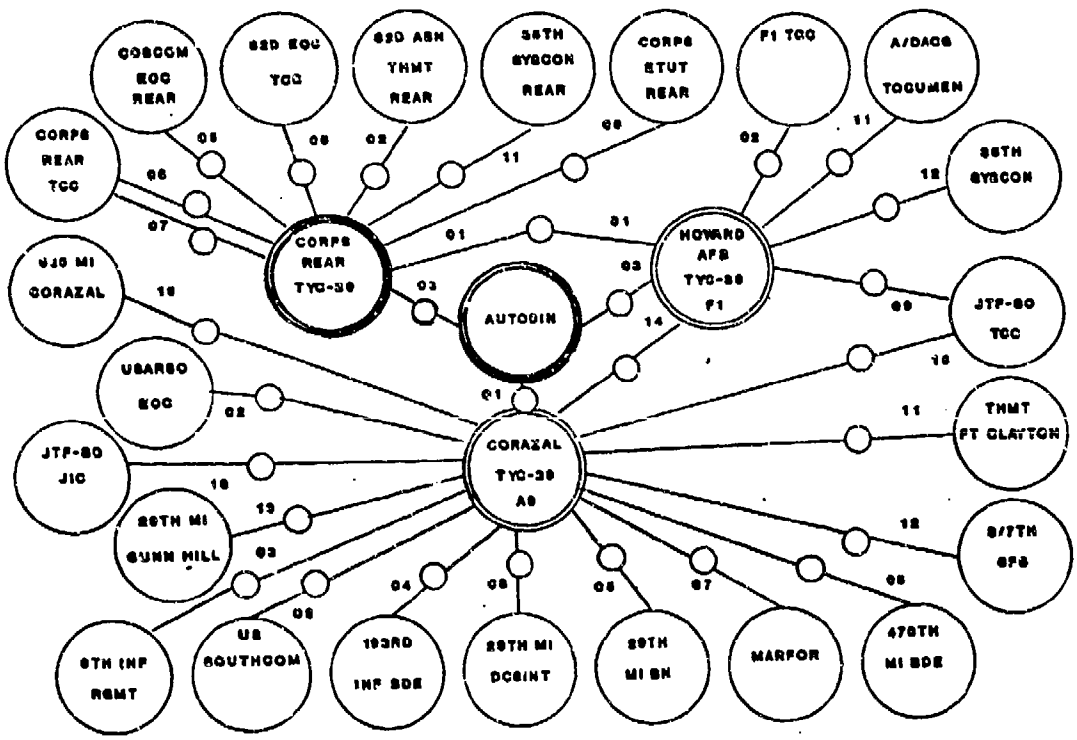


FIGURE 8-2

Message Switching (Teletype) Network



-CHAPTER IX-

CONCLUSION

Military communications are considered successful if they support the conduct of the war, to include command and control of subordinate units, lateral coordination between units, intelligence gathering and dissemination, and logistical support; all the while maintaining sufficient communications security (COMSEC) that the enemy does not gain and exploit valuable intelligence from those communications. By this standard, communications in support of JTF-South on Operation Just Cause were a success. The two most vital communications means were single-channel radio and fixed-station strategic communications. These functioned almost without flaw, while the problems that the tactical network had during the first week of the operation did not have a disastrous effect because the strategic network, for which it was a back-up, functioned without interruption.

Of pivotal importance to this success was the fact that SOUTHCOM and the other American military establishments had two years in which to plan this operation. The early inclusion of communications staff personnel in planning, both at SOUTHCOM J-6 and at XVIII Airborne Corps, was of

enormous importance to the form that communications support for Just Cause ultimately took. By including the communications staffs in the evolution of the plans that eventually grew into OPLAN 90-2, the final plan was well integrated with the available communications means. An outstanding example of this point is the case of the Joint Communications Electronics Operating Instructions (JCEOI), arguably the singl most important piece of work in the entire staff preparation for Just Cause. Major Witt coordinated daily with the operational planners at XVIII Airborne Corps to ensure that the JCEOI continued to support the evolving concepts, and the absence of problems with radio communications noted in Chapter VI bears witness to the importance of the work. This work would have been impossible had communications planners not been brought into the planning at an early stage.

Communications doctrine for the United States Army is based upon the four broad principles of continuity, security, versatility, and simplicity.[1] In support of these sound principles, certain more or less standard practices have developed. These standard practices were modified to suit the situation in Panama, but they always supported these four principles.

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[1]Headquarters, Department of the Army, Field Manual 24-1, Signal Support in the Airland Battle, (US Government Printing Office, October 1990), p. 2-1.

The guiding principle of simplicity was a significant strength for the communications plan. Where communications support for this operation deviated from common practice, it did so in the direction of greater simplicity. In many cases, the standard practices were devised based upon a sophisticated enemy threat and operations in a world-war type environment. This was very different from the conditions surrounding Just Cause. Additionally, the fielding over a period of years of imperfectly compatible communications systems, such as the KY-68 digital secure telephone for tactical use against the STU-III analog secure telephone for fixed-station use, made some degree of non-standard improvisation unavoidable.

The Signal Corps and the Department of Defense have committed heavily to fielding tactical digital telephones, both secure and non-secure. As explained in Chapter VII, the digital KY-68 telephones were largely abandoned by JTF-South, both because of their perceived unreliability during the early days of the operation and because the STU-III could be used for secure communications with a vastly greater number of people. The STU-III, and not the KY-68, was and still is the standard secure telephone throughout the United States Government. The fact that the KY-68 could not be used to talk in the secure mode to parties in the United States who had STU-IIIs alone would have made them insufficiently versatile and therefore unsuitable for this

operation, even if they had functioned much better than they actually did. If there is a single generic technical lesson to be drawn from Just Cause, it is that strategic and tactical communications networks should be integrated to the maximum possible extent.

In most cases, a tremendous strategic communications infrastructure such as existed in Panama will not be available; however, Joint Task Forces will almost always have satellite and high frequency access to the Defense Communications System (DCS). Secure telephone instruments at the tactical level should be compatible with secure telephones throughout the DCS. It would be valuable, given the STU-III's proven ability to function over a variety of tactical circuits (including circuits too poor in quality for the digital KY-68), to obtain a "ruggedized" tactical version of the STU-III. Such a telephone could be used down to the lowest levels, as demonstrated in Panama, and would insure interoperability "from the fox-hole to the White House." This course of action would require a modification in the TTC-39 family of switchboards in the direction of a greater analog capability. Digital communications would still be used for trunk groups between switches, since digital trunk groups offer greater capacity with reference to band-width, but the telephones themselves would be tactical STU-III analog instruments. For purposes of interoperability with the DCS and commercial networks, the

Army's new mobile subscriber equipment (MSE) should also be made more compatible with the DCS, with the analog STU-III as the basis for all presently digital MSE telephones, to include the "mobile subscriber radiotelephone terminal" (MSRT). Failure to improve tactical interoperability with the DCS will result in continued ad hoc solutions during every contingency mission.

Chapter II provided some background for the concept of the protected distribution system (PDS) in which a non-encrypted telephone network was treated as if it was secure by isolating it from non-protected networks, such as commercial telephone and AUTOVON. Because of the superior security of the STU-III, the PDS had no application in Just Cause. Chapters VII and VIII made very plain the fact that communications for this operation depended heavily upon the integration of strategic and tactical telephone networks, quite apart from any question as to whether or not PDS is really effective against a sophisticated electronic warfare threat, even when it is properly implemented. The availability of analog STU-III telephones, which were used at the lowest levels in the tactical network, obviated any need for tactical PDS. The sole purpose of tactical PDS is to provide some security for telephone circuits at levels lower than can be served by secure telephones. With STU-IIIs at the lowest levels, PDS was not needed.

It has been noted throughout this paper that school-trained signal officers often considered the local-battery magneto point-to-point telephone obsolete and wasteful. Chapter VII even gave an example where the S-3 officer of the 154th Signal Battalion stormed out of a meeting in which he was required to install such circuits to all of the task forces because he considered the requirement to be so unreasonable. While he expressed his opinion of magneto telephones in a more forceful way than some other signal officers might have, his opinion was shared by many others. "Common-user" telephony is advocated over "sole-user" telephony (such as the magneto point-to-points) because common user telephones are more efficient in terms of channels. However, because they are more complicated, they are not as fast, as simple, or as reliable. For the future, it remains to be seen whether the Army's new Mobile Subscriber Equipment (MSE) will provide service so reliable as to erase the demand for point-to-points.

JTF-South placed a great premium on speed, simplicity, and reliability. Also, literally every other tactical telephone in the JTF-South headquarters needed external electrical power to function.[2] If power had been lost, the

[2] This was the case because the TTC-39A used remote multiplexer combiners (RMCs) to serve the telephones in Building 95. These RMCs were not issued with dedicated electrical generators, and so they had to "slave" from whatever power was available. In Building 95 this meant commercial power, as was the case with literally all non-battery powered equipment in the headquarters.

only telephones that would have been able to continue to work would have been the point-to-points. The requirement for continuity demanded point-to-point magneto telephones, under the circumstances. Point-to-point telephony is not mutually exclusive of common user telephony; both should have their place in tactical communications.

Peacetime frequency management procedures received low marks from JTF-South J-6, both because of the SOUTHCOM frequency manager himself and because of the procedures. It really was unreasonable for SOUTHCOM to try to protect frequencies belonging to the PDF. Fortunately, this restriction was overcome by the author of the JCEOI, who used the frequencies anyway without permission. Along the same lines, SOUTHCOM J-6's failure to validate satellite channel requests immediately led to serious delays, which resulted in some units arriving in Panama without knowing what satellite channels they could use. This was really unsatisfactory and could have had significant consequences had the war not gone as well as it ultimately did.

Ordinary single channel radio operating procedures, under which call-signs and frequencies are changed daily to make it more difficult for the enemy to gain intelligence from friendly communications, were abandoned in favor of the JTF-South JCEOI in which frequencies never changed and call-signs were replaced by call-words that were easier to

remember. This was done at the express direction of Lieutenant General Stiner, who had grown accustomed to the practice both in Joint Special Operations Command and in the 82d Airborne Division. The theory was that the VINSON secure device would prevent an enemy from understanding anything, and that a Corps would use just about the entire frequency spectrum anyway, so that it would not matter even if the enemy noted the fact that a certain frequency was being used every day. In the same fashion, maintaining the same COMSEC key (segment 7) in use for much longer than the seven days prescribed by the National Security Agency was a serious deviation from doctrine. Given the fact that many of the units did not ordinarily train together and that task organization changed often, the decision to keep the entire theater on the same key for such a long time is defensible from the point of view of simplicity. The fact that the same key was used for all nets in theater at every level was itself a great deviation from standard practice and doctrine. Once again, events proved that no harm came from doing so in this case. This should not be taken as a blanket approval for such a practice; against a more sophisticated enemy the results could be harmful. The determination should be made, as it was in this case, by the commander on the ground.

Communications support for JTF-South under OPLAN 90-2 was designed to meet certain threats. Many of these threats

either did not materialize or, if they did, did not have the serious effects that the planners had feared. Other threats, while discounted by the planners as unlikely, may well have actually become a problem to JTF-South under different circumstances. In studying the communications support for JTF-South, it is important to recognize these contingencies, especially if the object of the study is to gain knowledge for future operations.

Under OPLAN 90-2, the primary purpose of the tactical communications network was to take the place of the strategic fixed-station network in the expected event that the PDF took action to damage it. In fact, significant degradation of strategic communications did not occur. The enemy did not interfere with strategic DCS communications in any meaningful way, and these communications were always available to the JTF-South commander and his staff. Given the fact that these facilities had been in place for years, and that the enemy must have had some understanding of both their importance and their vulnerability, it is incomprehensible that no effective action was ever taken to deny their use to the Americans. As this is written (January 1991), General Noriega is still in an American prison, pending trial for drug trafficking offenses, and so is not available to answer operational questions about the war. It is hoped that the General will explain why nothing was ever done against the strategic network, after the

disposition of his case. It is possible that classified intelligence reports from the interrogation of PDF officers may also shed some light on this fortuitous failure to strike at the strategic communications system, once these reports are declassified. Until that time, or until former PDF officers write their memoirs, the question is unanswered.

While OPLAN 90-2 planned the tactical network as a redundant means to the strategic network, it is obvious from the problems shown in Chapter VII (most notably the fact that tactical technical control did not exist at Fort Clayton until Christmas) that the tactical network was in no condition to assume this burden during the critical few days at the start of Just Cause. Fortunately, it was never called upon to do so, as this situation would have had serious consequences if the strategic network had suffered as the planners expected it to.

At an even more basic level, the JTF-South command post in Building 95 on Fort Clayton relied exclusively upon the industrial electric power grid that served Fort Clayton to the electricity that powered all communications means except for the magneto telephone point-to-points. This was potentially the gravest weakness in the local service arrangement at the JTF-South headquarters. The digital telephones that were served by the Fort Clayton TTC-39A

switchboard were hooked to a remote multiplexer combiner (RMC) that used electricity from a standard wall socket. All of the radios in the radio room drew power from a DC power supply that, once again, depended upon the industrial power grid. Even the fixed-station telephones needed commercial power, both to operate the key-system and to power the STU-IIIs. There was a back-up 250 kilowatt electrical generator permanently installed to serve Building 95, but it was very much an unknown quantity. The post engineer told this author that if he needed to gain access to the generator, he would probably have to destroy the lock on the door, and there were no electrical diagrams to be found explaining just what electrical circuits were covered by this generator. Neither did anyone have any idea of the generator's state of maintenance, or when it had last been tested. It may have been fortunate for JTF-South that it was not needed. The Assault CP vehicle (FM Special) that Captain Duffy had brought from the 50th Signal Battalion would have allowed single channel radio communications to continue after a short interruption, but the impediment to the staff's other normal functions would have significantly increased the friction and confusion that ordinarily prevail in a CP during a battle. As in the case of the strategic communications network, it is somewhat surprising that the enemy did not make more of an effort to disrupt the electrical power than the four days of somewhat half-hearted

mortar attacks which were the only measures that this author was aware of in that direction.

It should be noted that the enemy did successfully disrupt electrical power at the Southern Command's headquarters at Quarry Heights for several hours on 20 December, but the operational effect of this was small because the battle was being controlled from JTF-South at Fort Clayton, and General Thurman (the SOUTHCOM commander) spent much of his time at the JTF-South CP in any event.[3]

The Southern Command Alternate Command Center at Howard AFB, the reason for the pre-positioning of the heavy tactical communications equipment that would prove so important to the final utility of the tactical network, was never used. In spite of the interruption of electrical power on the first day of the operation, the Quarry Heights CP was never threatened enough to justify the dislocation that would have resulted from moving the entire establishment to Howard AFB. And, as noted above, General Thurman himself spent most of the most critical periods at the JTF-South CP at Fort Clayton, communicating over single-

[3]U.S. Army South Information Management, Information Management Bulletin No. 7, Fort Clayton, Panama, April 1990, p. 19; for evaluation of General Thurman's use of communications for command and control at JTF-South HQs see 35th Signal Brigade, "Internal After Action Report for Operation Just Cause," p. 24.

channel satellite radio, local-battery magneto telephone point-to-points, and STU-III telephones.[4]

The fact that the Joint Communications Electronics Operating Instructions (JCEOI) contained but a single time period and relied heavily upon call-words instead of the callsigns and multiple time periods that signal doctrine called for drew criticism at the time and has drawn it since. It was not objected to by the JTF-South staff, and in fact it had been endorsed by the JTF commander, because it was thought that the simplicity of such an arrangement more than made up for the risk of enemy signals intelligence exploitation. Even when Master Sergeant Bethea, the SOUTHCOM frequency manager, lost his notebook (complete with net diagrams and all frequencies) which was later returned by a Panamanian civilian, enemy disorganization by that time was deemed sufficient that the JCEOI was not even changed.[5] As it worked out, General Stiner was proved right, and no known enemy benefit derived from the arrangement of the JCEOI, while its simplicity made it a great success.

Along similar lines, the communications security (COMSEC) keying material in the Inter-theater COMSEC Package (ICP), which was designed to be used only on joint radio

[4] 35th Signal Brigade, "Internal AAR."
[5] Staff Sergeant Michael Murray, letter to the author dated 28 August 1990.

nets, was actually used on all nets at all levels. Once again, this ran the risk of compromising the COMSEC for every net in the entire theater at once, but the fact that literally everyone was on the same keying material made communications much more reliable under these circumstances where task organization changed often (at times, even daily). As noted in Chapter VI, even when the ICP was compromised on 24 December when a truck belonging to the military police was ambushed and the radio and VINSON COMSEC device stolen, the same ICP segment seven was kept in use until 2 January, with no known ill effect. It is true that if the enemy's organization had been better, JTF-South might not have escaped the possibly serious consequences of these decisions so easily; but it is also true that if the enemy's organization at that time had been better, the JTF-South commander would have evaluated the threat differently.

It is obvious from this account that individual personalities and abilities played a large role in the way that communications support for Just Cause played itself out. History is made by men, and any historical account will largely concern itself with what was done or not done by actual characters. While this is important for an understanding of history, it is less so for those who seek to derive "lessons learned" or guidance for future operations. Events cannot be hermetically sealed off from the participants who brought about the events. The reader

is cautioned to carefully judge the role of personalities in the events of this operation, as these personalities, like many other circumstances surrounding Just Cause, will probably never be duplicated in any future operation.

The outcome of a war is determined by both sides. Militarily, one side must win while the other side must lose. Those actions that the PDF omitted to take, either from a failure to plan, from command and control problems, or from other as yet unknown influences, prevented their exploitation of those weaknesses and potential weaknesses that this study has pointed out. The JTF-South Staff soberly examined and judged these weaknesses as best they could, and a certain degree of risk was accepted. In this case, the risk proved to be justified in the successful execution of Operation Just Cause.

-APPENDIX A-
MAJOR ITEMS OF COMMUNICATIONS EQUIPMENT USED ON OPERATION JUST CAUSE[1]

TAB A - Single Channel Tactical Satellite Radio AN/LST-5B
TAB B - Single Channel Tactical Satellite Radio AN/PSC-3
TAB C - Single Channel Tactical Satellite Radio AN/URC-101
TAB D - Single Channel Tactical High Frequency Voice Radio AN/PRC-104 and AN/GRC-193
TAB E - Single Channel Tactical Very High Frequency, Frequency Modulated Voice Radio AN/PRC-77
TAB F - FM Special
TAB G - High Frequency Radio Teletype AN/VSC-2
TAB H - Satellite Communications Terminal AN/TSC-85A
TAB I - Satellite Communications Terminal AN/TSC-93A
TAB J - Radio Terminal Set AN/TRC-145
TAB K - Radio Repeater Set AN/TRC-113
TAB L - Radio Repeater Set AN/TRC-138
TAB M - Radio Terminal Set AN/TRC-151
TAB N - Radio Repeater Set AN/TRC-152
TAB O - Telephone Terminal Set AN/TCC-73
TAB P - Automatic Telephone Central Office AN/TTC-39A
TAB Q - Automatic Telephone Central Office AN/TTC-41A
TAB R - Switchboard SB-3614A
TAB S - Automatic Message Switch AN/TYC-39
TAB T - Communications Patching Panel SB-675
TAB U - Communications Patching Panel TSC-76
TAB V - Communications Technical Control Facility AN/TSQ-84
TAB W - Satellite Communications Terminal AN/TSC-100
TAB X - Communications Technical Control Facility AN/TSQ-111
TAB Y - Air Force Tropo Scatter Support Radio (TSSR)
TAB Z - Secure Telephone Unit STU-III
TAB AA - Digital Secure Voice Terminal (DSVT) KY-68
TAB AB - Telephone Set TA-312

[1]Unless specified otherwise, all equipment pictures are taken from Headquarters, Department of the Army, Training Circular 24-24 (for line drawings) or Field Manual 24-25 (for photographs), (Washington, D.C., 1988).

TAB A - Single Channel Tactical Satellite Radio AN/LST-5B[2]

The Motorola LST-5B was a single channel satellite radio capable of either voice or data communications. It could be secured for voice operation using the KY-57 VINSON secure device. Smaller and lighter than either the PRC-3 or the Motorola URC-101, it was very popular with the radio operators who had to carry it in a rucksack.

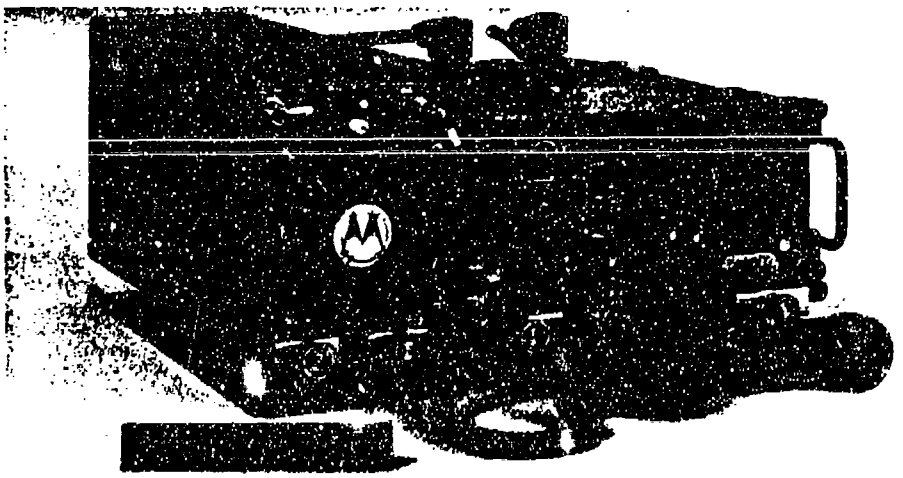
[2]Picture from Jane's Military Communications, 1988, (London: Jane's Publishing Company, 1988).

TAB B - Single Channel Tactical Satellite Radio AN/PSC-3

The Cincinnati Electronics PSC-3 was a single channel satellite radio capable of either voice or data communications. It was the standard Army satellite radio. It was the least popular with the radio operators because it broke more easily than the Motorola radios. It could be secured for voice operation using the KY-57 VINSON secure device.

TAB C - Single Channel Tactical Satellite Radio AN/URC-101[3]

The Motorola URC-101 was a single channel satellite radio capable of either voice or data communications. Although the oldest, it was widely regarded as the most reliable of all the satellite radios, partially because it was the easiest of the lot on which to make field expedient repairs, partially because it was just a tough radio. URC-101s tended to be used for the most important missions, "where nothing could go wrong."

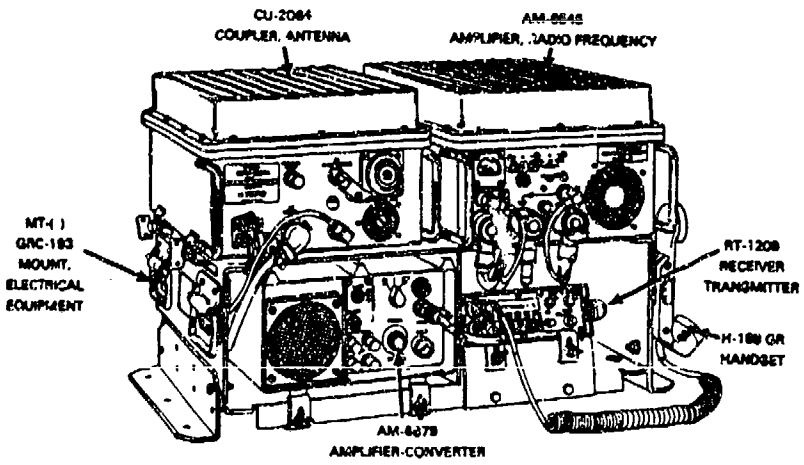


AN/URC-101 transceiver with power amplifier

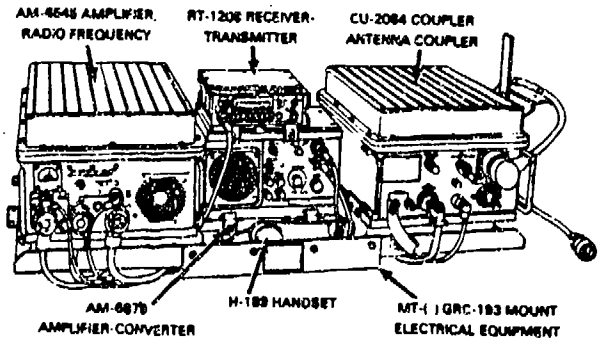
[3]Ibid, p. 123.

TAB D - Single Channel Tactical High Frequency Voice Radio AN/PRC-104 and AN/GRC-193

The Hughs Corporation PRC-104 high frequency or "short wave" radio was the rucksack version of the more powerful GRC-193. These radios were capable of world-wide communications without relying upon satellites. They achieved their great range by refracting their radio signals off the ionosphere, much as a billiard ball is banked off a billiard table. It took a great deal more in the way of engineering and operator skill to successfully use these radios, even though they were much easier than the PRC-74s that they replaced. Secure voice communication was only possible using the KY-65 PARKHILL secure device, which weighed more than the PRC-104 did. The weight of the entire assemblage, including the KY-65, made it a serious burden for the radio operator.



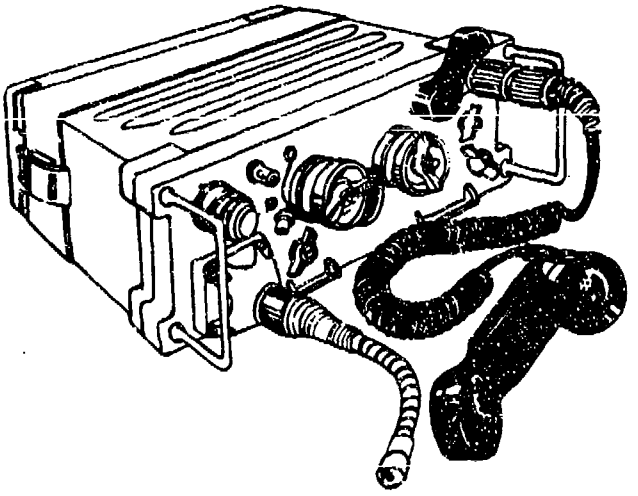
AN/GRC-193A



AN/GRC-193B

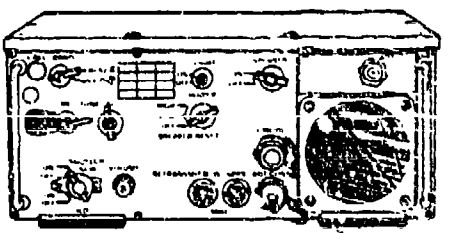
TAB E - Single Channel Tactical Very High Frequency, Frequency Modulated Voice Radio AN/PRC-77

The PRC-77 was probably the best known military radio. It was designed to be carried in a rucksack, and it was secured with the KY-57 VINSON. Dating back to the Vietnamese War, the PRC-77 had legendary reliability. Its maximum range for planning, however, was only about 15 kilometers because of its low power output and relatively inefficient "whip" antenna.



TAB F - FM Special

The FM Special is described in detail in Chapter 3. It had three VRC-46 FM radios and one GRC-193 HF radio, and was capable of parachute delivery as a "heavy drop." In Just Cause, the 50th Signal Battalion had the FM Specials. The 82d Signal Battalion had a variation of the FM Special that they called the "Shark." One of the Sharks was lost in a swamp in the course of a "heavy drop" on 20 December.



AN/VRC-46

TAB G - High Frequency Radio Teletype AN/VSC-2

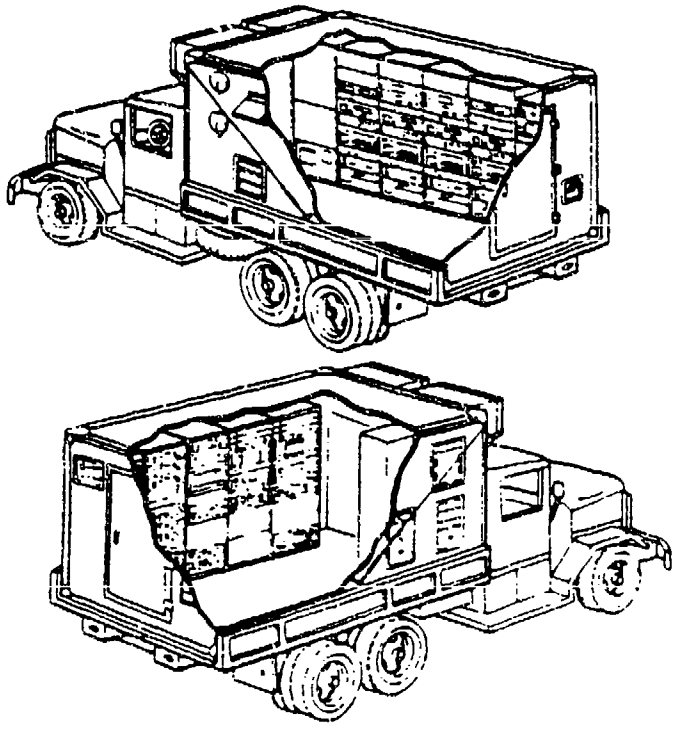
The VSC-2 radio teletype was originally mounted in a Jeep, but had been moved into the HMMWV trucks by the time of Just Cause. Only the 82d Airborne Division had VSC-2s at this time. They were short wave radios, and so used ionospheric propagation in the same fashion as the PRC-104 listed above. However, the GRC-106 radios that were part of the VSC-2s had as much as 400 watts power output, as compared to the 25 watts of the PRC-104 and the 200-250 watts of the GRC-193. At the time of Just Cause, the teletypes in the VSC-2s were secured by the KG-84 secure device, and they were set to operate at 300 words per minute.

Picture Not Available

TAB H - Satellite Communications Terminal AN/TSC-85A

The TSC-85A was a satellite terminal set capable of terminating up to four twelve-channel communications links. It was compatible with the TSC-93A, and it was mounted in a 2 1/2 ton M35 truck, with another truck to carry the antenna. It was issued with an eight-foot parabolic antenna, but it could also be used with larger antennas.

AN/TSC-85A
Satellite Communications Terminal

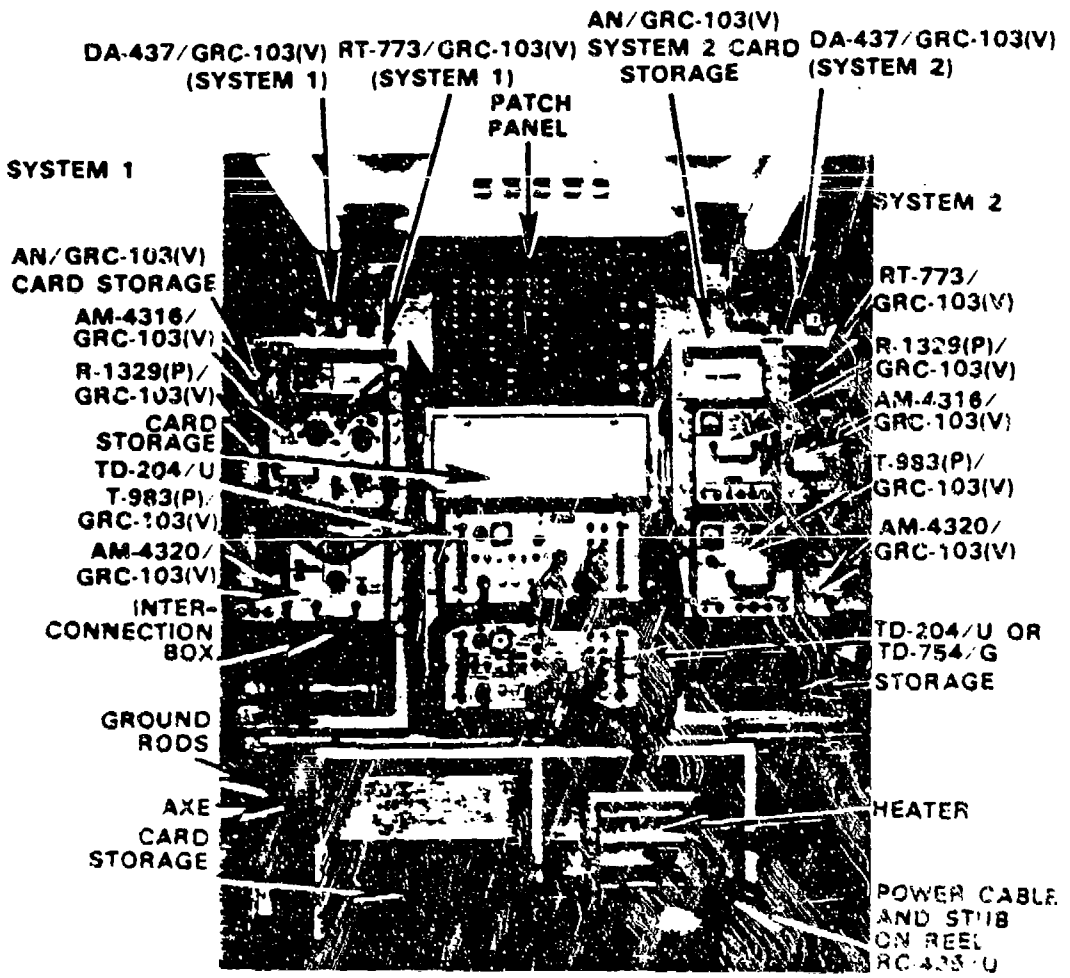


TAB I - Satellite Communications Terminal AN/TSC-93A

The TSC-93A was a small version of the TSC-85A. Although the weight of the van was such that a 2 1/2 ton truck was theoretically required, 5/4 ton trucks could also be made to carry the van, although they were overweight. The TSC-93A also needed a second truck to carry the antenna. It could only terminate one twelve-channel system.

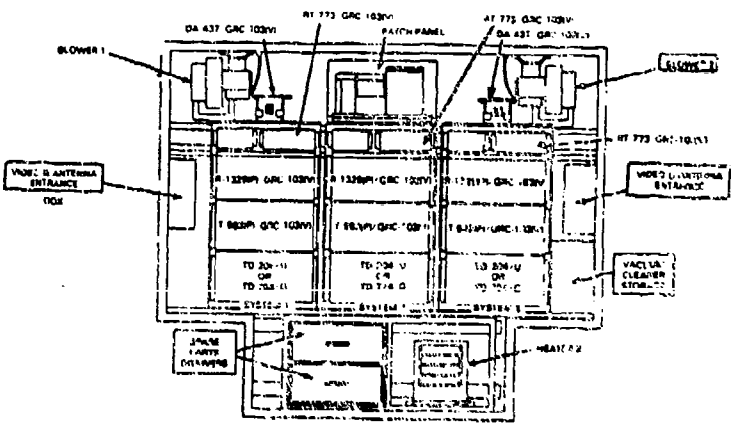
TAB J - Radio Terminal Set AN/TRC-145

The TRC-145 was a twelve-channel analog multichannel radio. It could handle up to 18 digital channels when carrying circuits between two TTC-39A switchboards. Its handy size (mounted in a 5/4 ton truck) and good ability to communicate through trees (to a point) made it the multichannel radio of choice for communications down to division level and lower. In Just Cause, the 154th Signal Battalion and the 50th Signal Battalion had TRC-145s.



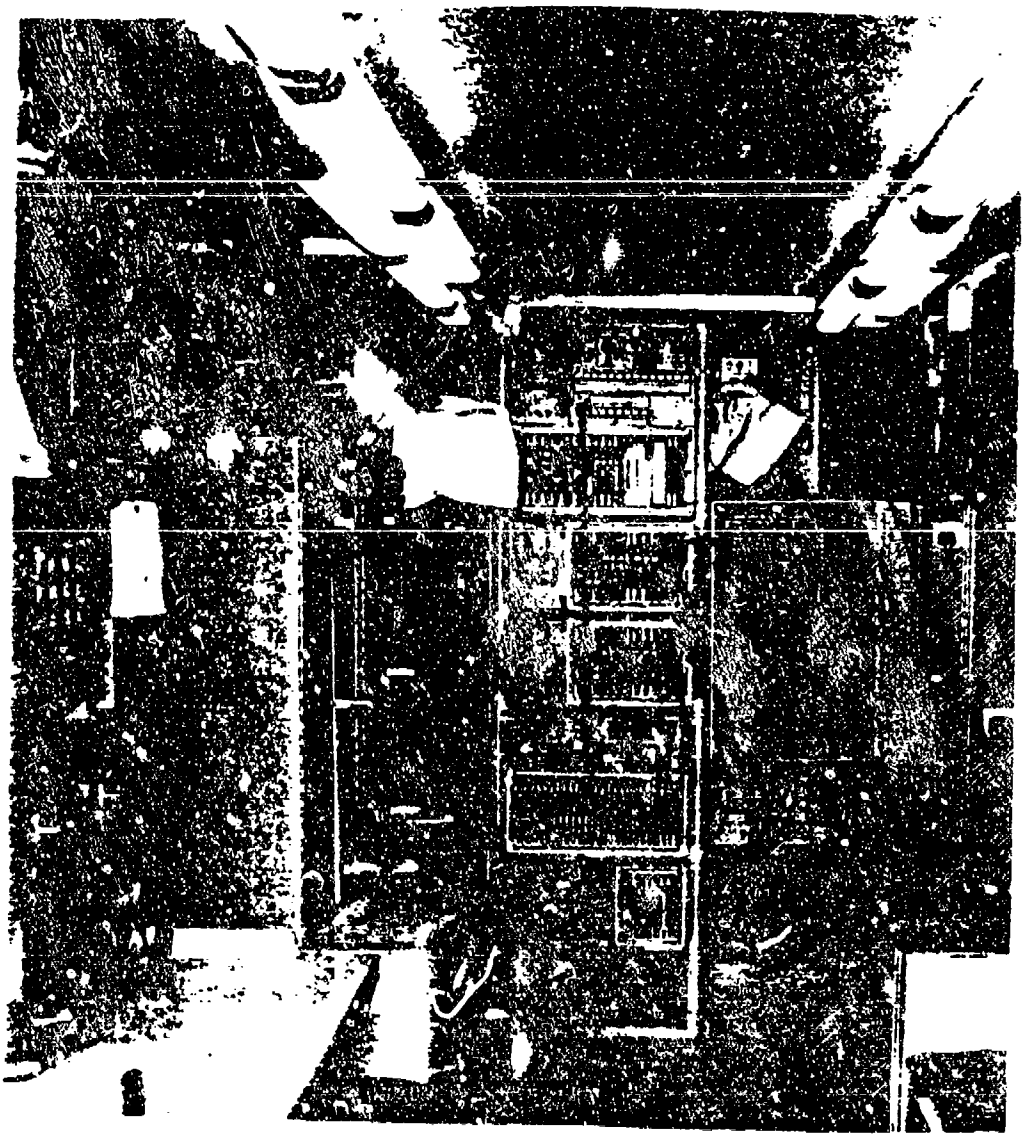
TAB K - Radio Repeater Set AN/TRC-113

The TRC-113 was the relay for the TRC-145. It was used to extend the range of a system beyond line-of-sight.



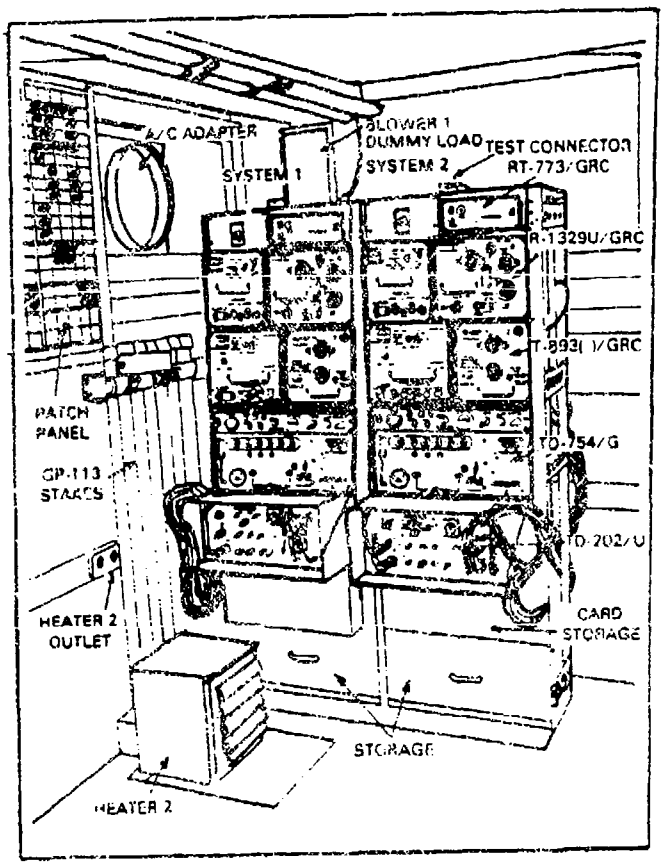
TAB L - Radio Repeater Set AN/TRC-138

This large and heavy multichannel radio operated in the microwave region of the radio frequency spectrum. As such, it was *seriously* a line-of-sight radio that could tolerate not even a single branch in its path. Generally, if one could not see the distant antenna with the naked eye or with binoculars, the radio shot was not going to work. Unlike the TRC-145 and the TRC-151, the TRC-138 had no internal multiplex equipment, so external multichannel vans such as the TCC-73 had to accompany the TRC-138. The TRC-138's virtues were its capacity (up to 96 channels in some versions) and its reliability (once the link was finally established). It was not a quick radio to install, when compared with other tactical multichannel radios. The area signal battalions had TRC-138s.



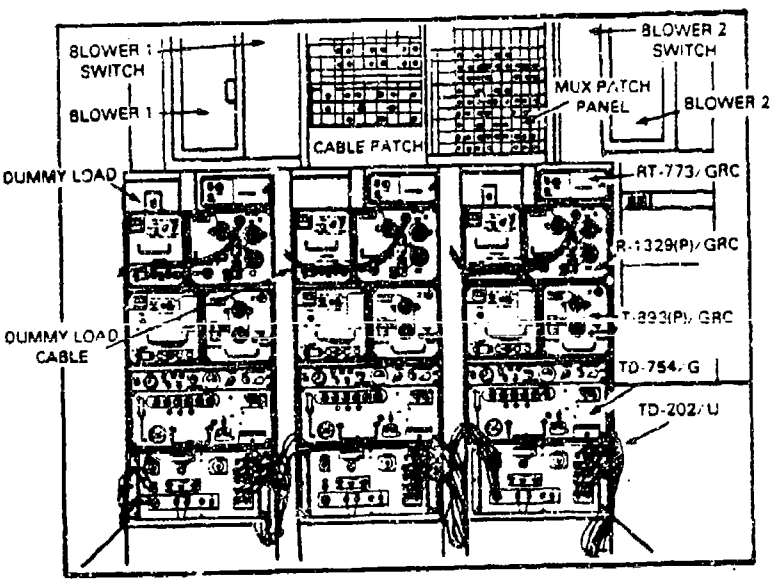
TAB M - Radio Terminal Set AN/TRC-151

The TRC-151 was a larger version of the TRC-145, with less efficient radio propagation characteristics than the TRC-145. It was mounted in a 2 1/2 ton truck and could handle up to 24 analog channels or 36 digital channels. It was slower to install than the TRC-145, but faster than the TRC-138. The area signal battalions had TRC-151s.



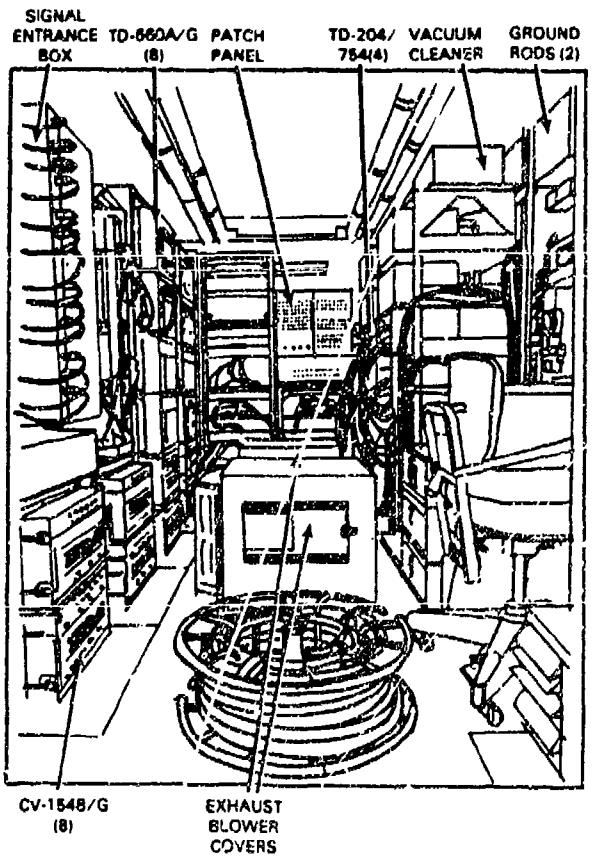
TAB N - Radio Repeater Set AN/TRC-152

The TRC-152 was the relay for the TRC-151, in the same way that the TRC-113 was the relay for the TRC-145.



TAB O - Telephone Terminal Set AN/TCC-73

This was a multichannel van that could be used with a variety of radios. It was usually only used with those multichannel radios which did not have their own multiplex equipment as the TRC-145s and TRC-151s did.In Operation Just Cause it was used with the TRC-138. The TCC-73 was mounted in a 2 1/2 ton truck, and could handle up to 96 analog channels. The area battalions had TCC-73s.



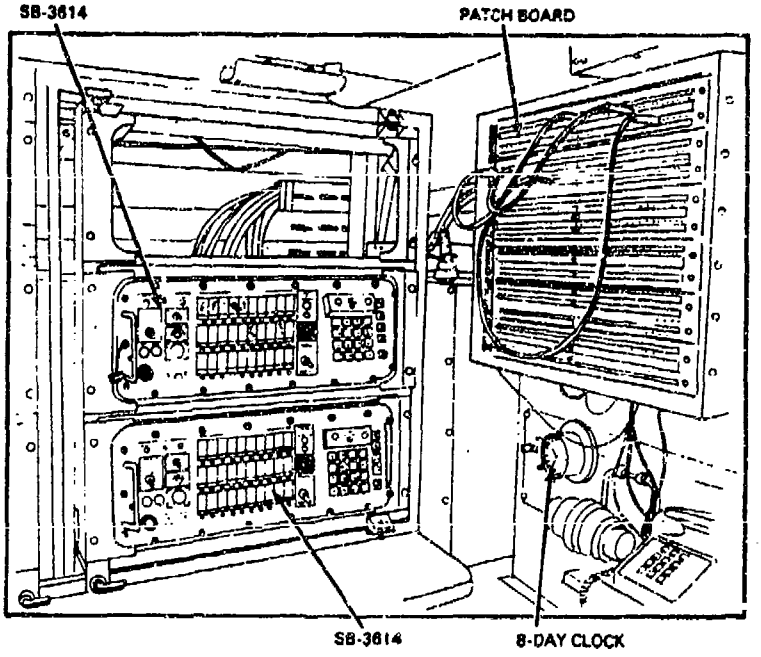
TAB P - Automatic Telephone Central Office AN/TTC-39A

The GTE produced TTC-39A was the standard corps level switchboard at the time of Just Cause. Every battalion in the 35th Signal Brigade had TTC-39As. It was either mounted in three five-ton trucks, or in a mix of five-ton and $2^1/_2$ ton trucks. Theoretically it could handle 96 analog telephone circuits (including analog trunks), but in practice it was best not to exceed about 72 analog lines because in periods of high usage the switch was excessively burdened by any more than that, and trouble usually resulted. In addition to the analog lines, the TTC-39A could handle up to 144 digital circuits of all types. This last number could be increased to up to 648 digital circuits if remote-multiplexer-combiners were used, for a grand total of 744 analog and digital circuits in theory. The full capabilities of this immensely complex switchboard are well beyond the scope of this study. The Army and the Air Force both used the TTC-39A.

Picture Not Available

TAB Q - Automatic Telephone Central Office AN/TTC-41A

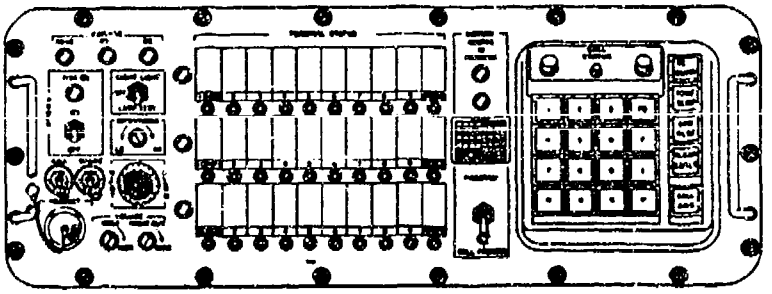
The TTC-41A central office had anything from one to four SB-3614A switchboards in it, each capable of up to 30 analog lines. Only analog telephones could be served by the TTC-41A. They were used at division and lower level. The Marines used them as well as the Army. The TTC-41A that came from Fort Bragg belonged to the 50th Signal Battalion. The 154th Signal Battalion also had TTC-41s.



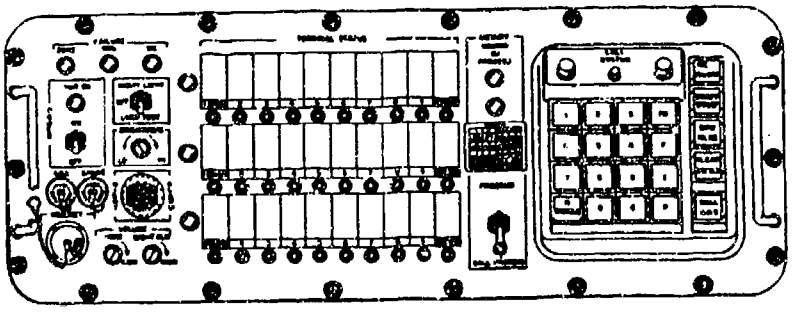
TAB R - Switchboard SB-3614A

This was the switchboard used in the TTC-41A. Sometimes the SB-3614A was used as a "stand-alone" switchboard, without a van to house it. One SB-3614 could handle up to thirty lines. Two men could easily carry the basic switchboard. Marines and paratroops tended to use stand-alone SB-3614As because they were small and fairly simple.

SB-3614/TT
Telephone Switchboard



SB-3614A(V)/TT
Telephone Switchboard



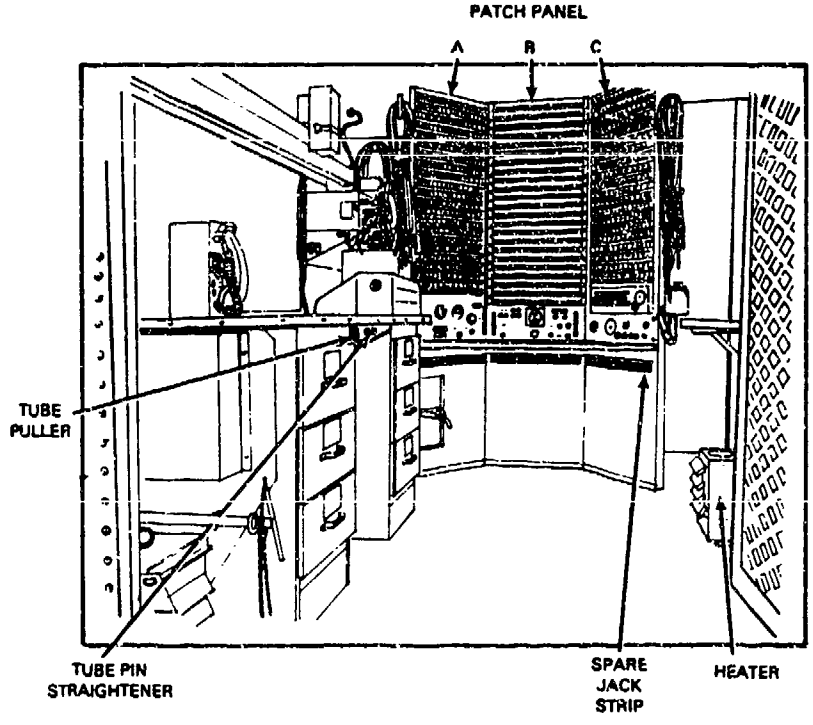
TAB S - Automatic Message Switch AN/TYC-39

The TYC-39 was used to switch teletype traffic. This GTE manufactured switch used a similar computer to the TTC-39A for its internal logic. A very complex device, with a properly trained crew it was reliable. The 154th Signal Battalion's TYC-39 operated without any outage for the duration of the operation and beyond; this was easily the most impressive and important achievement of the 154th. The 426th Signal Battalion had a TYC-39 at Howard AFB, and the 25th Signal Battalion had one at Fort Bragg. The TYC-39 was perfectly compatible with AUTODIN.

Picture Not Available

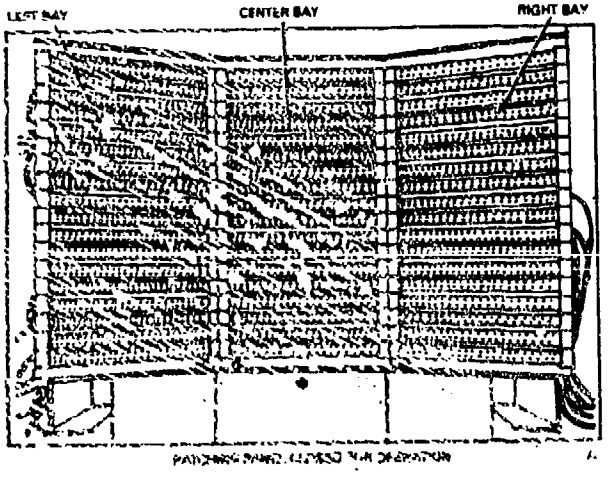
TAB T - Communications Patching Panel SB-675

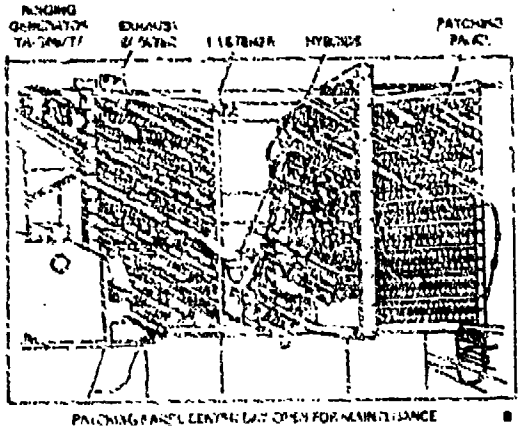
Mounted in a van on the back of a 2 1/2 ton truck, this was an analog technical control facility used by the area battalions. They were at least thirty years old at the time of Just Cause, but with proper maintenance they were reliable. The 426th used one to control circuits at Howard AFB.



TAB U - Communications Patching Panel TSC-76

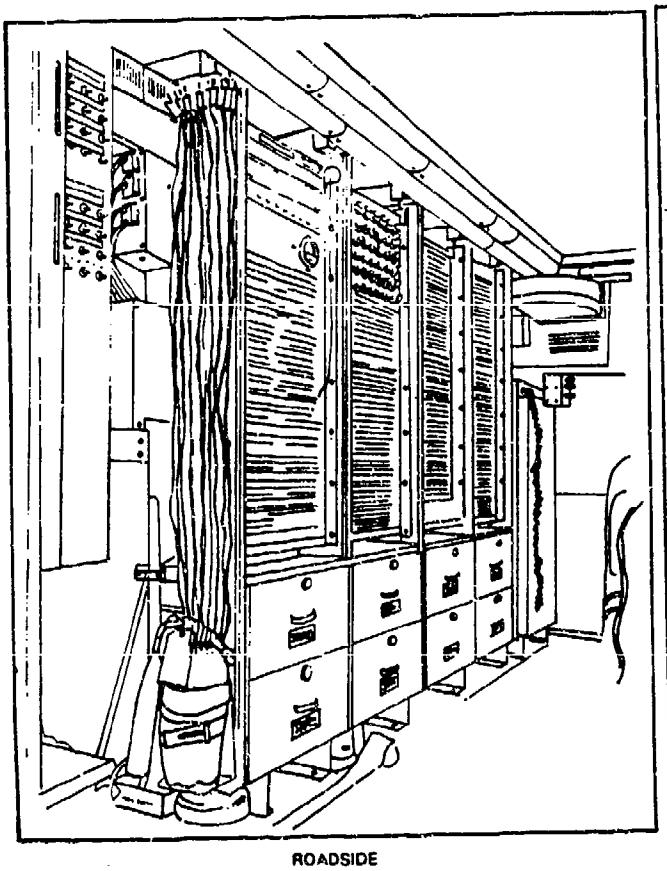
The TSC-76 was a small analog technical control facility mounted in a van on a 5/4 ton truck. It was designed for use at division level. Simple and well proven, they were perfectly reliable and adequate when maintained correctly and manned by properly trained operators.



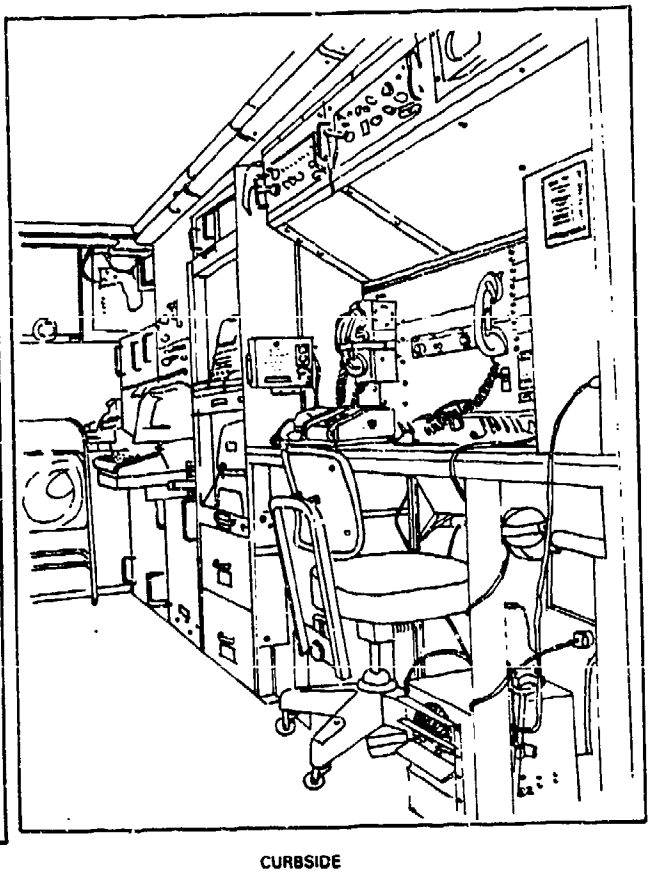


TAB V - Communications Technical Control Facility AN/TSQ-84

This was the most advanced of the analog technical control facilities. Mounted in a 2 1/2 truck, they resembled the SB-675 at first glance, but were actually of a greater capacity and they had superior circuit test equipment.



ROADSIDE



CURBSIDE

TAB W - Satellite Communications Terminal AN/TSC-100[4]

This was the Air Force standard multichannel satellite van. It was manufactured by RCA, and it was designed to carry digital groups, having no analog multiplex equipment such as the TSC-85A and TSC-93A had. The 31st Combat Communications Squadron provided the TSC-100 at Howard AFB.

[4]Ibid, p. 349.

TAB X - Communications Technical Control Facility AN/TSQ-111

The TSQ-111 was a digital technical control facility, designed to support the TTC-39 type switchboards and digital radio equipment. The Air Force used the TSQ-111, and the 31st CCS provided technical control with one at Howard AFB until replaced by the 426th Signal Battalion's SB-675.

ROADSIDE CURBSIDE

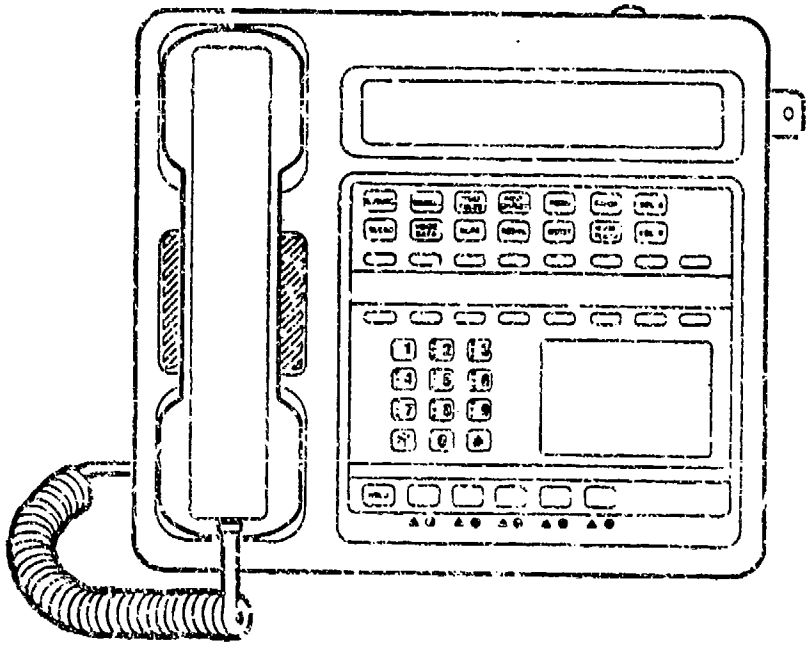
TAB Y - Air Force Tropo Scatter Support Radio (TSSR)

This was a small, unattended microwave radio that was designed to carry digital communications, and was used by the Air Force. In spite of the name, the TSSR was not a tropospheric scatter radio. It was designed to carry a signal for short distances, such as from a tropo radio site to a communications site, without having to lay cable. All of the TSSRs that the 31st CCS used around Fort Clayton and Howard AFB relied upon commercial or industrial electricity, having no dedicated power generators (which would have required a man to supervise each site). Captain Diane English, commander of the 31st CCS element in Panama, considered the fact that the TSSRs were bright blue in colour to be a great disadvantage, and often expressed her concern that the enemy would see the blue dish-shaped antennas and shoot at them. Fortunately, this never happened.

Picture Not Available

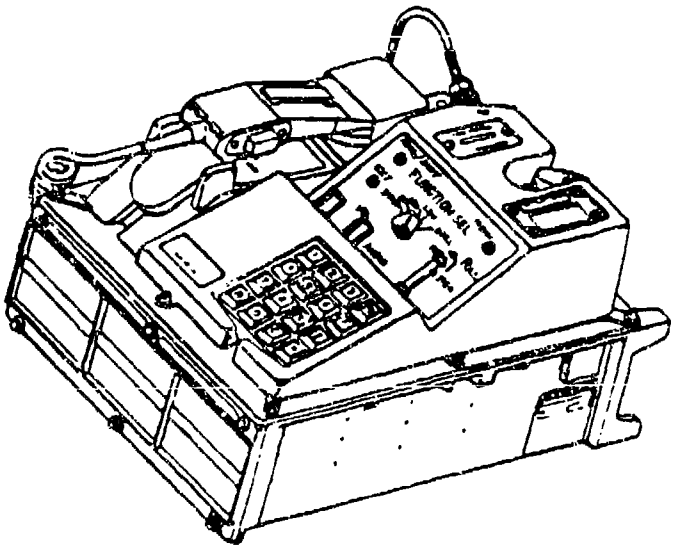
TAB Z - Secure Telephone Unit STU-III

This secure analog telephone was designed for use indoors, but its versatility as to type and quality of transmission lines over which it would work was so superior to the tactical secure telephone (the KY-68) that the STU-III was actually used as a field telephone. Its main drawbacks in this regard were the fact that it was rather fragile as compared to field telephones, and that it required external electrical power. These drawbacks, however, did not outweigh its advantages over the digital KY-68.



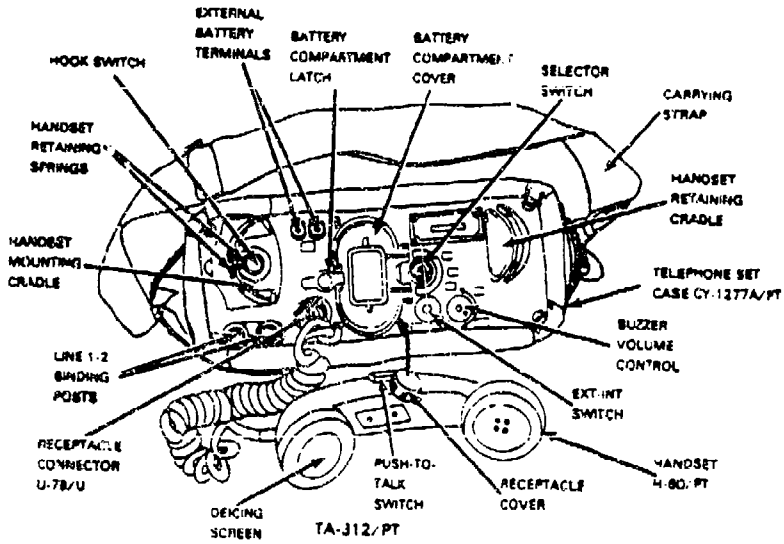
TAB AA - Digital Secure Voice Terminal (DSVT) KY-68

The most unpopular telephone in JTF-South, the KY-68 was practically abandoned in favor of the STU-III. The KY-68 was a large and heavy telephone, with a number of complicated knobs and levers upon its face. Its main defect was that it required a digital signal path between itself and the distant KY-68 in order to communicate in the secure mode. This requirement led to a great variety of problems, both to the tactical signal engineers who needed to put together a network with mostly analog equipment, and to the subscribers who had to face the fact that the KY-68 would only be secure with another KY-68, and even then only when a digital path was available between stations.



TAB AB - Telephone Set TA-312

The TA-312 was a local-battery magneto telephone set that could be used in either a point-to-point fashion or with a manual switchboard. The most reliable telephone in the Army, the TA-312 was of legendary ruggedness. Its two flashlight-batteries were adequate to provide the TA-312 with the almost unbelievable range of 520 miles over #12 AWG open copper wire without repeaters.[5] It represented the apex of the development of magneto telephones.



[5] Departments of the Army and the Air Force, TM 11-5805-201-12, Telephone Set TA-312/PT, (Washington, D.C.: U.S. Government Printing Office, June 1967), p. 1-3.

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