

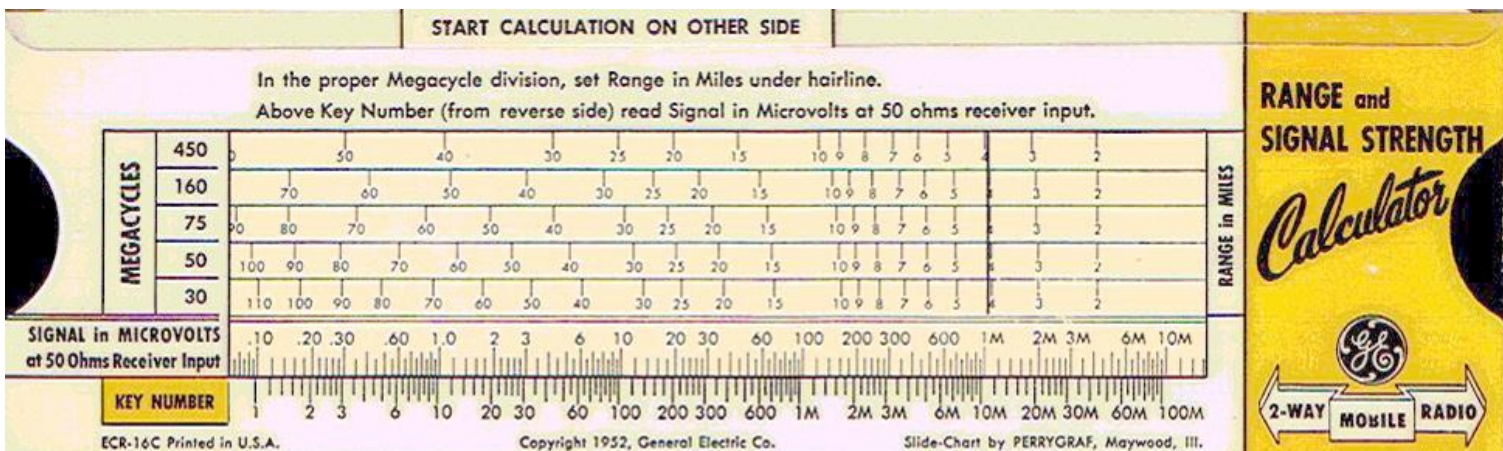
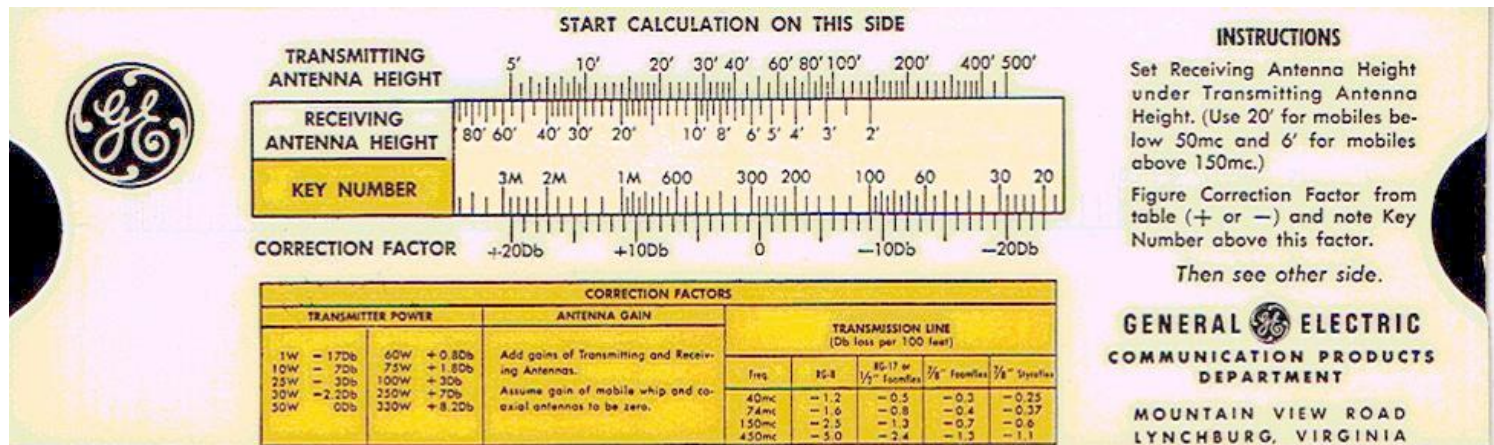
Meeting -- Thursday, May 8, 1969

Richard Gifford,
General Manager
General Electric Company
Communication Products Department

See RPGs mini biography at the National Academy of Engineering

<https://www.nae.edu/19579/19581/51314/51355/189403/RICHARD-PITMAN-GIFFORD-19221976>

GE Engineers credited RPG with the creation of this calculator.



BIOGRAPHICAL SKETCH OF RICHARD P. GIFFORD

Richard P. Gifford has served as General Manager of General Electric's Communication Products Department at Lynchburg, Virginia since February 1963. He is responsible for all phases of development, manufacture and marketing of a variety of communication products, including mobile and personal radio, microwave relay and multiplex equipment. He was born in New York City in 1922. He joined General Electric in 1946 after graduation as a mathematics major at Harvard University in 1943 and three years Naval experience.

At General Electric, he assisted in the establishment of the first television relay from New York City to Schenectady; he was later involved in development and design work for two-way mobile radio equipment at Electronics Park, Syracuse. He then served in a succession of managerial assignments in product design engineering before appointment to his present position.

He is a Fellow of the Institute of Electrical and Electronics Engineers; in the IEEE Group for Vehicular Communication he served nine years on the Administrative Committee and was chairman 1960-62. In the Electronic Industries Association, he is a member and past chairman of the Industrial Electronics Panel.

Mr. Gifford is Chairman of the Joint Technical Advisory sponsored by IEEE and EIA, and has been a member since 1962. He is Chairman of the JTAC Subcommittee on Electromagnetic Compatibility, and has served on the subcommittee for Space Communications. In June 1965, he was appointed to the Frequency Management Advisory

Council of the Office of the Director of Telecommunications Management. In 1966, he served as a member of the Telecommunications Science Panel called by the U. S. Department of Commerce.

Among Mr. Gifford's published articles are "Knee of the Nose", IEEE G-VC Transactions, June 1954; "Spectrum Pollution", IRE International Convention Record, Part 5, Vol. 10, 1962; "Radio Spectrum Management", Associated Public Safety Communication Officers Bulletin, October 1962; and recently he served as a member of the three-man JTAC Editorial Executive Committee which prepared and published the book, "Radio Spectrum Utilization", 1964.

5/23/66

✓ Fellow of the Institute of Electrical & Electronics Engin.

✓ 22 years experience in Radio & Telecom

Member of ~~the~~ Joint Tech Adv Committee

IEEE & EIA and of its
Committee on Space Communication

~~Chair~~

Now Chairman of JTAC

also chairman of the JTAC committee
on Electromagnetic Compatibility whose
report he will now summarize.



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* * * * *
* "WHAT WE HAVE HERE IS A FAILURE TO *
* C O M M U N I C A T E" *
* BY: R.P. Gifford *
* * * * *

The title of this paper has been borrowed from the key line in a recent allegorical movie called "Cool Hand Luke". The problem in communications being referred to at the time was the failure of Luke to conform to a plethora of rules and regulations at a prison farm. In Luke's case the problem in communications was rectified - they thought - by simply adding more of the same - more rules, more confinement, more chains.

But this is not going to be a paper on prison farms, our penal system or the conflict of the individual with an organized establishment - popular as those subjects seem to be today.

The problem that I am referring to has somewhat broader horizons - the total breadth, depth and development of human society.

"WHAT WE HAVE HERE IS A FAILURE TO COMMUNICATE"

And now - in some 4,000 words - let me explain.

First of all, let me establish a better image of what I mean by the breadth, depth and development of human society - or just you and I will have a "failure to communicate".

I choose to look upon man as a biological entity - an animal - fitting into the order of nature yet endowed by God with unique talents that in some mysterious way are to serve His ultimate and infinite purpose.

Like most other animals, man is instinctively motivated to survive. He is a social animal in that he seeks and finds security in group or family relationships.

But unlike other animals, man is uniquely endowed

- with a talent to create tools that amplify his physical and mental energies,

- and with a soul that can be motivated beyond the limits of natural biological instinct.

It is the impact of these two special attributes that give us upward development - the history of man. That history is a step by step narrative of the consequences of the interplay of man's inventiveness and man's complex motivations - ranging from serving God to serving self.

Our modern era is the product and consequence of all the tools that have been invented plus the motivations that led to the inventions - all followed by new motivations in turn created by the tools invented. Tools and motivation, in mixture are the fuel for the history of man.

When studying the history of man in these terms, it is helpful and particularly germane to this paper, to consider some basic divisions within the category of tools. The most basic division would be:

- tools of production - tools that increase man's capacity to feed, clothe and shelter the community of man,
- tools of transportation - tools that increase man's capacity to bind together the community of man through physical exchange,
- tools of communication - tools that increase man's capacity to bind together the community of man through mental exchange.

Now, just for a moment, reflect with me - close your eyes and consider the impact on history as man developed tools of production, transportation or communications. Consider first, tools of production such as:

fire
stone shaping
pottery
weaving
metal forming

the lever
the wheel
alchemy - leading to explosives

conversion of stored energy such as that in:

wood
oil
gas
flowing water or
the atom itself,

into almost any form of motion or light.

Consider the impact on history as man developed tools of transportation such as:

rafts
oar-propelled ships
horses, camels, elephants
carts, carriages
balloons
trains
automobiles
air planes
rockets

and finally consider the impact on history as man developed tools of communication such as:

oral language
written language
mathematical language
painting, art, architecture
signal fires
the printing press
semaphore
telegraph
telephone
radio
television

→ Each of these - and many, many, more have progressively expanded the capability of man to build things, move things and exchange information and ideas. In the last two hundred years, the rate of expansion of that capability has been explosive.

But the most interesting facet of that explosion - starting perhaps with the printing press - is the intricate interrelationship of the advances in all three categories of tooling.

- consider how the printing press played its role in enabling educators, government officials, churches, merchants and financial institutions to reach people never reached before.
- consider the impact of such readily available, visible publicity in creating new markets for goods and services.
- consider then the role of broader market opportunities on the development of new forms for transportation and more efficient modes of fabrication, to respond to increased demand.
- and then, to close the loop, consider how those new means of transportation and production brought new requirements for better communications - for education, for dissemination of up-to-date information, for safety in travel.

Just these brief examples are sufficient, I believe, to make the point that history of man is in fact the record of the consequential impact and the complex interrelationships of the products of man's inventiveness in the hands of individuals motivated by metaphysical forces that go beyond mere instinct for self or familial survival, love and protection.

Man literally has now at his command "tools" and energy that can propel him into still greater horizons or that can rub out all of the consequence or history of his being. I am reminded here of the closing scene of "On the Beach" - it was a view of a city in Australia - a modern city that at the end of the era of Man becomes
 → nothing, because there is no living soul to enjoy, accept or reject, love or despise that mass of steel, concrete, glass and blowing rubbish. We then can see the city for what it always has been - just

a tool of man for his glorification and satisfaction, ~~and~~ Without man, it is nothing.

Frankly, gentlemen at this point, I seem to find myself in the pulpit. While the title of this paper would most certainly be a convenient lead here into a sermonette on the timely importance of communications with our Creator and our brothers, that was not the original motivation for this paper.

"WHAT WE HAVE HERE IS A FAILURE TO COMMUNICATE"

In commenting on this subject, I am choosing to consider the impact of the physical forces of communication (vs tools of production or transportation) on our modern world rather than the metaphysical forces - though, by no means, do I feel one to be independently more significant than the other. My election to discuss the physical challenges in communications is dictated by the realities of my training and experience rather than any lack of motivation of the spirit. Perhaps a friend in the profession of metaphysical communication may someday provide the alter-finale to this venture.

So far we have traced the history of man in terms of the inter-relationship of products of his inventiveness and his motivations. We have seen that our modern era is the complex product of new tools of production, transportation, and communication being used in varying degrees for various purposes. And we have noted that the sum total of man's inventiveness is now adequate to exterminate himself or to extend further his horizons. But what we have not noted is that there are many ways in which either choice may be achieved. Extermination is not synonymous with the atomic bomb - consider the problems of the largest cities - air pollution, water pollution, garbage, breakdown of life support systems, breakdown of law and order.

And extension of man's horizons may not be the product solely of space travel - consider oceanography, making inhabitable the previously uninhabitable, new means to contact the remotest peoples of the good earth, progress in medicine, food production, etc.

On one hand, man's inventiveness in tooling for production and transportation, stimulated by an apparent zest for efficiency but with underlying motivations of self-interest, is leading to social, economic and physical disaster. On the other hand, this same inventiveness channeled in other directions by those constantly seeking to part the curtains of current knowledge with an underlying motivation reflection a sense of stewardship for mankind, is keeping alive a spark of hope for mankind, is keeping alive a spark of hope for the destiny of man.

Man now finds his creative talents for efficiency in production and transportation to be virtually self-defeating. It is from this observation and premise that I suggest:

"WHAT WE HAVE HERE IS A FAILURE TO COMMUNICATE"

On the surface such a statement may seem to be quite unreasonable - particularly as we see all around us a fantastic explosion in capability to communicate from Mars, the Moon, around the world, etc. The opportunities are there in almost any imaginable dimension but I suggest we are failing to harness these tools into partnership with tool for production and transportation. Man's creative power could be directed to increase the effectiveness of his outreach to his fellow man and could ultimately develop bonds for community living just as effective as an evening with your neighbors. More effective and more available communications would certainly take the edge off narrow self-interest. History is full of illustrations where

just the existence of impenetrable walls of silence between peoples has led to misunderstanding, jealousies, avarice and ultimately, meaningless conflict.

To achieve the kind of communications world I have in mind, there first must be common language. Then come books, magazines, papers. And finally come telephones and television - all untimately refined and coordinated into a sort of tele-presence. All the pieces to do the total communication job from the start to the foreseeable future are already on hand or in the laboratories. Our priorities, however, are elsewhere; we are failing to understand the opportunity⁴ or, I should say, the absolute need to communicate if man is not to become the victim of his inventiveness.

For us in the United States, the suggestion that we are failing to use tools of communications might sound almost blasphemous. We certainly are blessed with the most extensive and best run telephone system in the world. We have more variety of video programming into more homes than anywhere in the world. We have more books published and more records pressed per capita. We have more art prints and photographs per capita - save perhaps the Japanese. One could hardly accuse us of ignoring opportunities to communicate.

But let's also realize that we lead the world in energy input per capita or in ton-miles of transportation per capita. Our inventiveness in each of these fields has been a handmaiden to progress in the others. Our progress in utilization of communications may seem adequate to our needs in relation to the rest of the world; but is it adequate for the survival of man? Do we need to reexamine our priorities? Do we need to reexamine those forces that tend to support one category of tooling over the others?

One of the more interesting studies that one could make about the economic development of this country would be the relative private and public support of efforts to create and install tools for production, transportation and communication. Without attempting to be quantitative, there are some rather obvious observations one could make.

Tools of production have experienced relatively little public support.

Private initiative and private enterprise have been the prime movers. And there always has been plenty of "fuel" - personal desire and ambition, motivations of self-interest have let no idea lay idle long. Tools of production produce material results clothes, cars, homes, pools - the accoutrements of what we have come short sightedly to call the good life.

Tools of transportation have experienced a mixture of public and private support. To the extent they have offered an attractive opportunity for a return on investment that have been developed by private interests. There was never any problem in finding backers to transport coal, oil, or lumber - nor was there any need for public money in developing the automobile - a sort of personalized magic carpet by which we mark our status. But where transportation has been needed to provide a basic convenience for the movement of people to and from work or for transporting supplies and assistance of general public needs, it has been heavily subsidized by public funds. Consider our subsidy of:

roads
canals
airlines (initially in the interest of mail)
airports
passenger trains
commuting trains

These subsidies, coupled with other natural, economic forces in the development of transportation, have contributed their share of the urban crises. We have let our "ability to transport" accelerate once again the urban consequence of the industrial revolution. In the absence of other alternatives, we continue to presume that overall efficiency at work is improved by close physical interface with suppliers, banks, stores, restaurants and entertainment and that the excellence of such facilities is proportional to their size and that their size is in turn, proportional to the people working per square foot within a one mile radius. And so it is, an efficiency minded people ends up moving almost two tons of steel 40 miles round trip per capita and then bartering for the right to park the two tons of steel nearby. One of the best illustrations of the corner into which man's inventiveness has driven him is the fact that in 1900 one could go crosstown in New York City in a one horse carriage at about 8 miles per hour; today, with 300 horses on the rein, he can make the same trip at ^{the same 8} 8 miles per hour! And only in the past five years have we come to hear the semi-serious question:

"Shall we walk - or do we have time to take a cab?"

Tools of communication are almost entirely the product of private initiative. Only in their most basic form, oral and written language - or education, are "tools" of communication subsidized. Actually, the more advanced inventions are effectively discouraged by excessive regulatory practices. It's hard to attract capital for ventures in communications at 7% return on investment when there are far more lucrative opportunities in

tools for production or even transportation where the risk is reduced through a pattern of subsidy should financial failure be imminent in what is then found to be a public need. We should also note that basic personal motivations for accelerated development of tools of communications are secondary to those stimulating tools of production. Our social world does not yet value the intangible and fleeting experience of communications as high as the tangible luxuries.

About this time, people with whom I have discussed this subject, take on a gaze of wonderment, asking "Good grief - are you, a decentralist, proposing subsidies for communications or even perhaps government takeover?" At that point what had seemed to be an intellectual objective discussion becomes a missionary challenge - a missionary challenge to straighten Gifford out, he's gone too far!

Tonight I hold an advantage, for the procedure has been to grant the speaker freedom from dialogue for about the first 40 minutes. Maybe, if you will promise not to get "hung-up" on such an assumption regarding my political mental health, I can be very specific as to what conclusions I do draw - and which solutions I would avoid.

It is very important to realize the power of public subsidy of the development and installation of tools. One has only to consider the role of war in providing subsidies for tools of production - albeit in this case for efficiency in destruction. Similar results occur even when the subsidies are not as massive and may extend over considerable time. Our road system costing billions per year continues to provide the auto makers in Detroit with reason to build more cars, appeal to wider ranges of variety, push for two or even three cars per family - to load up that space built for their cars. We don't get across town any faster - but we do it fancier.

Yet, one cannot deny that much public benefit has been derived from subsidy of canals, railroads and highways. Some might even claim that our fantastic thrust in transportation in the 19th century contains the key to our industrial leadership in the world today.

The modern tools of communication have not enjoyed any such special backing and have even been discouraged by national policy. Up to a few years ago, we have virtually ignored the role of communications as a tool for social progress for the common good. In their earliest days, new communication tools represented attractive → opportunities for investment and the foresighted geniis of a few men put together what is today the world's greatest telephone network. But today, we force tight regulation on the system thereby discouraging entry of entrepreneurial capital to open up new system possibilities.

Consider this most recent example of a road block to progress in communication:

Technology is available today to bring 20 channels of video information into the home with better definition and color than the best off-the-air reception. And the cost per home - to be paid either by the subscriber, the advertiser or the programmer would amount to about \$5 per month per home - about one tankful of gas or a pack of cigarettes per day. Some channels would undoubtedly carry our present cultural level of advertised programs but others could carry a wide variety of evening adult education courses or bring the meetings of city council, school boards, or other activities of civic concern to our homes as we may wish.

Only a small segment of the public may at first avail themselves of such cultural or educational or civic opportunities, but for them consider the saving of time, avoidance of dangers and reduction in car expense by having their interests piped into the home. But, even more important, note that these bonds with culture can extend over wide areas. Once a cable is in, it costs no more to carry 20 channels than one. The rural retreat can be in touch with all types of worlds from highest culture to mediocre soap operas.

If cable TV is so great, then why isn't private industry installing it at once? There are many reasons - all related to regulation. The FCC is concerned lest this new mode compete unfairly with broadcast TV. They are also concerned lest the telephone companies extend their power by offering to install such systems and provide for some of the programming. The FCC dreams of setting up competition for AT & T by letting local firms - entrepreneurs - set up the cable with permission also to do programming, but only so long as nothing is done that will hurt the broadcasters! A communication tool that could have fantastic impact on our mode of living awaits a Government solution that would protect the status quo. Unfortunately, we don't seem to realize that change - innovation - must, almost by definition, lead to upheavals in existing systems and economic structures and the status quo.

Let's take a look at another example of communication roadblocks - something right here at home. For business reasons - namely, to attract and hold the best technical talent available - we have long sought some means to make post graduate work leading to a Doctorate in Engineering available to our technical staff. Courses for such

a program are available only on a commuting basis to Blacksburg or Charlottesville - a dangerous, tiring and expensive solution^(60-80 miles one way). Recently through discussions with officials and professors at VPI, we found that credit could be given on courses conducted on a two-way TV hook-up. This technique has been experimented with most successfully in at least two other states - and, I'm sorry to say, in behalf of our competitors. VPI is to be congratulated for wanting to forge ahead as one of the leaders in this new technique for expanding the geographic coverage of great universities. Based on VPI's response, we made arrangements with the C & P Telephone Company to lease the transmission facilities to do this job for about 8 hours of courses per week. At the start, we were willing to subsidize this program in the interest of research to the extent of assuming full time rental of the facility for the first year. But, since such a circuit is not covered by public common carrier tariffs, we found that we would also be obligated to pick up the tab for any unliquidated costs should we not want the facility next year.

Now, I am sure, and I assume the C & P Telephone Co. also has adequate faith in the future of this state to be sure, that time on such a facility would soon be needed by the Community College or Lynchburg College or Randolph Macon or other major industries in town seeking to establish a two-way classroom pipeline with the extensive variety of services and skills available at VPI. But since we would not be permitted to sub-lease time on the circuit, our confidence in assuming a risk investment is quickly erased. And the Telephone Company has to weigh such a risk investment vs the required investments they must make to meet growing public common carrier demands. So long as the Telephone Company is constrained on the percent

return on its investments to figures only slightly better than those available in banking, it can give little but moral support to the riskier opportunities.

If we had the time, I could fill the whole evening with such examples of "discouragements" to seeing the innovations available in communications come into reality. There's a whole fantastic new world available via communications, if someone will say "go".

But why should we be concerned? Why do I observe: "WHAT WE HAVE HERE IS A FAILURE TO COMMUNICATE"? Should our political system tamper with the natural flow of development and implementation of tools of production and transportation and communication? Should we seek Governmental policy influence on certain tools vs others? Can we appreciate what might be the consequences of such tampering on the motivations of man?

If we had come to where we are today without any subsidy or tampering in behalf of any tools of production or transportation or communication, then such questions would merit serious debate. But the facts of history for the last 100 years make such an alternative academic. On a Government policy basis, we have already significantly influenced the role of tools of transportation and communication on the development of our modern day socio-economic and geo-economic systems. In the case of transportation, the influence has generally been positive - a stimulant to progress; in the case of communications, the influence has generally been relatively negative - a deterrant to potential progress.

The most serious consequence of this tampering has been what I choose to call the second urbanization wave in the industrial revolution. Constant stimulated progress in transportation and the theoretical efficiency of bigness have now brought us to the era of

super cities - fantastic centers of everything in business, industry, merchandising, culture, entertainment, recreation. Those cities which can attract the largest population within an hour's travel can afford the biggest museums, the biggest universities, the biggest and most varied entertainment. Such cities become regenerative - by size they attract those seeking the biggest and the best in their own fields of interests; and as more people arrive, investors in the city are ready to provide still more facilities. As a consequence, cities attract people and then engorge themselves on their desires.

Cities also become most complex social systems. Living close in space and timing; living with views limited to the concrete and steel on the other side of the street; living entirely dependent on life support systems to be provided by others - these conditions mold people either into cold isolated conformity adjusted to the system or into violent, frustrated aimless rebellion, as though they feel trapped in the concrete canyons. It's darn hard to relate with your fellow man or with God when you can't see the sky, grass or trees (or even the horizon) or when you can't take a meditative walk down a back woods path or when you can't camp with your buddies in the backyard and wake up with dew in your hair.

Consider this contrast right here in the United States among people at approximately equal income levels. Last August, I attended a 4H Rodeo in Livingston, Montana. Inside there were the exhibits and contests in bakegoods, flower arrangements, vegetable growing, woodwork, jams, and even matchbook collecting. Outside there was a rodeo for and sponsored by teenagers - calf roping, heifer bulldogging, team roping, etc. And all over there were teenagers, plus older and younger sisters and brothers, and parents and neighbors

and friends. Like all teenagers, they were going all the time at full speed. But in Livingston that night, the teenage storehouse of energy was expended on showing off their exhibits - or their buddies' - or talking with their cowboy heroes. It was pandemonium - but pandemonium not needing the sheriff. If he had been there, he would probably have been another center of attention - for out there he's still a hero.

On that same evening in August there were riots in progress in two cities - a different type of 4H activity where all the H's are unfit to print. There the spirit was to destroy, not enjoy - for what was there to enjoy? And there were sheriff's to control the pandemonium but they were hardly looked up to as heroes.

That very sensation of contrast struck me as I sat in the stands at the rodeo. Here under one political, economic system among peoples of approximately equal earnings there were two entirely different August evenings to be experienced. One in the city, breeding a bitter, narrow-minded almost inhuman society; the other in a small town breeding a friendly open-minded familial society. Oddly enough, it seemed as though those who live further from their neighbors were "in heart" closer. Try a trip to Montana sometime - with a 20 mile distant horizon for every view and a big sky overhead, it's downright challenging to think small, bitter or narrow-minded.

As one flies over this country, he cannot help but be impressed with the vast open spaces beneath. Why then do we insist on crowding into cities? 70% of our population inhabits only 2% of our land area. And one could observe that over 70% of our domestic problems are those arising from the impossibilities of urban living.

I contend that the real challenge of the last third of the 20th century is not in solving the existing disasters of our cities but in doing as much or more in seeing that we do not create any more such cities. We need to find ways to stimulate industrial development - that is, job opportunities - with fine living in relatively rural areas. Here is where tools of communications need to be released from their bonds.

Let's take an example. Let's suppose we have accepted deurbanization as a national goal. What would it take to attract industry into Southwest Virginia? Certainly it would take energy sources - power companies stand ready to do that job, the return on their investment would be quite sure. It will take people resources - many are already there wondering what big city their children will go to as farming now requires less labor; and the housewife now has more free time as a consequence of electric power and appliances. But how will a Southwest Virginia community attract the professionals - the engineers, the managers, the accountants necessary to operate a plant competing with others drawing on the trained and educated brain power available in the big city? These people want an educational environment, a cultural environment; they want schooling capable of challenging the most gifted as well as the slow learner; and they seek choices in buying and variety in entertainment and recreation. How can the resources for these needs and desires spring up overnight?

New tools of communication such as cable television - plus existing tools of transportation - hold ^{a possible} ~~the~~ answer.

With cable television as a basic resource in the community it should be possible to:

- provide graduate courses in various fields from a variety of universities.

- strengthen local school and college curricula with special video tie-ins with other school and colleges; in other words, share specialties via video,
- provide a wide variety of current cultural entertainment from opera to debating,
- to shop by sight in the stores of the big "city" with overnight delivery,
- to hold a family video conference back home once a week,
- to access the most advanced computing facilities or most extensive data files,
- to "thumb through" a book at a distant library and order copies of pages needed.

Wave guide
 In other words, coaxial cable into the homes plus coaxial cable *and* interconnecting facilities could effectively "transport" one into universities, libraries, stores, operahouses, auditoriums or one's family home without having to live right in the middle of them all. And if we someday find stereo, and three dimensional color and even smell essential to the suitability of such facilities, those features can and certainly will be added.

But will such services pay for themselves? To that I must reply with a question: "On what economic base will you measure whether they pay for themselves?" If one would measure the result in terms of the ability of such a community to support itself against its competitors, I think so.

I doubt if one could prove that highways pay for themselves. Oh yes, we pay for them in taxes; but do they pay us back in terms of some socio-economic advantages that are commensurate with those taxes? I don't know - but overall the system is working towards an improving economy.

We may have to adopt a similar attitude re public support of

"highways" of communication.* The "highways" might still be provided by private interests but concessions on rates of depreciation that would affect the charges would have to be permitted to attract the necessary investment capital. Those rate increments would be the equivalent of the public interest taxes for concrete highways.

An up-to-date example of this type of thinking can be found in Canada. There are tremendous natural resources in the northwest where no "civilized" man would choose to live. In the interest of the general long term economic growth of Canada, development of those resources need to be encouraged. One of the tools they expect to use is a communication satellite to provide ultimately at least a dozen two-way video highways between those remote communities and current centers of cultures and commerce. They feel such a video bond is a minimal requirement for attracting professionals into such frontier territory.

HERE THEN IS THE SUM OF MY THESIS:

The history of man is the interplay of his inventiveness in tools for production, transportation and communication and his motivations.

In our modern history in the U. S. we have used governmental power relatively to encourage tools of transportation and discourage tools of communications.

*To bring this analogy close to home, consider that all the secondary and collegiate institutions of Virginia could be interconnected with two-way video highway for a cost about equal to 11 miles of modern superhighway. It doesn't take much imagination to determine which investment would have the greatest impact on the future destiny of our state.

One of the consequences of our economic system, supported by our talent for tools of production and our subsidy of tools of transportation has been a second wave of urbanization in the industrial revolution,

This second wave of urbanization is leading to social and physical disaster through catastrophic emergencies of increased crime, riots, air pollution and water pollution.

← We cannot build a land for life, liberty, and the pursuit of happiness on such a base.

A national goal of deurbanization appears in order; towards this end tools of communications must not only be unleashed, but, in effect, publicly supported.

And finally - a warning. As noted earlier, tools provide only half the motive power for the history of man. His destiny is equally the product of his development of motivations beyond animal instinct. Ultimately man must live for brother man as our Father has asked of us. Expansion of tools of communication would appear to offer great opportunities for building the brotherhood of man. But it is what you and I communicate that will lead to success or failure - we would have an effective opportunity to be missionaries from our own homes. Or will what we have there, again, be a failure to communicate?

RPG

January 15, 1969