ENGINEERING STATEMENT OF A. EARL CULLUM, JR., CONSULTING RADIO ENGINEER,
BEFORE THE SENATE SUBCOMMITTEE INVESTIGATING UHF TELEVISION

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I HAVE REQUESTED PERMISSION TO APPEAR BEFORE THIS COMMITTEE BECAUSE CERTAIN PROPOSALS HAVE BEEN MADE TO IT WHICH I, AS AN ENGINEER, FEEL ARE INCOMPATIBLE WITH THE PUBLIC INTEREST. MY QUALIFICATIONS ARE ATTACHED AS APPENDIX 1.

THE ACT OF CONGRESS, WHICH CREATED THE FEDERAL COMMUNICATIONS COMMISSION, STATED THAT THE COMMISSION WAS CREATED FOR THE PURPOSE "... OF REGULATING INTERSTATE AND FOREIGN COMMERCE IN COMMUNICATION BY WIRE AND RADIO SO AS TO MAKE AVAILABLE, SO FAR AS POSSIBLE, TO ALL THE PEOPLE OF THE UNITED STATES A RAPID, EFFICIENT, NATION-WIDE AND WORLD-WIDE WIRE AND RADIO COMMUNICATION SERVICE...." IT IS TO THE PROBLEM OF MAKING A TELEVISION SERVICE AVAILABLE TO ALL OF THE PEOPLE OF THE UNITED STATES THAT I WISH TO DIRECT MY REMARKS. IT IS RECOGNIZED THAT ENGINEERING FACTORS ARE NOT THE ONLY CONSIDERATION IN DEVELOPING A TRULY NATION-WIDE SERVICE. THE ENGINEERING CONSIDERATIONS, HOWEVER, ARE THE BASIC CONSIDERATIONS UPON WHICH ANY SUCH SERVICE MUST BE BUILT. I, THEREFORE, WANT TO FURNISH THIS COMMITTEE WITH THE ENGINEERING BACKGROUND FOR MY REMARKS.

IN THE FIRST PLACE, IT SHOULD BE UNDERSTOOD THAT, IF AN ADEQUATE SIGNAL IS AVAILABLE, THERE NEED BE NO DIFFERENCE BETWEEN THE QUALITY OF TELEVISION PICTURE PROVIDED BY EITHER A UHF OR VHF TELEVISION STATION. THERE ARE DIFFERENCES IN THE ABILITY OF VHF AND UHF TO ESTABLISH ANY GIVEN SIGNAL INTENSITY AND ALSO THERE ARE DIFFERENCES IN THE SIGNAL INTENSITY REQUIRED TO GIVE ADEQUATE SERVICE.

IN TRANSMITTING A TELEVISION SIGNAL BY VHF OR UHF, ELECTROMAGNETIC ENERGY IS RADIATED FROM THE TRANSMITTING ANTENNA, ATTENUATED THROUGH SPACE, REFLECTED OR DIFFRACTED BY THE INTERVENING TERRAIN, INTERCEPTED BY THE RECEIVING ANTENNA AND CONVERTED TO SIGNAL AT THE RECEIVER. BASICALLY, THE SYSTEM IS THIS — ENERGY IS RADIATED, THERE IS A LOSS OVER THE PROPAGATION PATH, SOME OF THE ENERGY IS INTERCEPTED AND CONVERTED TO USABLE SIGNAL. IN COMPARISON WITH VHF THE PATH LOSSES ARE SUBSTANTIALLY GREATER AT UHF, THE AMOUNT OF ENERGY INTERCEPTED IS GENERALLY SUBSTANTIALLY LESS AT UHF UNLESS EXTREMELY ELABORATE AND EXPENSIVE RECEIVING ANTENNAS ARE USED SO THAT LESSER SIGNALS ARE AVAILABLE AT UHF. FURTHERMORE, A GREATER STRENGTH OF SIGNAL IS REQUIRED TO PRODUCE A SATISFACTORY PICTURE AT UHF. THE SIGNAL REQUIRED DEPENDS UPON THE ELECTRICAL NOISE PRESENT IN THE RECEIVER WHICH APPEARS AS "SNOW" ON THE SCREEN. PRESENT UHF SETS ARE RELATIVE SNOW STORMS IN THIS REGARD.

IT IS SEEN THAT ALL OF THE FACTORS FAVOR THE VHF SERVICES, AND IN FACT TEND TO FAVOR THE LOW BAND VHF SERVICES. IN ADDITION THE SAME FACTORS FAVOR THE LOWER UHF CHANNELS AS COMPARED WITH THE HIGHER UHF CHANNELS. THIS IS A FACT THAT IS NOT GENERALLY RECOGNIZED OR ADMITTED, BUT ONE WHICH MAKES IT EXTREMELY DOUBTFUL THAT ALL OF THE 70 UHF CHANNELS WILL BE CAPABLE OF PROVIDING SATISFACTORY SERVICE. THEY ARE NOT NOW AND WILL NOT BE ABLE TO PROVIDE COMPARABLE SERVICE FOR MANY YEARS TO COME — IF EVER.

IN AN ATTEMPT TO EQUALIZE THE SERVICE OF THE SEVERAL CLASSES OF STATIONS THE FEDERAL COMMUNICATIONS COMMISSION HAS PROVIDED THAT LOW BAND VHF STATIONS BE RESTRICTED TO A RADIATED POWER OF 100 KILOWATTS WHILE HIGH BAND VHF STATIONS ARE PERMITTED 316 KILOWATTS AND ALL UHF STATIONS ARE PERMITTED 1000 KILOWATTS. EQUIPMENT IS AVAILABLE TO PERMIT STATIONS TO ACHIEVE FULL POWER ON ALL VHF CHANNELS, BUT THE PRESENT STAGE OF EQUIPMENT DEVELOPMENT NOW LIMITS THE MAXIMUM POWER POSSIBLE AT UHF TO APPROXIMATELY 250 KILOWATTS.

IN ORDER TO SHOW THE EFFECTS OF SEVERAL OF THE FACTORS DISCUSSED ABOVE, I HAVE PREPARED A SERIES OF BAR GRAPHS WHICH DEPICT THE SERVICE AREA OF TELEVISION STATIONS IN THE VARIOUS BANDS. THESE ARE SHOWN IN FIGURE 1 ATTACHED AND ARE SUMMARIZED IN THE FOLLOWING TABLE IN WHICH CONSIDERATION HAS BEEN GIVEN TO PRESENT DAY RECEIVER SENSITIVITIES:

CHANNEL	POWER	HEIGHT	COMMENTS	RELATIVE SERVICE AREA
2	100 KW	1000 FT	VHF	100%
13	316 KW	1000 FT	VHF	65%
14	1000 KW	1000 FT	UHF	47%
83	1000 KW	1000 FT	UHF	26%

IF CONSIDERATION IS GIVEN TO THE PRESENT POWER POSSIBLE AT UHF, THE ABOVE TABLE MAY BE EXTENDED AS FOLLOWS:

14	250 KW	1000 FT	UHF	31%
83	250 KW	1000 FT	UHF	15%

IF CONSIDERATION IS ALSO GIVEN TO ADDITIONAL PROPAGATION LOSSES AT UHF, THE TABLE MAY BE EXTENDED AS FOLLOWS:

14	250 KW	1000 FT	UHF	18%
83	250 KW	1000 FT	UHF	8%

IF FURTHER CONSIDERATION IS GIVEN TO THE FACT THAT FEW UHF STATIONS USE HEIGHTS OF 1000 FEET, AND 500 FEET IS USED, THE TABLE MAY BE EXTENDED FURTHER:

CHANNEL	POWER	HEIGHT	COMMENTS	RELATIVE SERVICE AREA
14	250 KW	500 FT	UHF	9%
83	250 KW	500 FT	UHF	4%

THIS LATTER TABLE IS MORE TYPICAL OF THE PRESENT UHF STATIONS.

A COMPARISON OF THE ABOVE FIGURES CLEARLY SHOWS THAT THE SERVICE AREA NOW POSSIBLE WITH UHF STATIONS IS VASTLY INFERIOR TO THE SERVICE AREA POSSIBLE WITH VHF STATIONS. WHEN CONSIDERATION IS GIVEN TO THE UHF SERVICE POSSIBLE WITH MAXIMUM POWER, WITH OPTIMUM RECEIVER SENSITIVITIES AND WITH OPTIMUM TERRAIN THE SERVICE AREA POSSIBLE WITH UHF STATIONS IS STILL INFERIOR TO THE SERVICE AREA POSSIBLE FROM A VHF STATION. THESE ARE ENGINEERING FACTS AND ARE AT THE HEART OF THE PROBLEM OF THE UHF TELECASTERS. THESE ENGINEERING FACTS MAKE RIDICULOUS THE PROPOSAL ADVANCED BY THE UHF TELEVISION ASSOCIATION THAT ALL TELECASTING BE CONFINED TO THE ULTRA HIGH FREQUENCIES. THE ONLY MEANS OF PROVIDING TELEVISION SERVICE TO VAST RURAL AREAS IS BY USE OF VHF UNLESS THERE IS VIRTUALLY COMPLETE SUBSIDY OF A VAST NUMBER OF STATIONS IN RURAL COMMUNITIES. IN ADDITION, IN RUGGED TERRAIN, SUCH AS THE AREA ABOUT PITTSBURGH, PENNSYLVANIA, VHF SERVICE IS ESSENTIAL TO PROVIDE ADEQUATE SERVICE TO THE METROPOLITAN AREA.

ADDING TO THE PROBLEM OF THE UHF TELECASTERS IS THE FACT THAT NOT ALL PEOPLE WITHIN THEIR SERVICE AREA WILL HAVE SETS ADJUSTED TO RECEIVE UHF SIGNAL. WHEN IT IS CONSIDERED THAT THERE ARE IN EXCESS OF 20,000,000 RECEIVERS WHICH ARE INCAPABLE OF RECEIVING UHF TODAY, AND THAT IT WOULD COST PERHAPS $50 EACH TO CONVERT, IT CAN BE SEEN THAT THE PUBLIC IS BEING ASKED TO UNDERGO A POTENTIAL OUTLAY OF ONE BILLION DOLLARS FOR THE PRIVILEGE OF RECEIVING UHF TELEVISION. THE UHF TELEVISION ASSOCIATION EFFECTIVELY PROPOSES TO TAX THE PUBLIC BY THIS AMOUNT SO THAT SOME UNECONOMIC OPERATIONS MAY HAVE A BETTER CHANCE OF SURVIVAL.

THE PROBLEM OF REDUCED COVERAGE WITH UHF STATIONS WOULD BE ALLEVIATED IF UHF STATIONS COULD BE BUILT AND COULD OPERATE WITH LESS EXPENSE THAN A VHF STATION. THE TRUTH OF THE MATTER IS, HOWEVER, THAT ONLY THE COST OF UHF TRANSMITTING PLANT EQUIPMENT IS LESS EXPENSIVE AT THE PRESENT TIME, AND THIS IS ONLY BECAUSE FULL POWER TRANSMITTERS ARE NOT AVAILABLE. FOR STATIONS CAPABLE OF PROVIDING THE SAME TYPE OF PROGRAM SERVICE THERE WOULD BE NO DIFFERENCE IN THE COST OF STUDIO BUILDINGS AND EQUIPMENT BETWEEN A UHF AND A VHF STATION. WHEN ALL FACTORS ARE CONSIDERED THE INITIAL COST OF A UHF STATION IS APPROXIMATELY THE SAME AS THE INITIAL COST OF A VHF STATION. GENERALLY SPEAKING THEN THE INVESTMENT PER VIEWER WITH A UHF STATION IS GREATER THAN THE INVESTMENT PER VIEWER WITH A VHF STATION.

EXPERIENCE INDICATES THAT THE INVESTMENT PER VIEWER IS NOT THE MAJOR CRITERION WHICH WILL DETERMINE THE SUCCESS OR FAILURE OF A TELEVISION STATION. A MORE IMPORTANT FACTOR IS THE COST OF OPERATION. IF WE ASSUME THAT EITHER A UHF STATION OR A VHF STATION AT THE SAME LOCATION WOULD PROVIDE THE SAME TYPE AND QUALITY OF PROGRAM SERVICE THEN THE COST OF OPERATING THE STATION WILL NOT DIFFER ONE FROM THE OTHER. SINCE A UHF STATION WILL GENERALLY SERVE APPRECIABLY FEWER PERSONS AND SINCE IT COSTS THE SAME AMOUNT TO OPERATE, THE OPERATING COST PER VIEWER MUST BE HIGHER THAN FOR A VHF STATION. WHERE THERE IS DEMAND FOR THIS TYPE OF SERVICE, OR ADDITIONAL SERVICE, AND WHERE THE UNIT COST IS NOT EXCESSIVE, SO THAT THE ADVERTISER, AND ULTIMATELY THE PUBLIC, IS WILLING TO PAY THE PRICE THEN, IN THOSE LOCATIONS, UHF STATIONS WILL BE SUCCESSFUL.

ANY ATTEMPT TO FORCE ALL TELECASTING STATIONS TO USE UHF CAN ONLY RESULT IN AN INCREASED COST FOR THE USE OF THE MEDIUM OR IN A SERIOUS REDUCTION IN ITS USE. IN EITHER CASE IT IS THE PUBLIC THAT WILL SUFFER.

IT IS GENERALLY CONCEDED THAT THE 12 VHF CHANNELS BY THEMSELVES CANNOT PROVIDE A TRULY NATION-WIDE TELEVISION SERVICE TO ALL OF THE PEOPLE OF THE UNITED STATES. IT WAS ALSO RECOGNIZED THAT, IN ORDER TO SURVIVE, INDIVIDUAL VHF STATIONS WOULD HAVE TO HAVE RELATIVELY EXTENSIVE SERVICE. IN ORDER TO ACHIEVE THIS IT WAS NECESSARY THAT STATIONS ON THE SAME CHANNEL BE SEPARATED BY A CONSIDERABLE DISTANCE SO THAT THEY WOULD NOT MUTUALLY DESTROY AN EXCESSIVE AMOUNT OF EACH OTHER SERVICE AREA. ALSO STATIONS ON ADJACENT CHANNELS REQUIRE A LESSER SEPARATION FOR THE SAME REASON. IT IS BECAUSE OF THESE NECESSARY SEPARATIONS BETWEEN STATIONS AND THE FACT THAT CITIES DO NOT CONVENIENTLY OCCUR WITH EXACTLY THE REQUIRED MINIMUM SEPARATION THAT THE VHF STATIONS ARE UNABLE TO COVER THE ENTIRE COUNTRY. IT IS FOR THIS REASON ALSO THAT CERTAIN CITIES CANNOT HAVE ASSIGNED TO THEM MORE THAN A LIMITED NUMBER OF VHF STATIONS. IT WAS TO PROVIDE ADDITIONAL TELEVISION OUTLETS IN CERTAIN CITIES AND TO PROVIDE LOCAL TELEVISION OUTLETS IN SOME AREAS WHERE IT WAS IMPRACTICABLE TO ASSIGN VHF CHANNELS THAT IT WAS NECESSARY TO EXPAND THE TELEVISION BROADCASTING INDUSTRY INTO THE UHF.

AFTER THE CONCLUSION OF HEARINGS WHICH LASTED FROM 1948 TO 1951, DURING WHICH THERE WAS A "FREEZE" ON NEW CONSTRUCTION, AN ALLOCATION PLAN WAS ADOPTED, WHICH IS BASICALLY THE PRESENT PLAN, AND APPLICATIONS FOR CONSTRUCTION PERMITS TO BUILD NEW TELEVISION BROADCAST STATIONS WERE ACCEPTED BY THE FEDERAL COMMUNICATIONS COMMISSION. SINCE, IN EACH CITY, THERE WERE ONLY A LIMITED NUMBER OF TELEVISION ALLOCATIONS AVAILABLE AND THERE WAS GREAT DEMAND FOR MANY OF THE ALLOCATIONS IT WAS REALIZED THAT IT WOULD BE NECESSARY TO HOLD HEARINGS TO DETERMINE WHICH AMONG SEVERAL APPLICANTS FOR ANY ONE FACILITY SHOULD BE GRANTED THE CONSTRUCTION PERMIT. THE "FREEZE" WAS LIFTED OVER THE ENTIRE COUNTRY AT ONE TIME SO THAT IT WAS ALSO REALIZED THAT THE COMMISSION WOULD BE

FACED WITH THE REQUIREMENT OF HOLDING A GREAT NUMBER OF HEARINGS FOR COMMUNITIES ALL OVER THE UNITED STATES. IT WAS OBVIOUSLY A PHYSICAL IMPOSSIBILITY TO DECIDE ALL OF THE HEARINGS AT ONE TIME. IN AN ATTEMPT TO MAKE AN EQUITABLE PROCEDURE, THE FEDERAL COMMUNICATIONS COMMISSION ESTABLISHED A SET OF PRIORITIES TO DETERMINE THE ORDER OF HEARINGS. NOW, MORE THAN TWO YEARS AFTER THE LIFTING OF THE "FREEZE", THE PROCESS OF HOLDING HEARINGS TO DETERMINE WHICH AMONG COMPETING APPLICANTS SHOULD BE GRANTED A CONSTRUCTION PERMIT IS STILL GOING ON. IN FACT IN CERTAIN MAJOR CITIES HEARINGS HAVE NOT YET BEGUN.

OBVIOUSLY THE COMPETITION WAS MOST SEVERE FOR THE MORE DESIRABLE CHANNELS. THIS RESULTED IN A SITUATION WHERE THERE WERE MULTIPLE APPLICANTS FOR VHF CHANNELS IN CITIES AND IN MANY CASES THERE WERE ONLY SINGLE OR EVEN NO APPLICANTS FOR UHF CHANNELS IN THE SAME CITIES. IT IS JUST AS OBVIOUS THAT MOST, IF NOT ALL, APPLICANTS FOR VHF CHANNELS LOOKED AT THE UHF CHANNELS AVAILABLE AND WONDERED WHETHER OR NOT IT WOULD BE WISE TO DROP THE APPLICATION FOR THE VHF FACILITY AND APPLY FOR A UHF FACILITY, IN THE HOPE OF GETTING A LONG HEAD START ON THE VHF COMPETITION. IN EVERY CASE WHERE A CLIENT OF MINE ASKED ME TO CONSIDER AND GIVE MY OPINION ON THE ADVISABILITY OF MAKING SUCH A CHANGE IN ORDER TO BE ABLE TO GET ON THE AIR EARLIER WITH A UHF FACILITY I ADVISED VERY STRONGLY AGAINST IT WHERE THERE WAS OR WOULD BE ADEQUATE VHF SERVICE. GENERALLY, OTHER COMPETENT COUNSEL WAS ALSO SOUGHT AND IN EVERY CASE THAT I KNOW OF THE RECOMMENDATION MADE WAS THE SAME AS MINE. MY ADVICE WAS BASED ON A STUDIED OPINION THAT, IN A COMPETITIVE MARKET, IT WAS ESSENTIAL THAT THE GREATEST POSSIBLE SERVICE BE RENDERED BY A TELEVISION STATION AND THAT IT WAS VERY DOUBTFUL THAT A STATION WITHOUT EXTENDED SERVICE WOULD BE ABLE TO COMPETE ECONOMICALLY WITH SUPERIOR SERVICES. EXPERIENCE NOW INDICATES MY RECOMMENDATIONS WERE CORRECT.

UNDER OUR SYSTEM OF BROADCASTING, I BELIEVE THAT ULTIMATELY THE COST OF OPERATION OF A TELEVISION STATION AND THE RETURN ON THE INVESTMENT MUST COME FROM THE PUBLIC IN THE FORM OF ACCEPTANCE OF ADVERTISED PRODUCTS. THE ADVERTISING COST, WHICH INCLUDES THE COSTS OF THE TELEVISION FACILITY, IS BENEFICIAL IF IT CREATES A SUFFICIENT INCREASE IN THE MARKET SO THAT OTHER SAVINGS EXCEED THE ADVERTISING COST. THIS REQUIRES A WIDE BASE RELATIVELY LOW COST ADVERTISING MEDIUM WITH GOOD PUBLIC ACCEPTANCE. WHERE EVER THE UNIT COSTS ARE TOO HIGH, OR THE COVERAGE IS INADEQUATE, TELEVISION IS NOT AN ECONOMICAL MEDIUM WHETHER IT IS VHF OR UHF. THAT THIS IS TRUE IS WITNESSED BY THE NUMBER OF VHF STATIONS THAT HAVE SUSPENDED OPERATIONS, OR HAVE DECIDED AGAINST COMMENCING OPERATION. IT IS ALSO BORNE OUT IN THE PROFIT AND LOSS STATEMENTS OF STATIONS IN LARGE METROPOLITAN AREAS, SUCH AS NEW YORK AND LOS ANGELES. THERE, THERE ARE SO MANY COMPETING SERVICES THAT SOME STATIONS DO NOT HAVE A SUFFICIENTLY WIDE AUDIENCE APPEAL. SOME 50 PERCENT OF THE STATIONS IN THOSE TWO CITIES ARE ACTUALLY LOSING MONEY.

On the basis of the engineering facts, wide area coverage by single stations is possible only with VHF. In certain areas where the terrain is relatively smooth, UHF stations can serve the principal city approximately as well as VHF stations. Beyond a rather limited radius, however, UHF service has difficulty in competing with VHF which can provide service to much greater radii. The populations residing at distances of 50 to 100 miles from metropolitan areas having television services can look only to two main sources for television service. Either they must depend upon the service from VHF outlets in the metropolitan areas, the only wide range service available, or they may develop local outlets. It was for this latter purpose in part that it was necessary to add allocations for UHF channels. Where there is demand, economic justification and suitable terrain, local UHF outlets will provide a satisfactory service. In the rural areas, however, without sufficiently large population centers the only hope of receiving television service comes from an augmented VHF service. Furthermore, in metropolitan areas having rugged terrain large segments of the population can only receive satisfactory television service through the use of VHF.

At the present time there is a certain limit to the number of stations throughout the country. This is not a matter of regulation, in fact most allocations are not used, but a matter of economic fact. There are factors which over a period of years will tend to increase the number of services possible. Technological improvements are possible which will permit increased service by UHF stations. These factors include higher power transmitters, more sensitive receivers, better antenna systems. Whether or not the potential improvements are realized depends upon the demand for the improvement and the willingness of the public to pay the added cost for sets and service. In any event, however, we cannot now foresee that UHF television stations will be able to serve by any means as wide an area as a VHF station at the same location.

As the industry grows experience and study will result in reduction in the cost of providing a television program service for both VHF and UHF. Technological factors are also at work here, which over the years will have their effect. The use of magnetic tape instead of film offers one possible means. New type studio equipment designed with emphasis on ease of operation and maintenance and more reliable equipment all offer the hope of reduced operating costs. The major contribution, however, will probably be made by the ingenuity of station management and program personnel in devising simple, yet effective program sources.

A combination of the above factors should lead to a television service which will gradually increase the total number of stations over the foreseeable future.

CERTAIN PROPOSALS HAVE BEEN MADE TO THIS COMMITTEE BY MEMBERS OF THE UHF TELEVISION ASSOCIATION. THESE PROPOSALS CALL FOR A VARIETY OF ACTIONS FROM A NEW "FREEZE" ON THE GRANTING OF NEW TELEVISION STATIONS, TO THE FORCED ELIMINATION OF THE VHF TELEVISION SERVICE AND THE USE OF UHF ALONE. THE UHF TELEVISION ASSOCIATION CLAIMS TO BE A GROUP OF PIONEERS. THE TRUTH OF THE MATTER IS THAT MANY UHF TELECASTERS WHO ARE IN DIRECT COMPETITION WITH VHF STATIONS ARE NOT PIONEERS, BUT ARE INSTEAD GAMBLERS. THE REAL PIONEERS OF THE TELEVISION INDUSTRY ARE THE PRE-FREEZE VHF STATIONS WHICH STARTED TELEVISION WHEN NO ONE KNEW IF IT WOULD BE ECONOMICALLY FEASIBLE AND ALSO THOSE VHF AND UHF TELECASTERS WHO NOW ARE ATTEMPTING TO PROVIDE SERVICE TO RURAL COMMUNITIES OF LIMITED SIZE. THE UHF TELECASTERS WHO ARE NOW IN COMPETITION WITH VHF, OR ARE FACED WITH COMPETITION WITH VHF, HAVE NOT PIONEERED, BUT INSTEAD HAVE MERELY GAMBLED THAT THE EXPANSION OF VHF TELEVISION WOULD ENCOUNTER SERIOUS DELAYS. THEIR ARGUMENTS FOR THE ELIMINATION OF VHF TELEVISION ARE PURPORTEDLY BASED ON A DESIRE TO DEVELOP A NATION-WIDE SERVICE. IN VIEW OF THE LIMITED SERVICE AREA OF UHF STATIONS, THIS CAN ONLY BE ACHIEVED BY A GREAT EXPANSION IN THE NUMBER OF STATIONS IN MANY SMALL RURAL COMMUNITIES. IN THIS CONNECTION IT IS INTERESTING TO NOTE THE AFFILIATION OF THE DIRECTORS OF THE UHF TELEVISION ASSOCIATION.

MR. POLLER OF WCAN-TV, MILWAUKEE, IS NOW IN COMPETITION WITH ONE VHF STATION OF LONG STANDING AND FACED WITH COMPETITION FROM TWO ADDITIONAL VHF STATIONS. IS HIS INTEREST IN THE RURAL VIEWER OR IN HIS OWN COMPETITIVE SITUATION?

MR. TENENBAUM OF WTVI, BELLEVILLE, ILLINOIS, CLAIMING TO BE A ST. LOUIS STATION, NOW IS IN COMPETITION WITH ONE PRE-FREEZE VHF AND ONE UHF STATION AND IS FACED WITH COMPETITION FROM TWO ADDITIONAL VHF STATIONS. IS HIS INTEREST IN THE RURAL VIEWER OR IN HIS OWN COMPETITIVE SITUATION?

MR. GARRISON OF KACY, FESTUS, MISSOURI, ALSO CLAIMING TO BE A ST. LOUIS STATION, IS NOW IN COMPETITION WITH ONE PRE-FREEZE VHF STATION AND ONE UHF STATION, AND IS NOW FACED WITH COMPETITION FROM TWO ADDITIONAL VHF STATIONS. IS HIS INTEREST IN THE RURAL OR IN HIS OWN COMPETITIVE SITUATION?

MR. BERK OF WAKR, AKRON, OHIO, ONLY 30 MILES FROM CLEVELAND, OHIO, WHERE THERE ARE THREE PRE-FREEZE VHF STATIONS IS FACED WITH COMPETITION FROM THEM. IS HIS INTEREST IN THE RURAL VIEWER OR IN HIS OWN COMPETITIVE SITUATION?

MR. LOEWI OF WITV, FT. LAUDERDALE, FLORIDA, ONLY 25 MILES FROM MIAMI, AND ONLY 15 MILES FROM THE "FARM" AREA DESIGNATED FOR MIAMI TELEVISION TOWERS, CLAIMING TO BE A FT. LAUDERDALE-MIAMI STATION, IS NOW IN COMPETITION WITH ONE PRE-FREEZE VHF STATION AND ONE UHF STATION, AND FACING COMPETITION FROM TWO ADDITIONAL VHF STATIONS. IS HIS INTEREST IN THE RURAL VIEWER OR IN HIS OWN COMPETITIVE SITUATION?

MR. MCKINNON OF WGVL, GREENVILLE, SOUTH CAROLINA, NOW IN COMPETITION WITH ONE VHF STATION, IS FACED WITH COMPETITION FROM A VHF STATION IN NEARBY SPARTANBURG. IS HIS INTEREST IN THE RURAL VIEWER OR IN HIS OWN COMPETITIVE SITUATION?

THE UHF TELEVISION ASSOCIATION HAS RECOMMENDED CERTAIN "REMEDIAL ACTION". I WOULD LIKE TO CONSIDER THESE ITEM BY ITEM.

(A) A HIATUS IS REQUESTED FOR A MINIMUM OF 90 TO 180 DAYS. THIS IS OBVIOUSLY A STALL AND A HOPE THAT A NEW FREEZE WILL BE INSTIGATED LASTING INDEFINITELY AND ELIMINATING COMPETITION TO CERTAIN UHF TELECASTERS. SUCH A NEW FREEZE WOULD BE A GROSS INJUSTICE TO THE PEOPLE OF MANY OF OUR MAJOR CITIES SUCH AS, BOSTON, PITTSBURGH, ST. LOUIS, MILWAUKEE, AND OTHERS WHERE THERE IS TODAY EITHER INADEQUATE TELEVISION SERVICE OR WHERE AN ADEQUATE NUMBER OF SERVICES IS ONLY AVAILABLE IF THE PUBLIC INVESTS ADDITIONAL DOLLARS IN THEIR TELEVISION SETS. IT IS ALSO AN INJUSTICE TO THE APPLICANTS IN CITIES SUCH AS THE ABOVE WHO ARE NOW INVOLVED IN HEARINGS TO DETERMINE WHICH OF THEM WILL RECEIVE PERMISSION TO BUILD ADDITIONAL VHF STATIONS. THESE APPLICANTS WOULD BE PENALIZED FOR TAKING A LONG AND ACCURATE LOOK IN THE POTENTIALITIES OF UHF TELEVISION IN COMPETITION WITH AN ADEQUATE NUMBER OF VHF SERVICES. THIS REQUEST OF THE UHF TELEVISION ASSOCIATION IS OBVIOUSLY FOR THE BENEFIT OF A LIMITED FEW AND IS NOT FOR THE BENEFIT OF THE PUBLIC.

(B) A TRANSFER FROM VHF TO UHF IS REQUESTED. SUCH A PROPOSAL WOULD NOT PROVIDE ADDITIONAL SERVICE BUT WOULD PROVIDE LESS SERVICE. IT IS MY FIRM BELIEF THAT SUCH A TRANSFER CAN ONLY RESULT IN MAJOR AREAS OF THE COUNTRY NOT RECEIVING ADEQUATE TELEVISION SERVICE. FUTHERMORE, IN THOSE PORTIONS OF THE COUNTRY WHERE ADEQUATE SERVICE WOULD BE AVAILABLE THE PUBLIC WOULD BE TAXED MORE THAN ONE BILLION DOLLARS FOR NO BETTER SERVICE AND IN MANY CASES POORER SERVICE THAN THEY ARE NOW RECEIVING. THIS REQUEST OF THE UHF TELEVISION ASSOCIATION IS OBVIOUSLY FOR THE BENEFIT OF A LIMITED FEW AND IS NOT FOR THE BENEFIT OF THE PUBLIC.

(C) AS A "FIRST STEP" THE ELIMINATION OF INTERMIXTURE OF CHANNELS HAS BEEN REQUESTED. IN VIEW OF THE FACT THAT INTERMIXTURE DOES NOW EXIST, ANY CHANGE TO AVOID INTERMIXTURE WOULD RESULT IN MAKING MANY VHF ONLY

RECEIVERS OBSOLETE, OR WOULD REQUIRE GREATER ADDITIONAL OUTLAY BY THE PUBLIC. THE RESULT WOULD NOT BE IMPROVED SERVICE AND IN MANY CASES WOULD RESULT IN INFERIOR SERVICE. IN FACT, ALTHOUGH IT MIGHT BE POSSIBLE TO ELIMINATE INTERMIXTURE WITHIN CITIES, THERE WOULD ALWAYS BE INTERMIXTURE IN THE AREAS BETWEEN CITIES. THIS REQUEST OF THE UHF TELEVISION ASSOCIATION IS OBVIOUSLY FOR THE BENEFIT OF A LIMITED FEW AND IS NOT FOR THE BENEFIT OF THE PUBLIC.

(D) MANDATORY REGULATION OF NETWORKS AND OTHER PROGRAM SOURCES IS REQUESTED. I CANNOT HELP BUT BELIEVE THAT IN THE LONGRUN THE NETWORK PROBLEM IS ONE OF ECONOMICS. IF A NETWORK OF UHF STATIONS COULD PRODUCE THE SAME VIEWING AUDIENCE FOR THE SAME COST, ITS EXISTENCE WOULD DEPEND UPON ITS ABILITY TO PERFORM A SERVICE. IN GENERAL A GROUP OF UHF STATIONS CANNOT REACH THE SAME AUDIENCE FOR THE SAME COST. ANY REGULATION OF NETWORKS WHICH REQUIRES THAT THEY AFFILIATE WITH INEFFICIENT UHF STATIONS CAN ONLY RESULT IN ADDITIONAL COSTS WHICH ULTIMATELY MUST BE BORNE BY THE PUBLIC. THIS REQUEST OF THE UHF TELEVISION ASSOCIATION IS OBVIOUSLY FOR THE BENEFIT OF A LIMITED FEW AND IS NOT FOR THE BENEFIT OF THE PUBLIC.

(E) REGULATIONS AND TAX PREFERENCE TO ENCOURAGE ALL CHANNEL RECEIVER PRODUCTION ARE URGED. THIS IS NOT AN ENGINEERING MATTER SO I HAVE NO EXPERT OPINION ON THIS PROPOSAL.

(F) MODIFICATION OF PRESENT INCOME TAX LAWS IS REQUESTED. THIS IS NOT AN ENGINEERING MATTER SO I HAVE NO EXPERT OPINION ON THIS PROPOSAL.

(G) A FEDERAL CONTRACT FOR DEVELOPMENT AND RESEARCH IN UHF TRANSMISSION AND RECEIVING TUBES IS REQUESTED. THIS RESEARCH WOULD CONSTITUTE MERELY ANOTHER TAX ON THE AMERICAN PUBLIC. IT WILL BE MADE BY PRIVATE ENTERPRISE IF THERE IS DEMAND. IF THERE IS NOT DEMAND, IT WOULD BE AN UNNECESSARY EXPENSE.

(H) A REQUEST IS MADE FOR FINANCIAL ASSISTANCE. THIS IS NOT AN ENGINEERING MATTER SO I HAVE NO EXPERT OPINION ON THIS PROPOSAL.

THE PRESENT RULES GOVERNING TELEVISION BROADCAST STATIONS HAVE BEEN IN EFFECT FOR OVER TWO YEARS. THERE IS NO DOUBT SOME READJUSTMENT SHOULD BE MADE TO PROVIDE ADDITIONAL TELEVISION SERVICE. ANY READJUSTMENT SHOULD BE TESTED, NOT BY THE DESIRES OF A LIMITED GROUP OF TELECASTERS, BUT BY A CAREFUL APPRAISAL OF THE PUBLIC SERVICE WHICH WOULD RESULT. IN GENERAL IT IS MY BELIEF THAT THE PRESENT ALLOCATION PLAN HAS PROVIDED A REASONABLE STARTING POINT. I DO OBJECT TO THE ALLOCATION PHILOSOPHY OF THE FEDERAL COMMUNICATIONS COMMISSION WHICH HAS A TENDENCY TO BE FIXED AND INFLEXIBLE AND TO MAKE ADMINISTRATIVE CONVENIENCE PARAMOUNT TO THE PUBLIC INTEREST. A FLEXIBLE POLICY, BASED PRIMARILY ON CONSIDERATION OF PUBLIC INTEREST, HAS BEEN FOLLOWED IN THE FIELD OF STANDARD BROADCASTING AND AS A RESULT A TRULY NATION-WIDE SERVICE IS APPROXIMATED. IF THE FEDERAL COMMUNICATIONS COMMISSION WOULD RETREAT FROM ITS POSITION OF ARBITRARY REQUIREMENTS AND INSTEAD WOULD GIVE WEIGHT TO THE SAME TYPE OF CONSIDERATION AS HAS BEEN IN STANDARD BROADCASTING ADDITIONAL SERVICE COULD BE AND WOULD BE PROVIDED. NO NEW "FREEZE" OR "HIATUS" WOULD BE REQUIRED.

A. EARL CULLUM, JR.
CONSULTING RADIO ENGINEERS

QUALIFICATIONS OF A. EARL CULLUM, JR.

1. He is a consulting engineer with offices located in Dallas, Texas.

2. He graduated from the Massachusetts Institute of Technology in 1931 with a Bachelor of Science Degree in Communication Engineering.

3. Since 1936, he has maintained an office as a consulting engineer.

4. During World War II, he was employed by the Office of Scientific Research and Development. Under that employment -

   a. He was Associate Director of Radio Research Laboratory at Harvard University, Cambridge, Massachusetts.

   b. He was Expert Consultant to the Secretary of War on Electronic Matters.

   c. He was Expert Consultant to the United States Strategic and Tactical Air Forces on Electronic Matters.

5. Since World War II, he has been employed as expert consultant to the Joint Research and Development Board. Under that employment -

   a. During the last of 1945, he was the first Executive Secretary of Electronics Committee of the Joint Research and Development Board.

   b. From 1946 through 1948, he was Consultant to the Electronics Committee of Research and Development Board.

   c. From 1946 through 1947, he was Chairman of the Countermeasures Panel of the Electronics Committee.

   d. During 1948, he was a Member of the Countermeasurements Panel of the Electronics Committee.

6. He is a Fellow of the Institute of Radio Engineers.

7. He has been awarded the Presidential Certificate of Merit.

8. He appears regularly before the Federal Communications Commission as an expert witness on allocation matters.

RELATIVE SERVICE AREA OF TELEVISION FACILITIES

1. With Consideration Given to Present Receiver Sensitivities

   Channel 2, 100 kw, 1000 ft

   Channel 13, 316 kw, 1000 ft

   Channel 14, 1000 kw, 1000 ft

   Channel 83, 1000 kw, 1000 ft

2. With Consideration Given to Present Maximum UHF Power

   Channel 14, 250 kw, 1000 ft

   Channel 83, 250 kw, 1000 ft

3. With Consideration Given to Increased UHF Propagation Losses

   Channel 14, 250 kw, 1000 ft

   Channel 83, 250 kw, 1000 ft

4. With Consideration Given to More Typical UHF Antenna Height

   Channel 14, 250 kw, 500 ft

   Channel 83, 250 kw, 500 ft

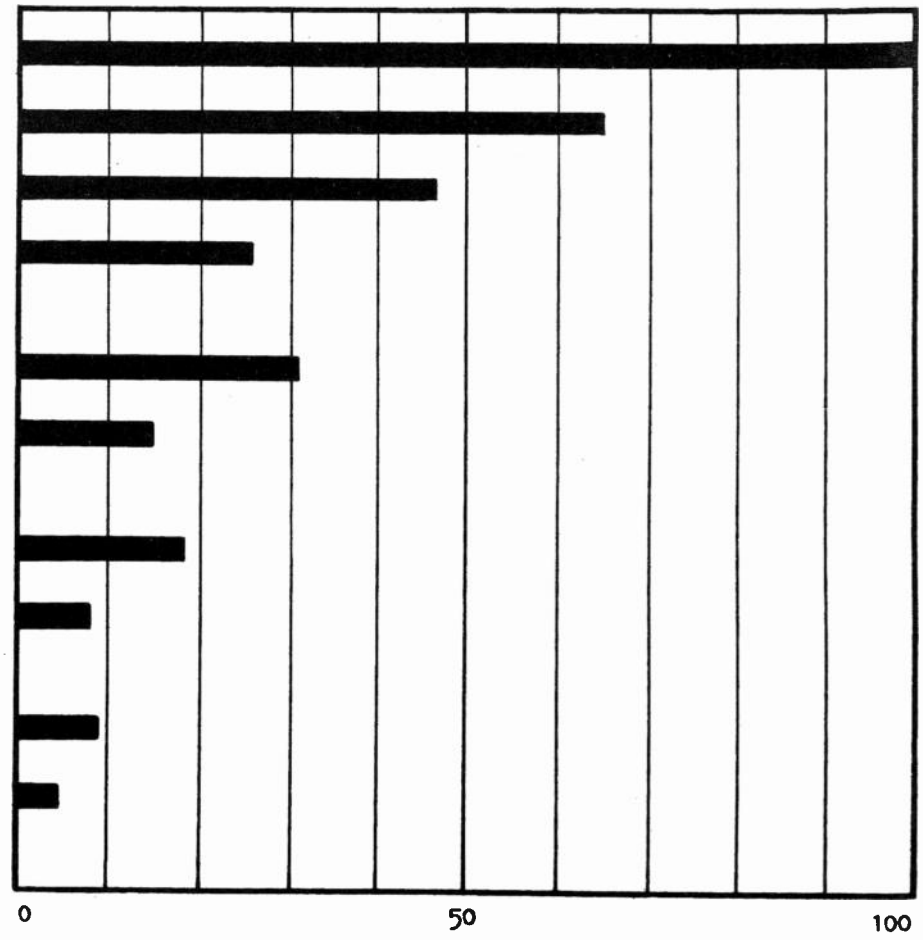

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FIGURE 1

ASSOCIATE ENGINEERS
D. A. PETERSON
T. A. WRIGHT, JR.
C. M. DANIELL
K. B. LANDRESS

DALLAS TELEPHONE
JUSTIN 6108

A. EARL CULLUM, JR.
CONSULTING RADIO ENGINEERS
HIGHLAND PARK VILLAGE
DALLAS 5, TEXAS

June 19, 1954

Mr. William H. Bronson
Shreveport Times
Shreveport, Louisiana

Dear Bill:

As you may know, I appeared on June 16, 1954, before the Subcommittee on Communications of the Interstate and Foreign Commerce Committee of the United States Senate in connection with the investigation of television. A copy of the statement made at that time is enclosed for your information.

With personal regards, I am

Sincerely yours,

A. Earl Cullum, Jr.

AECJr/mm

cc: (w/enc)

Mr. Henry Clay
Mr. B. G. Robertson
Mr. W. E. Antony
Dempsey and Koplovitz