

CONTEMPORARY C3 I

SPEECH BY LT GEN GORMAN TO CANADIAN
FORCES STAFF COLLEGE, 17 FEB 1981

I am going to talk to you this morning about three broad subjects: the first goes to the root of the problem of command and control with which we will have to collectively grapple in the decade of the 1980's. It is a problem that will be with you gentlemen a lot longer than General Kitchen and I, and one you should be acutely conscious of as you do your work in the remainder of your course. I then want to focus on the problem of a contemporary division. I hesitate to use the word modern because it's a much over used and misunderstood concept. I prefer the word contemporary to cover the fact that I'm talking about an actual division today, specifically the 8th Division in Germany. Some of you may have actually seen some of the things I'll be talking about in operation in Germany. I want to underscore that when I get to the final section I'm actually drawing on experience; none of this is hypothetical, although I'll join you in some forecasting of where these considerations might take us in terms of technology or technique, my third subject.

FLAG O	MOVEABLE SBN	SBN LDR AVG RANK	COMM W/SBN	INFO RE SBN	TACTICAL FLEXIBILITY	DOCTRINE (STYLE)
NAVY	10 ¹ - 10 ²	HIGHEST	BEST	PRECISE	GREATEST	CENTRALIZE
AIR FORCE	10 ² - 10 ³	↓	↓	↓	↓	
MARINE	10 ³ - 10 ⁴	↓	↓	↓	↓	DECENTRALIZE
ARMY	10 ⁴ - 10 ⁵	LOWEST	WORST	VAGUE	LEAST	

Let me start, since you are about to get into considerations of joint operations, with a joint slide. Here is an attempt to show you why command and control problems vary from Service to Service. What I want to do is compare four serving flag officers of two or three star rank. I have listed in one column the number of movable subordinate units under the command of one of these chaps. For example, consider an Admiral afloat, say in the Med, with something like 10 to 100 moveable entities under his command, referring to ships, submarines, flights of aircraft, etc. He can be compared with an Air Force three star who commands a numbered Air Force with something between 100 and 1,000 moveable entities representing individual sorties or flights under his command. Compare him, in turn, to a Marine general commanding a Marine amphibious force that has made

an assault operation and is operating ashore; he'll have something like 1,000 to 10,000 moveable entities under his command, referring to squads, platoons, artillery survey parties, mortar platoons, batteries, supply detachments, etc. Finally, I've listed an Army corps commander, for example General Becton's VII Corps in Germany. General Becton has under his command something like 10,000 to 100,000 moveable entities, if you include the logistic infrastructure that a corps operates in a contemporary theater of operation.

If you want to make some comparisons among these four flag officers, besides the numbers of moveable entities that they have under their command, you should note that the naval commander deals with subordinates that, on the average, are of a much higher rank than the others. In fact, as the chart suggests, the average rank will decline, and decline rather precipitously from the Naval force down to the Army force, although the Marine and the Army force are quite close together. Understand, of course, that the commander of the Marine amphibious force has an air arm integral to that force, and he has a lot of pilots plus officers in communications systems associated with flying so he tends to, in some respect, look like the air commander. When you compare communications systems you find, of course, that naval communications systems will generically be the best and Army communications systems generically the worst. This is a product of the differing environments within which they work. The Navy is in homogenous sub-surface-surface-air environments. The Marines and Army are operating amid the clutter of the earth's surface, man made and otherwise. Their communications systems have to be perforce portable, which puts certain inherent difficulties into play regarding command and control.

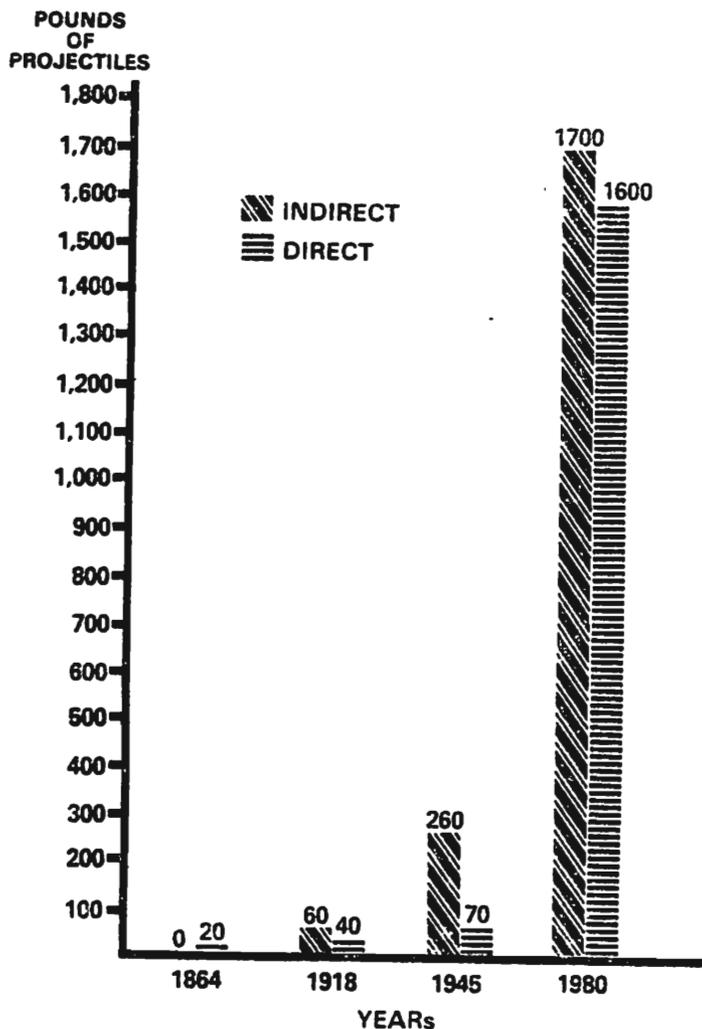
More importantly, for the purposes of our discussions today, note that when one compares the information that is available concerning subordinates, the Naval commander has, by and large, fairly precise information as to where his folks are, what they are doing, what vector they are proceeding on and at what speed. He can combine with this knowledge instantaneous secure voice communication direct to a senior officer commanding those entities and alter their mission, instantaneously. He can change, divert, call back, or warn and do it with a great deal of precision. Compare that with what's going on down here on the ground where three out of four soldiers don't know where they are, don't know what's happening on their right or their left, couldn't read a map if they had one, and, even if they had communications, couldn't tell anybody what it was that they are supposed to be doing. This general might know within three or four hours, about major changes in the situation, but I've seen instances in Germany where corps commanders have been as much as twelve hours behind fastbreaking events in command post exercises. Consequently, the Naval commander has the greatest tactical flexibility.

This leads to certain styles of management, call them (if you will) doctrinal differences. The simple fact of the matter is that the Navy commander and the Air commander will probably resist doing a great deal of advance planning. Their fundamental interest is simply to get a capability into a given geographic area. What they do with the force after they get there (they've learned through long experience) is best addressed at the time. "Sufficient unto the day is the evil thereof." They tend, doctrinally and as a matter of style or habit, to centralize. They want to bring all the information into one place, allowing a senior commander to make the fundamental decisions, and thus use his tactical flexibility to best advantage. Now you can overstate all of this, as some of you may think that I have already, but if you consider it from one end of the scale to the other I think you'll begin to see it's not a bad comparison. Certainly when a Captain of an aircraft carrier, with 5,000 personnel under his command, wants to turn left and get all 5,000 of them to follow, he has only to convince the quartermaster, whereas to get 5,000 Marines or soldiers to turn left, it takes hours of troop leading and all sorts of forceful persuasion.

This leads to the fact that the style of the lower two commanders is one of decentralization. That is to say, a deliberate attempt to pass the mission to subordinates and expect them, within the confines of their own undertakings, to figure out how to solve the tactical problems. Commanders at my end of the scale would prefer the centralization and the tactical flexibility that flows from the command and control systems available to them. We would prefer that they have the same advantages as the Navy and Air Force, but the fact of the matter is that today, and for the foreseeable future, they probably will not have command and control systems comparable to those available to Naval and Air Force commanders. The result is that we have to cope; that is the purpose of my discussion today.

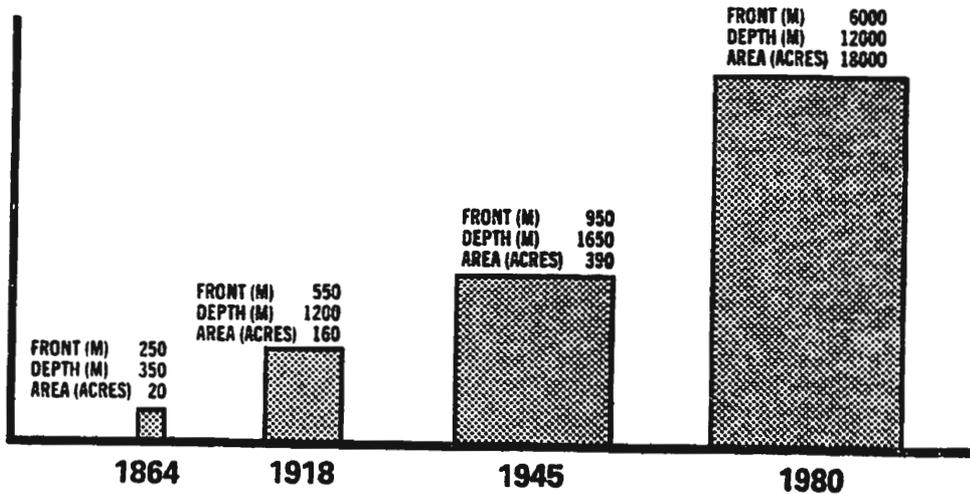
I'm going to focus this morning on a division and the problems confronting division commanders. Before I do so I want to impose on you some general propositions about why these problems are so acute.

FIREPOWER PER SOLDIER IN BATTLE DIVISION, ONE HOUR FIRE



Take fire power per soldier committed in battle as measured within a division firing all its weapons for thirty minutes. Then, compare this fire power from the time of our war between the states through WWI, WWII, and contemporary conflicts, you get these comparisons. You will note that between WWII and 1980 there has been an enormous buildup, a times-10 improvement in direct fire weaponry of the division and a very substantial plus up times-7 or-8 in indirect fire, which leads to wider dispersion.

BATTALION, DEFENSE ACRES CONTROLLED

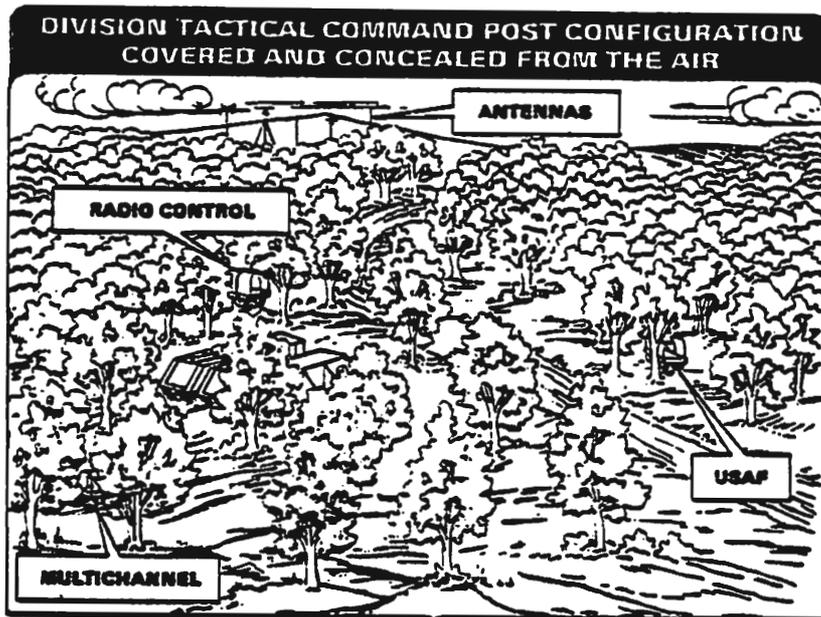


In 1864 a battalion was expected to control something like 200 acres. Today, in Germany, we expect a battalion to control something like 80,000 acres. The dispersion factors are indeed so large that it's difficult to maintain control, leading to a multiplication of sensors or reliance on artificial intelligence as a mechanism for solving the problem of dispersion. If you'll look at the 8th Infantry Division which participated in the campaigns of the Muse Argon in 1918, 60% of the division, at that time, fought on foot with four regiments of infantry and a lot of riflemen forward. In WWII the 8th Infantry Division, that fought across Europe, had only 30% of its personnel fighting on foot; in 1980, the division in Germany has only 15% of its personnel fighting on foot. The 8th Infantry Division, incidently, just so you understand what we're talking about, has 400 tanks, a very heavily armored mechanized force. I have also included mechanized infantry formations; although they fight on foot, by this definition, they have armored personnel carriers moving around the battle.

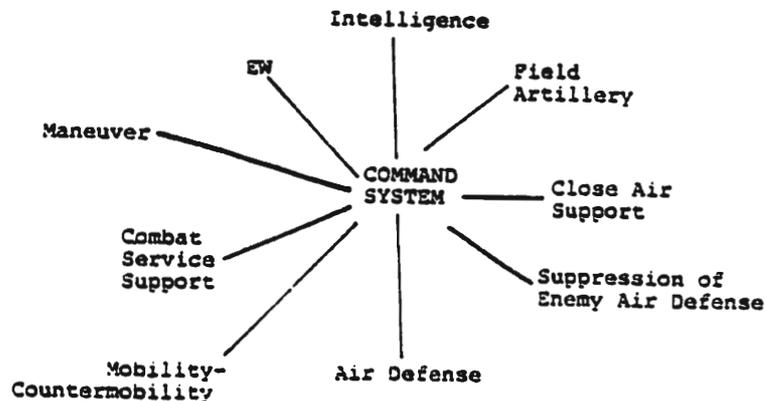
U.S. INFANTRY DIVISION

	<u>FIGHT A FOOT</u>	<u>DENSITY</u>	<u>FIREPOWER</u>
(MECH)	%	MEN/KM FEBA	LBS/MAN/ HOUR
1918	60	6000	100
1945	30	2200	330
1980	15	550	3300

If you will look at the amount of the forward edge of the battle area that they are expected to control, and divide that into the number of folks that are in this business, you come up with a manpower density per kilometer of FEBA. Again, a very substantial percentage of the force. Here is the firepower relationship from which you can see this enormous plus up times-10 from WWII to 1980. The fact of the matter is that most of this has occurred in the last 2 decades, a good part of it in the last 10 years. If you were to take the 8th Division today, the division responsible for the defense of the Fulda Gap, and compare it with the division that had been assigned the defense of the Fulda Gap before, the 4th Division (the 8th relieved the 4th in 1957), you would discover that whereas the 4th Division disposed only 7 anti-tank weapons per kilometer of front, the 8th Division has 27 direct-fire anti-armor weapons of major caliber per kilometer of front. That's a lot of direct fire power that has largely appeared in the last 10 years with the fielding of Tow, Dragon, the attack helicopter, etc. These numbers, gentlemen, tell you that we commanders are facing some powerful land battle trends which have had the effect of multiplying the demands upon the information systems of the divisions. I'm now going to talk about those systems in a theoretical fashion, just to help you understand what it is that I'm driving at.



In the same field manual is this depiction of a tactical command post. Like most armies we still associate a lot of romantic notions with the idea of commanding forward. We encourage, in our doctrine, our division commanders to operate forward from these facilities so they can maintain periodic face to face contact with subordinate commanders. Again, although not as badly, this, too, understates the number of vehicles that would be in such an installation. What your seeing, incidently, are APCs with canvas tent extenders on the back and antennas up on the hills. The idea is to get forward so that you can visit or monitor FM radio communications in the battle area.

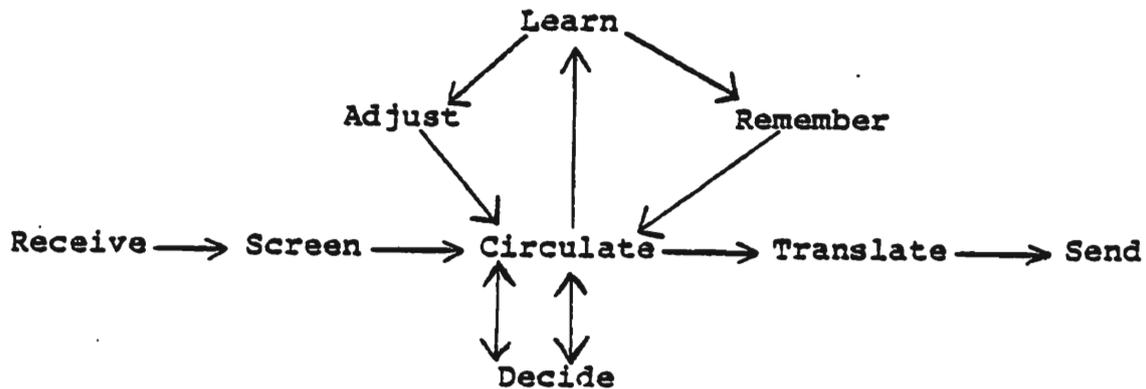


The difficulty with the idea of commanding forward is precisely that it tends to focus the division commander on the maneuver aspects of his command. To be sure, maneuver is still a crucial part of land warfare, but it is increasingly becoming a relatively smaller part of the problem as the battle, fire power and information systems become more complicated.

There is, besides maneuver, combat service support referring generically to logistics; the mobility/counter-mobility problem (This refers to the sort of work that combat engineers perform); air defense, and suppression of enemy air defense, both of which are very complicated and increasingly difficult undertakings involving a close interrelationship between the Air Force and the land force, close air support; and field artillery. You understand that the field artillery delivers mines and collects intelligence; so they have to interact with the intelligence system on the one hand, and the mobility/counter-mobility folks on the other.

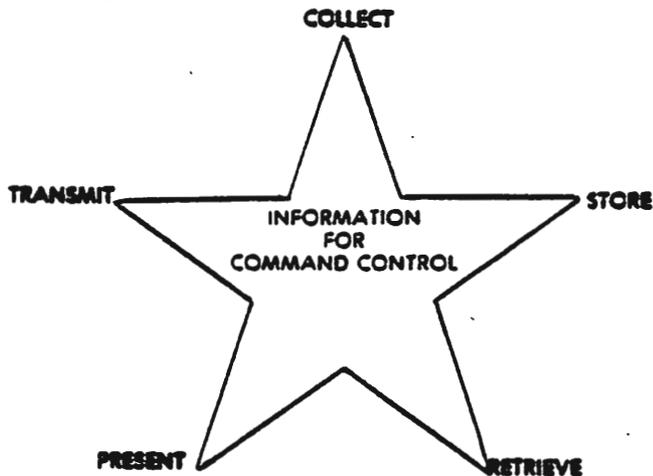
What interlinks all of that is what I call the command system; generically all the things that I showed in the two previous slides of the main command post and the division tactical command post. It is a system which functions for, around and largely because of the division commander. It certainly functions poorly when he doesn't take a direct and personal interest in making it operate, and in fact, by American doctrine, we permit our division commanders to dictate how this system will be put together. Our field manual 71-100, which was published in 1978 and is the armored and mechanized division operations manual, indicates that "commanders generally organize command posts to suit themselves." The staff assists the commander by providing information, data, counsel, preparing plans and orders as he may direct and by exercising such supervision over the execution of his orders as he may prescribe. Here you see the American propensity for personalism written into our doctrine. In fact, if you travel from American division to American division, you will rarely, if ever, see two that look alike. They will all reflect very much the division commander's personal way of doing business. You can criticise that, as some have, or say "that's great," as others have, but the fact of the matter is that you see all kinds of practices out there, some good and some bad. I'm going to be talking about my own system, and I make no representations for it other than it works.

What is it that that command system actually does for the division? This is where, as division commanders, you've got to start into the problem, what is it that that central core is supposed to be doing for the division itself.



One way of looking at it is to say that there are certain functions which deal with the flow of information through the system. There are certain sensing functions that have to be performed just to find out what is happening out there. That means whether you're dealing with an electronic sensor or calling up Joe Glotz and saying: "Corporal, what do you see to your front;" either way you're sensing. You've got to communicate information. You've got to pass word on what it is that is being sensed among the sub-systems. You've got to make decisions based on that information. You have to perform what is referred to by some in theory as a "stabilizing function". That is to say when you detect something is going awry, you've got to intervene and get it working right. If the fellow in the combat service support system didn't get breakfast delivered in time for the unit that jumped off and made its attack, then you've got to worry about getting a ration forward to them on the objective, etc,etc. You've got to cope with the unexpected, you've got to deal with what is not planned for, particularly the results of enemy action, and you've got to go find out whether the guys that you directed to do something, in fact did it, and what happened as a result of their actions.

Described hereon is a way of explaining what transpires within a division command system. There are elegant theories written around this sort of thing; let me suggest simply that we took a team of researchers from the Army Research Institute during our division command post exercises and had them measure, using their own systems, how well these functions were performed by command groups. We did this, in effect, off line, the commanders and staff were not privy to how those ratings were being undertaken. When we compared the results of those measurements with traditional measures of effectiveness, ground gained, mission accomplished, exchange ratios, ammunition expended, and other traditional measures of effectiveness, we found that the units that were good in these functions were good in the other functions and, vice versa, the units that had difficulty in making these functions happen had difficulty in accomplishing their mission or doing so efficiently on the battlefield.



I personally prefer the much simpler construct shown here. The five functions, the collecting of information, the storing of information, the retrieving of information, the presentation of information, and the transmittal of information are all focused around the general commanding the division. I gather most of you recently participated in a command post exercise and are, therefore, probably well aware that the usual way of doing business is to pick up a telephone and talk to somebody at the other end of the line; it could be in the next tent or 50 miles distant. You store the information by writing down what he tells you, or you make entries in grease pencil on a map. You retrieve by consulting the journal or looking at your map or looking at the message that the operations sergeant hands the operations officer; or you retrieve by calling the ops sergeant in and asking, "what happened this morning to Bravo Company?" We do a lot of storing of information in between the ears of NCOs and officers, and a lot of retrieving through the mechanisms of briefings and oral presentations.

Of all the evil habits that were etched on my consciousness by the Vietnam years, scheduled divisional briefings were perhaps the most debilitating. Late in the war, in one of the light divisions of the 1st Corps Tactical Zone, the daily briefing had become high theater. We had a huge bunkered amphitheater staged under spot lights. On that stage, once per day, each event in the division zone was chronicled by a Greek chorus of briefers, crisp of speech, pointer technique and movement. They had a special corps of young officers who had no other duties save to brief the division commander. Each day these chaps would go in and retrieve the information that had been collected and stored for them by the operations officers. Then they'd rehearse their presentation and, when the overture to the grand event began, you know, the scrapping of chairs and the buzz of conversation as the divisional commanders arrived from the field, those officers would divest themselves

of ordinary working day jungle fatigues and get up on the chair, step down into fresh starched trousers, put on a heavily starched shirt and then, barely moving the pointer arm, walk on with their telescoping pointers. Now, don't misunderstand me, those briefings served a very useful function. They served a very useful function because they presented to key leaders and key staff officers of the division the salient information on the division situation and they permitted all present to share the commander's reaction to same; that in itself was not infrequently a drama worth taking in.

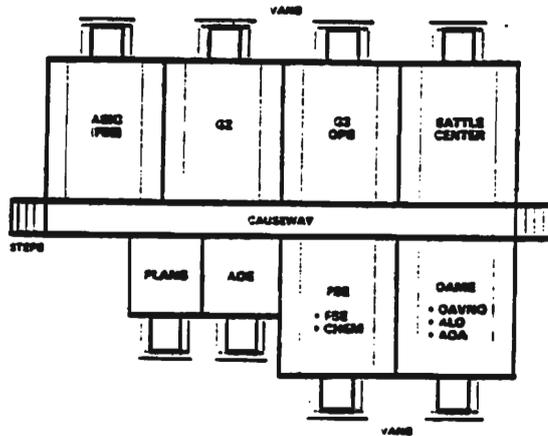
However, no matter how useful such an information processing system might have been for that war, which was fought afoot in the jungle, I hold that it is dysfunctional for combat between mobile mounted formations, with powerful fire, maneuver and electronic warfare capabilities on both sides. Moreover, simply assembling all key personnel in one place would induce grave vulnerability for the division as a whole. I have to say, parenthetically, if the costs that I have addressed for this practice of briefings were just what I've stated, it would be too expensive. But it goes beyond that. The daily briefing business, whether it's once a day or twice a day, induces bad staffing, because staff officers tend to focus on the briefing and not on the battle. It gets sort of a pavlovian response, i.e., let's find some good news for the Old Man. And I believe that division commanders are misinformed by the neatness, the form, the polish that briefing information in that fashion producers.

To go back to differing styles of command, some commanders will try to operate forward out of their tactical command post as much as possible, others like to get right in the middle of the tactical operations center where they can watch the op sergeants scurrying around and op officers shouting into the phone, listening to FM radios blarring away; it gives them a feeling of excitement, and a sort of "Fingerspitzengefuehlen," a sense of what's going on in the division. But that too, you see, is fallacious. Often times, when calamity is striking a division, the DTOC will fall silent, and there won't be any activity back there to signal what's going on. No, you need a better way of doing it. To that end I devised some approaches which are based upon using gear that I bought on the German economy, in part.

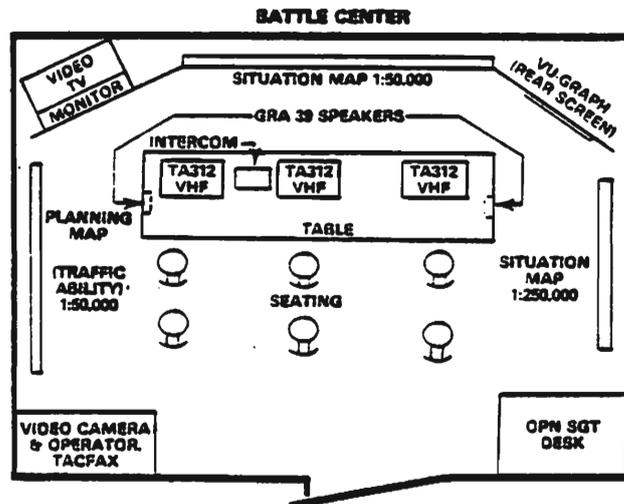
Function	A. FM/VHF/TWX	B. Facsimile	C. Television	D. Allinizer Wave Radio
Collect	•	•		
Store		•	•	•
Retrieve		•	•	•
Present		•	•	
Transmit	•	•		

I've shown the functions of the command system, and indicate the traditional FM radio, the VHF multi-channel and the radio teletype systems used in the command post arrangement largely for collecting and transmitting of information. We also used facsimile devices which operated over the multi-channel VHF system, a directional, secure, transmission system which permits the transmission of charts, overlays or reports (I'll show some examples of those in moment) direct from any commander to the division commander, if one chose to do so, in a minute or two. We found this to be useful for all of the functions shown. All elements of the command post were equipped with a television screen and camera, the purpose of which was not to show the division commander's smiling face to the G-4 clerk, but to show the division commander's map to the G-4's clerk so that he could plot the situation the way I was plotting the situation, or show me the information that he was keeping in his log on the earlier alluded to ration problem. It was a way, in brief, of handling the storage, retrieval and presentation of information via the television. Finally, we purchased a little radio about the size of a camera, with a parabolic reflector on the front which looks very like a camera lens. Battery operated, typically put on a tripod, it's a line-of-sight radio with a range of up to 5 kilometers. It will handle a very broad band of communications information, so you can transmit over it all 96 VHF channels, transmit television signals, black and white or color, and handle any of the cryptologic devices that are available. Consequently, these became important for the storage and retrieval of information in ways I'll show you in a moment.

TACTICAL OPERATIONS CENTER



Let's start with a depiction of the tactical operations center in step one of building a better command and control system within a contemporary division. Shown here are a number of expando vans, which our divisions in Europe are liberally equipped, parked adjacent with doors and a causeway in between so you can pass from one to another. You will note the all-source intelligence center, fire-support element with a little cell for the purpose of targeting. The rest of the fire support element and the chemical folks are located next door to the Air Force. There is also the division aviation officer, the division air management element, the assistant division engineer, the mobility-counter mobility man, the plans van where your working on tomorrow's work, the G-3 operations center, the G-2 operations center, and, finally, something that I refer to as a battle center. I'll explain what I have in mind on the next chart.

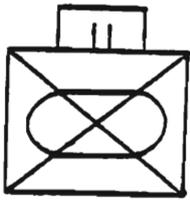


My basic approach was that I wanted a place where I could operate like the Captain on the bridge of a ship. I wanted it to be quiet; I wanted to interface with the minimum number of subordinates at any one time; I wanted to

be able to have it private when I wanted a private conference and public when I wanted to go public. I wanted, moreover, to be able to access information available at any element of the command post at any time of the night or day, and I wanted to be able to do it right then. So we arranged a lashup like this, a table with some chairs in front and several maps on the walls. One, an engineer traffic-ability map, if you will, was of the V Corps Tactical Zone on a scale of 1 to 50,000. The other was a large scale map that would extend well into East Germany and across the Rhein on a 1 to 250,000 scale that was used for keeping track of the macro aspects of the situation. Directly to the front was a 1 to 50,000 scale situation map flanked by a video and a view graph screen. Imbedded in the table were telephone receivers and three secure telephones. There was a small panel for controlling the degree to which you went public or stayed private within the command post. There were also loudspeakers with switches so that anytime you wished to bring up a telephone conversation you were having, the people within the battle center could hear the other side of the conversation, or I could send it throughout the command post via intercom. In the back was a video camera and the tactical facsimile device that I referred to earlier; the camera looking at the situation map. An operations sergeant, who ran all of this, had a desk where he kept track of incoming and outgoing messages.

As shown on the previous slide, all this was initially located adjacent to other elements of the division tactical operations center because it was important to get the division staff used to interfacing with the division commander, plus we wanted to keep it together at the outset just so we could get our procedures right. We quickly discovered that the following was true: first, staff officers in the division almost universally claimed they knew more about what was going on because they could see and hear, in real time, what was happening at the hub of the operation; secondly, because so many of the transactions were handled directly between the division commander, the ADC that was running the operation, the division chief of staff and brigade commanders, we cut message center traffic 90% -- this was the major finding of the whole business. Moreover, the communications that emanate from the battle center center are all encrypted, all line of sight, very difficult to jam and are therefore considerably more robust than radio teletype or HF transmissions that are typically used by a message center. Looking at our map we discovered that traditional symbology was inadequate and here I, again, stress the importance of improving informational aspects of the division command and control system.

1-13



Standard
Symbol



Decision
Graphic

At the left is the traditional US way of showing you the 1st of the 13th mechanized infantry organized as a battalion task force. You know a lot immediately about them, but you don't really know enough to make tactical decisions. At the right is a better way of showing the 1st of the 13th. We identify them as a battalion task force and we communicate to you that it has an infantry company and two companies of tanks organized under the headquarters. There is also a circle-symbol which communicates that the outfit, although shot up a bit, is still capable of performing its mission. Moreover, this symbology tells you that, in terms of posture, it is in a defensive position oriented as shown.

Tank regiment advancing



091035

Depleted tank regiment advancing



091017

Motorized rifle regiment advancing



091040

Infantry task force
defending. Two mech
inf teams, one armor
team. Task force fully
capable of mission.



Armor task force
defending. Two tank
teams, one cav troop,
one mech inf team. TF
depleted but capable
of mission.



Here's another informational depiction that shows two defending task forces. The 1st of the 13th is in good shape; it has two mechanized infantry teams and a tank company team under its control; it is in excellent condition. The 1st of the 70th has two tank companies, a cavalry troop,

and a mechanized infantry team. It has taken some battering, but it is still capable of performing its mission. When a unit was on the move we depicted it with arrows. On the bottom is a motorized rifle regiment, on the top a tank regiment, and in the center, a tank regiment that's been shot down. These are just stick-on symbols that the ops sergeants could draw and, with tape, attach to the map.

The point is that when the division commander looked at the map he could get a sensing of what was going on and he could grasp the macro aspects of the battle. He didn't have to know how the roads went through Hofbeber or any other little town, although if he wanted to know that he could walk up to the map and eyeball it; but sitting back at his table he could see the whole division zone. With that kind of information displayed he could quickly grasp what was going on. More importantly, it televised well. All could grasp what was going on, make appropriate decisions, and pass information. Division staff officers that were looking at his map through the eye of the television camera were seeing it exactly as he saw it. Of course, we did other things to enhance the map, such as color contouring, highlighting of terrain, major routes etc. It seemed to work very well, keeping everybody abreast of the situation in real time without a lot of plotting and replotting of maps.

COR. EVAL CODE	DECISION GRAPHIC	COMMANDERS ASSESSMENT OF ABILITY TO PERFORM MISSION
		"NO PROBLEM"
●		"SOME DIFFICULTY"
●●		"MAJOR PROBLEMS"
●●●		"CAN'T"

Those evaluations in the little circles are what we call the commander's evaluation. They could be assessed only by a commander. The ability to perform the mission and the reason for the two sets of symbols, will be evident in a moment; one is used on the map, the other on message forms.

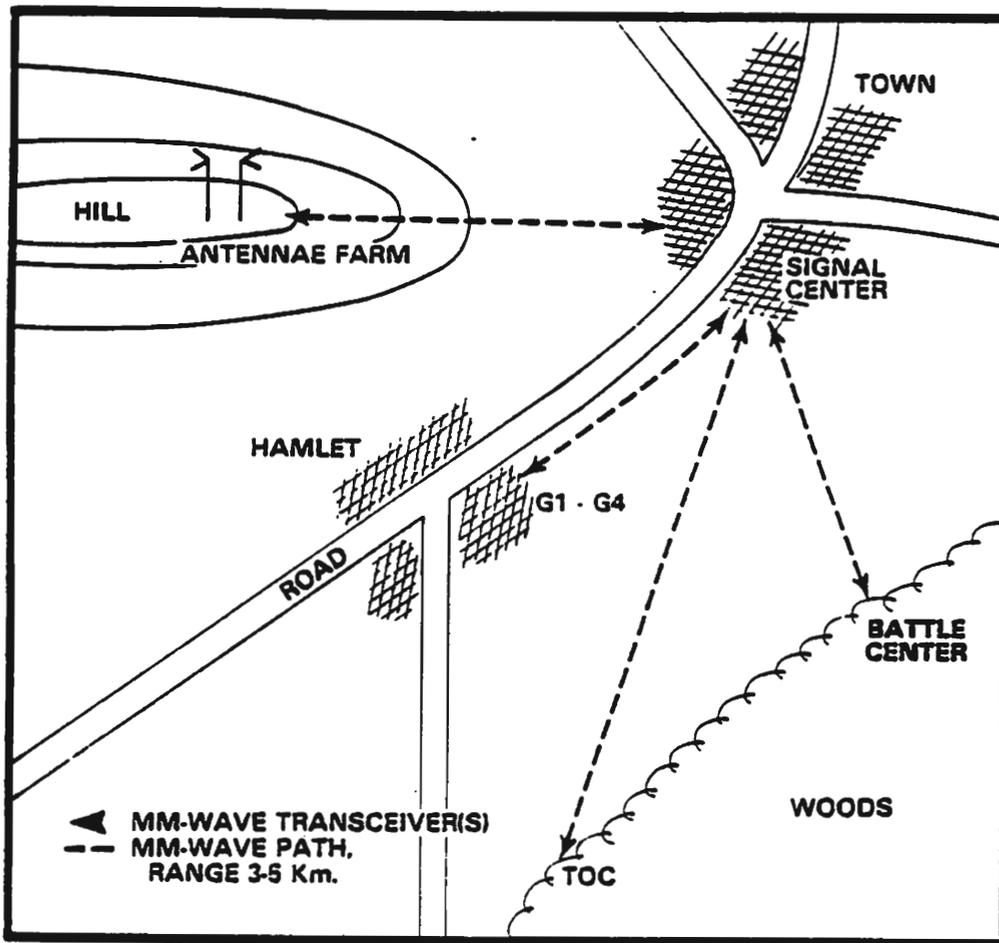
BATTLE SUMMARY

ENEMY SITUATION: <i>Enemy Continues Attack With Regiment + IN The 1st BDE Sector</i>		
FRIENDLY SITUATION: <i>Division Continues To Defend Along Pk Apple TF 2-28 Attached To 1st BDE EFF 0600Z</i>		
UNIT	LOCATION	SITUATION
<i>1st BDE TF 2-28 TF 2-87 TF 4-69</i>	<i>ND 3170 ND 3177 ND 3379</i>	<i>As Above</i>
<i>2nd BDE TF 1-13 TF 1-39 TF 1-87 TF 1-68 TF 2-68</i>	<i>ND 3386 ND 3581 ND 3585 ND 3280 ND 3078</i>	<i>No Contact Since 0500Z. Estimated Battalion Size Unit moving Southeast Along Hwy 203 via ND 274906</i>
<i>3rd BDE TF 2-13 TF 3-68 TF 5-68 TF 3-8</i>	<i>ND 3799 ND 3375 ND 3490 NE 3503</i>	<i>No Contact Since 0200Z. TF 2-13 And TF 5-68 Below 50% Strength</i>
<i>DEPARTY</i>	<i>NVC: SR CHEM: HOLD</i>	
<i>3 CAB</i>	<i>CRITICAL Shortage OF TOW ROUNDS</i>	
<i>TAC AIR</i>	<i>0600-0900 HRS: 15 Sorties 0900-1200 HRS: 20 Sorties</i>	
<i>8TH Engns</i>	<i>PRIORITY TO Repair OF MSR</i>	

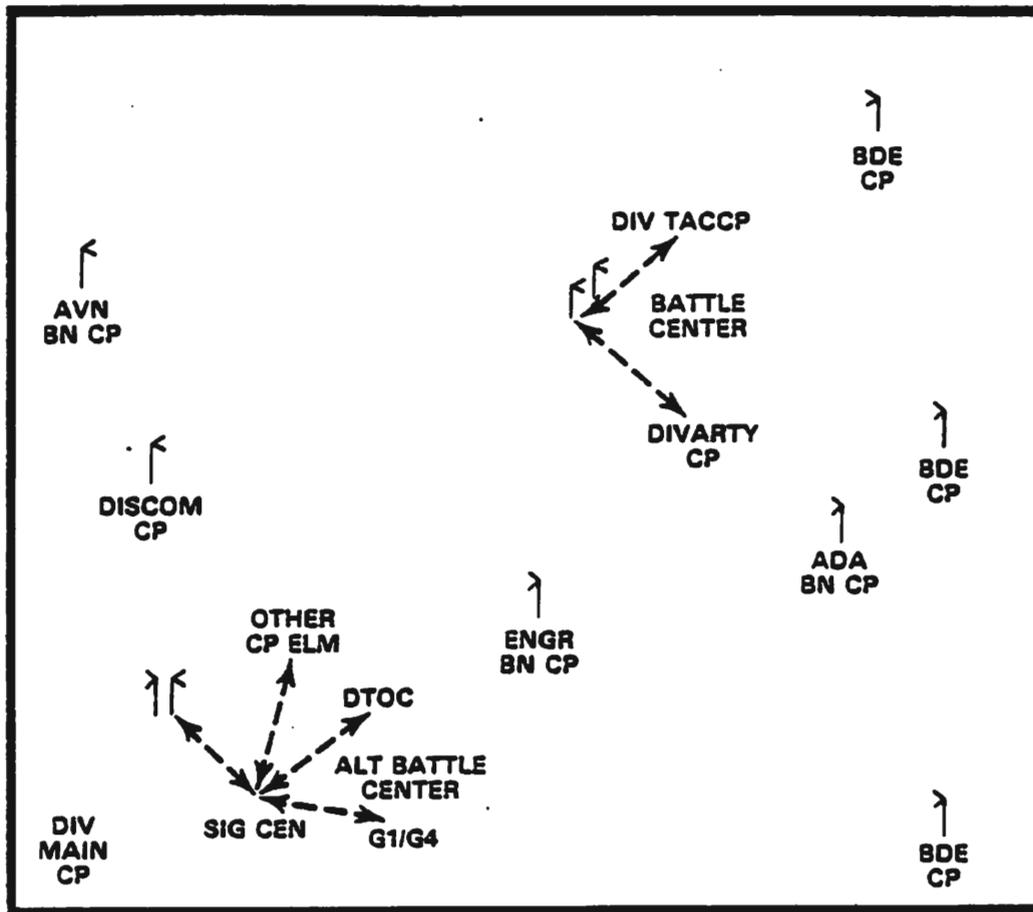
From time to time we would transmit a battle summary, one of the recurring reports that we used and one that could be transmitted on demand or sent, for example, every two hours. It was written and transmitted via facsimile, coming directly into the battle center or going into the operations center, as the commander elected.

COMMANDERS SITUATION REPORT															
UNIT	MSC	TASK ORG			LOCATION	COMB EVAL	TANKS			TOWS			SQUADS		
		M	T	C			OH	B	E	OH	B	E	OH	B	E
TF-113	AD BOE	2	1		NO 3386	.	16	17		19	20		17	18	
TF-213	30 BOE	2	1		NO 3749	.	13	17	.	15	20	.	15	18	
TF-119	AD BOE	2	1		NO 3587	.	9	17	.	11	20	.	17	18	
TF-218	1st BOE	2	1		NO 3772	.	16	17		20	20		17	18	
TF-117	20 BOE	2	1		NO 3585	.	17	17		20	20		18	18	
TF-115	1st BOE	2	1		NO 3177	.	9	17	.	17	20	.	18	18	
TF-119	AD BOE	1	2		NO 3280	.	24	37		6	6		6	6	
TF-118	AD BOE	1	2		NO 3078	.	28	37	.	6	6	.	6	6	
TF-117	10 BOE	1	2		NO 3375	.	25	37	.	6	6	.	6	6	
TF-115	30 BOE	1	2		NO 3490	.	24	37	.	6	6	.	6	6	
TF-115	1st BOE	1	2		NO 3373	.	24	37	.	6	6	.	6	6	
TF-117	30 BOE	1	4		NB 3503	.	43	45		15	18		14	16	
UNIT	2-20	2-31	1-83	3-16	1-333										
OH	18	18	17	10	6										
BASE	18	18	18	12	6										
EVAL		0 0		0											
COMMAND POST LOCATIONS															
UNIT	MAIN	TAC	UNIT	MAIN	TAC										
V CORPS	MG 7523	NE 1015	DIVACR	MD 9183											
3 ID	MO 9541	NO 0587	OISCOM	MD 9179											
1st BOE	MO 9966	NO 1170													
30 BOE	NO 0281	NO 1779													
30 BOE	NO 0590	NO 2244													
ATTACK HELICOPTERS						TACTICAL AIR SORTIES									
UNIT	OH	BASE	EVAL	TIME PERIOD	ALLOCATION	FLOW									
	B/B	C/B		0300-0600	10	5									
	0	1		0600-0900	15	17									
	0	1		0900-1200	20	18									
				1200-1500	20	18									
				1500-1800	20	20									
				1800-2300	10	3									
				2300-0300	10	1									
NUCLEAR															
HOLD	SR	SR	SR	SR	SR										
1st ROS:	36	8" (L) ROS:													
8" (S) ROS:	12	LANCER ROS:	6												
CHEMICAL															
HOLD	SR	SR	SR	SR	SR										
VX ROS:	None	GB ROS:	None												
TIME PREPARED															

Here's another report completed twice daily with the commander's evaluation entered in dots. The commander, personally, had to put these in. You notice that we are keeping track of numbers of major weapon system. The "B" column refers to the base, that is to say how the outfit was organized at the time the task organization went into effect. "OH" represents the on-hand numbers, followed by the TOW systems, then infantry squads. We do much the same thing for artillery, keeping track of tubes by artillery battalion. In the lower right is the division air sortie allocation. Again, this is transmitted by facsimile.



I made the point that at the beginning we put the battle center with the division's tactical operation center. It turns out, however, that with those millimeter wave radios, which permit one to transmit this information, whether by television signal, telephone over VHF, or indeed FM radio, you don't need to have everybody tucked in close together as in that configuration I showed for the divisional tactical operation center. In fact, it was possible to set up a configuration where all of the antenna could be located up on a hill for better line of sight characteristics, and then the millimeter wave radio used to shoot down the hill into a little signal center. Other millimeter wave radios brought the signal out to command post elements located in the village, as shown, or on the edge of woods. These distances can be anywhere up to 3 to 5 kilometers as previously stated. Once you do that, of course, you have substantially decreased the signature of any one of these elements. As a matter of fact, you make it very, very difficult to identify this as a division command post as it certainly gives a much different look to sensors and observers than the command post that I showed you at the outset. Now where does this take you?



It could take you to this sort of a notion: if we could push a VHF signal across these linkages that was as rich as those that could be passed across the millimeter wave radio, then it might be possible to put the battle center anywhere in the division zone; and it might be possible then to put the elements of the command post any place in the zone--simply interlink with the division communications system. The multi-channel VHF equipment that is presently on issue in Europe is quite robust from an electronic warfare point of view, therefore I hold we ought to climb onboard and at least, in the near time frame, use available gear that you can buy off the shelf or lease to supplement it.

What do I have in mind? For example, video disc equipment that is read by a laser, has a number of interesting characteristics--on something about the size and shape of a phonograph record you can put 55,000 separate images. You could thus put all of the maps in the central front on that one disc, frame by frame. You could have them available in several scales; you could have engineer trafficability or situation maps; you could have them available in 1 to 12,500 scale city plans; you could have them available in 1 to 250,000 scale macro displays. You could call them up, virtually instantaneously, because each one of those 55,000 frames has a digital address, that is to say you could find the map very quickly, index it, bring up and show it on a TV screen. If your TV display is adequate for conveying the information at issue, it suggests to me that without recourse to computers, and I haven't used that term throughout this presentation advisably, one can go considerably further than we have heretofore imagined in collecting, storing, retrieving, presenting, and transmitting information. All we need to do is use commercially available video facsimile devices and such communication mechanisms as the millimeter wave radio.

I close by appealing to you, ladies and gentlemen, that we may very well find ourselves before the decade is out confronting problems of command and control which will be generated, not only by the firepower and dispersion equations that I have discussed, and all of the pressures on the system that proceed therefrom, but also by the opportunities that will become available through the use of such command and control mechanisms as I have just described. It may be possible to take artillery batteries and put them out by a single gun or two guns, it may be possible to have tank battalions very widely dispersed by platoon or section and coming together for short, intense combat and then redispersing while maintaining control over the whole force. A much higher degree of centralization, in brief, opens to us if we will but use the mechanisms that are at our disposal today. If you add to that the power of the computer and the calculator I think you can see we may, indeed, be able to move toward the upper end of that spectrum that I showed on the first slide and proceed toward more tactical flexibility in land warfare. But that day is still in the future, and whether we get there soon or not depends largely on your ingenuity.