I. MICROELECTRONICS -- "THE CRUDE OIL OF THE 80'S".

In recent months, there have been a number of comments in the press to the effect that microelectronics "will be the crude oil of the 80's." This is a seemingly apt reference to the opportunity microelectronic technology offers to those who would dominate world trade in the future. Perhaps unwittingly it also implies an unfortunate policy and strategic direction the U.S. computer industry is pursuing...one which in the long run can only lead to a declining competitive position. Remarks today will center on this dilemma...for we are, in fact, at a vital crossroads in the evolution of microelectronic technology and its application to economic growth. The "oil" analogy, or rather its inappropriateness will serve as a good vehicle to describe the nature and importance of the decisions we are about to make at this crossroads.

How we in the computer industry treat this issue of microelectronic development -- more than any other single factor -- will determine the economic future of this country. And since our political future is inextricably tied to our economic future, there is a whole lot more at stake here than mere prosperity.
IN THE NEXT EIGHTEEN MONTHS OR SO EITHER EXPLICITLY OR
IMPLICITLY, OUR INDUSTRY IS GOING TO DECIDE WHICH PATH IT WILL
TAKE. THERE ARE ONLY TWO PATHS, AND AS YOU HAVE CORRECTLY
GUessed THEY FALL INTO THE BIBLICAL MOLD -- ONE RIGHT, ONE
WRONG.

I'LL COME BACK TO THAT IN A MOMENT BUT, FIRST, LET'S RETURN TO
OUR OIL ANALOGY....AND ITS MISLEADING IMPLICATIONS.

OIL IS A PHYSICAL RESOURCE AND IT IS RELATIVELY WIDESPREAD
COMPARED TO SOME OTHER IMPORTANT MINERALS. BUT EVEN IT IS
LIMITED TO CERTAIN GEOGRAPHIC AREAS. A VERY SMALL MINORITY --
LESS THAN SEVEN PERCENT -- OF THE WORLD'S NATIONS CONTROL THE
MAJOR DEPOSITS. AND THE MAJOR INDUSTRIALIZED NATIONS ARE FOR
THE MOST PART DEPENDENT RATHER THAN SELF-SUFFICIENT. AS A
PHYSICAL RESOURCE OIL MUST BE PUMPED, PUT INTO PIPES OR
CONTAINERS, AND PHYSICALLY MOVED BEFORE IT CAN BE OF USE TO
ANYBODY. SO IT IS EASILY CONTROLLED. IN RECENT YEARS, WE HAVE
LEARNED THE HARD WAY WHAT THAT MEANS. IF YOU HAVE IT, YOU HAVE
IT -- AND THE OTHER GUY DOESN'T. HE'S GOT TO BUY, AND EVEN
BEG, TO GET IT FROM YOU -- OR, HE MAY POSSIBLY KILL YOU TO GET
IT. BUT WHEN HE DOES GET IT FROM YOU -- BY WHATEVER MEANS --
HE HAS IT AND YOU DON'T. IT'S A ZERO-SUM GAME.
MICROELECTRONICS, ON THE OTHER HAND, IS KNOWLEDGE. WELL, THERE IS A LITTLE SAND AND SOME OTHER PHYSICAL MATTER INVOLVED, BUT MICROELECTRONICS FOR STRATEGIC CONSIDERATIONS IS KNOWLEDGE. AND HERE IS THE FIRST CRUCIAL DISTINCTION WHICH MAKES THE OIL ANALOGY MISLEADING. INTELLIGENT, KNOWLEDGEABLE PEOPLE EXIST IN EVERY NATION, IN EVERY RACE, ON EVERY LAND ON EARTH. CONTROLLING KNOWLEDGE IS OBVIOUSLY A DIFFERENT BALL GAME THAN CONTROLLING A PHYSICAL QUANTITY SUCH AS OIL. FOR ALL PRACTICAL PURPOSES IT CAN'T BE DONE.

NOW CERTAINLY THE DEVELOPMENT AND USE OF HIGH TECHNOLOGY REQUIRES MORE THAN THE PRESENCE OF INTELLIGENT, KNOWLEDGEABLE PEOPLE. A WHOLE ECONOMIC, EDUCATIONAL AND POLITICAL INFRASTRUCTURE IS ALSO REQUIRED. BUT SUCH AN INFRASTRUCTURE ALSO EXISTS TO THE DEGREE NECESSARY IN EVERY COUNTRY WITH WHOM WE COMPETE. THUS, ONE CAN ARGUE ONLY WITHIN A RELATIVELY LIMITED RANGE ABOUT WHO HAS THE POTENTIAL TO DO WHAT IN THE AREA OF MICROELECTRONICS. THE POINT IS THAT, AS OPPOSED TO OIL OR ANY PHYSICAL RESOURCE, KNOWLEDGE, AND SPECIFICALLY THE KNOWLEDGE OF MICROELECTRONICS, IS MORE WIDELY DIFFUSED, MORE EASILY TRANSPORTED, AND MORE READILY ACCESSIBLE THAN ANY OTHER RESOURCE WHICH HAS EVER BEEN ESSENTIAL TO HUMAN DEVELOPMENT. ALL OF OUR INTERNATIONAL COMPETITORS HAVE ENOUGH OF THIS VITAL RESOURCE TO CREATE ECONOMIC MISCHIEF.
THERE IS A SECOND IMPORTANT DIFFERENCE: KNOWLEDGE TRANSACTIONS AS OPPOSED TO OIL TRANSACTIONS ARE NOT ZERO-SUM EVENTS. IF I HAVE KNOW-HOW AND I SELL IT TO YOU, I'VE STILL GOT IT. THE TRICK IS TO TURN THIS NON-ZERO-SUM ATTRIBUTE TO OUR ADVANTAGE.

AND RIGHT HERE WE HAVE COME TO THE CRUX OF THE MATTER -- THE ESSENCE OF THE CROSSROADS DECISION WE FACE. WE CAN TREAT KNOWLEDGE TRANSACTIONS ACCORDING TO THEIR TRUE NATURE -- NON ZERO-SUM EVENTS -- OR WE CAN FALL INTO THE TRAP OF SETTING CORPORATE STRATEGY AND GOVERNMENT POLICY AS THOUGH THEY WERE ZERO-SUM. THE FIRST WILL ALLOW US TO RETAIN A POSITION OF LEADERSHIP. THE SECOND, IN THE LONG RUN, WILL REDUCE US TO SECOND-RATE STATUS. THE WAY TO TAKE ADVANTAGE OF THE TRUE NATURE OF KNOWLEDGE IS TO WORK COOPERATIVELY WHICH MEANS: I SHARE WITH YOU IN SUCH A WAY AS TO ADD TO MY KNOW-HOW. WE BOTH GAIN. AND IF THE TRANSACTION IS WELL CONCEIVED WE BOTH GAIN TO THE SAME RELATIVE DEGREE.

FINALLY, THERE IS A THIRD IMPORTANT DISPARITY BETWEEN OIL AND MICROELECTRONICS: THE "APPLICATIONS" OF OIL ARE RELATIVELY LIMITED AND RELATIVELY CHEAP -- YOU REFINE, YOU BURN IT, YOU CONVERT IT. THERE ARE AROUND 750 REFINERIES IN THE WORLD. NOW A REFINERY COSTS ONLY 500 MILLION DOLLARS OR SO AND THE DESIGN ENGINEERING PART OF THAT COST IS ONLY $45 MILLION. THE MOST FAMILIAR APPLICATION OF OIL IS THE INTERNAL COMBUSTION ENGINE
A RELATIVELY INEXPENSIVE DEVICE IN ENGINEERING TERMS. EVEN A LEADING CHEMICAL COMPANY LIKE DUPONT SPENDS ONLY $450 MILLION PER YEAR ON NEW APPLICATIONS OF PETROLEUM DERIVATIVES. THESE SUMS OF MONEY ARE SMALL WHEN COMPARED TO RESEARCH AND DEVELOPMENT ASSOCIATED WITH THE APPLICATION OF SEMI-CONDUCTORS.

AND APPLICATION OF SEMI-CONDUCTOR TECHNOLOGY IS STILL SO LABOR-INTENSIVE THAT THE DEMAND FOR MONEY AND PEOPLE TO PURSUE THEM IS MIND-BOGGLING. IBM, ALONE, SPENDS IN DESIGN ENGINEERING COSTS THE EQUIVALENT OF 30 REFINERIES A YEAR. AND THAT IS BASICALLY FOR ONE APPLICATION OF MICROELECTRONICS -- MAKING ELECTRONIC CALCULATORS. ACCORDING TO BUSINESS WEEK, THE TOTAL U.S. COMPUTER INDUSTRY SPENDS OVER $3 BILLION PER YEAR. WORLD-WIDE, ALL APPLICATIONS OF SEMI-CONDUCTORS CONSUME NEARLY 7 BILLION R&D DOLLARS. AT THAT RATE, IN LESS THAN FIVE YEARS, WE WILL EXCEED THE ENGINEERING COSTS ASSOCIATED WITH ALL THE REFINERIES THAT EXIST AND THE APPLICATION OF MICROELECTRONICS IS STILL IN ITS INFANCY. THAT IS ONE THING ON WHICH EVERYBODY AGREES. FROM THIS PERSPECTIVE -- THAT OF THE GREAT DIFFERENCE IN THE NUMBER AND COST OF APPLICATIONS -- ACTING ON THE BELIEF THAT MICROELECTRONICS IS ANALOGOUS TO OIL CAN CLEARLY BE SEEN AS A ROAD TO DISASTER. THE KEY STRATEGIC ISSUE IN OIL IS WHO USES THE LEAST AMOUNT RELATIVE TO THE AMOUNT IS AVAILABLE TO THEM, WHEREAS FOR MICROELECTRONICS IT IS PRECISELY THOSE WHO CAN USE THE MOST WHO WILL WIN THE GAME.
SPEAKING TO THE SIXTH SOLID STATE CIRCUITS CONFERENCE RECENTLY, ROBERT NOYCE SAID: "SINCE IT IS THE GROWTH OF APPLICATIONS THAT IS THE SOURCE OF SEMICONDUCTOR INDUSTRY GROWTH, IT FOLLOWS THAT THE BEST ASSURANCE OF A VIABLE SEMICONDUCTOR INDUSTRY IN ANY COUNTRY IS THE EXISTENCE OF VIABLE INDUSTRIES USING SEMICONDUCTOR PRODUCTS, AND NOT THE OTHER WAY AROUND."

AND EVERY TECHNICAL OR CAPITAL DOLLAR SPENT ON UNNECESSARY AND DISSIPATED MICROELECTRONICS RESEARCH EFFORT IS A DOUBLE WHAMMY: IT GAINS NO BASIC KNOWLEDGE NOT ALREADY AVAILABLE AND IT IS MONEY NOT AVAILABLE TO ACHIEVE GAINS IN THE APPLICATIONS AREA -- WHICH IS WHERE THE ECONOMIC BENEFIT TRULY LIES.

II. CURRENT SITUATION.
SO WHAT IS IN FACT HAPPENING? EVERYONE IS OUT THERE SCRAMBLING FOR THEMSELVES. WE ARE ACTING EXACTLY AS THOUGH WE BELIEVE THE OIL ANALOGY. LISTEN TO BUSINESS WEEK: "...COMPUTER MAKERS ARE HAVING TO INVEST A LOT MORE MONEY...TO AUTOMATE AND STREAMLINE THEIR MANUFACTURING OPERATIONS. CAPITAL REQUIREMENTS HAVE RISEN SO RAPIDLY THAT EVEN THE HEALTHIEST OF THE COMPANIES ARE SCRAPING THE BOTTOM OF THEIR COFFERS." THE ARTICLE GOES ON TO POINT OUT HOW EVERYBODY IS INTEGRATING FORWARD AND BACKWARD AND SPENDING MONEY TO THE LIMIT. A COUPLE NUMBERS FROM THE ARTICLE WILL ILLUSTRATE MY POINT -- IN 1980 IBM SPENT TWO AND ONE QUARTER BILLION DOLLARS ON PLANT
AUTOMATION. DATAPoint IS SPENDING $50. THAT'S A RATIO OF 45 TO ONE. YOU CAN PICK OUT ANY OTHER NUMBERS FROM THE ARTICLE AND FIND SIMILAR DISCONTINUITIES OF SCALE. BUT MY POINT IS NOT TO PICK ON DATAPoint OR ANY OF THE OTHER COMPANIES MENTIONED. IT SIMPLY POINTS OUT THE DIFFUSION AND DUPLICATION IN OUR INDUSTRY. IF YOU ADD UP THE UNNECESSARY, OVERLAPPING EXPENDITURES TO ADVANCE THE TECHNOLOGY, IT WOULD UNDOUBTEDLY AMOUNT TO MORE THAN A BILLION DOLLARS PER YEAR. IN PARTICULAR, EVERYONE IS OUT THERE DUPLICATING THEIR EQUALLY INADEQUATE EXPENDITURES IN THE AREA OF SEMI-CONDUCTORS -- WHEN THEY NEED EVERY DOLLAR POSSIBLE TO ACHIEVE VALUE-ADDED DISTINCTIVENESS FOR THEIR PRODUCTS AND SERVICES WHICH ARE BASED ON THOSE DEVICES. THIS IS EVEN MORE AMAZING WHEN YOU CONSIDER THAT IN THE AREA OF SEMI-CONDUCTORS WE ARE ENTERING A TOTALLY NEW ERA. THERE ARE CHANGES TAKING PLACE IN EVERY PHASE OF MICROCIRCUITS INCLUDING RESEARCH, HARDWARE, SOFTWARE, MANUFACTURING AND APPLICATIONS:

(1) AS ALREADY NOTED, THE INDUSTRY IS BECOMING MORE CAPITAL INTENSIVE.

(2) SOFTWARE TECHNOLOGY IS MORE PERVERSIVE AND MORE CRITICAL TO ADVANCES IN SEMI-CONDUCTOR TECHNOLOGY AND CERTAINLY IN APPLYING IT.
(3) THERE IS A GREAT SHORTAGE OF TECHNICALLY TRAINED PERSONNEL, ESPECIALLY SOFTWARE TYPES. IN THE SAME ADDRESS I REFERENCED A MOMENT AGO, BOB NOYCE ALSO NOTED THAT: "...WE MUST CONSERVE DESIGN TALENT IN THE SEMI-CONDUCTOR INDUSTRY....WE MUST COPE WITH THE TOO RAPID CONSUMPTION OF OUR INDUSTRY'S HUMAN RESOURCES..."

ESSENTIALLY THERE ARE ONLY TWO OR POSSIBLY THREE EFFORTS IN MICROCIRCUITS THAT HAVE SUFFICIENT SCALE AND COORDINATION TO EFFECTIVELY COPE WITH THE CHANGING ENVIRONMENT: JAPAN, INC.; IBM; AND POSSIBLY BELL LABS. THE OTHER EFFORTS, WHICH INCLUDE CONTROL DATA'S, ARE FRACTIONATED, UNCOORDINATED AND OVER TIME WILL NOT BE PRODUCTIVE ENOUGH.

AND WHAT OF OUR GOVERNMENT? NOT SURPRISINGLY WITHOUT LEADERSHIP FROM US THERE IS NO HELP THERE. ALTHOUGH THE DEBACLE IN DETROIT IS BRINGING SOME PEOPLE TO THEIR SENSES, WE STILL NEED IMPORTANT POLICY CHANGES AND PERHAPS LEGAL CHANGES AS WELL.

THE NATIONAL SCIENCE FOUNDATION, THE DEPARTMENT OF DEFENSE AND OTHER GOVERNMENT AGENCIES COULD DO A LOT TO FOSTER COOPERATION IN MICROELECTRONIC RESEARCH -- BUT RATHER THE PREVAILING MOOD SEEMS TO MIRROR THAT OF INDUSTRY.
INTERNATIONAL ATTITUDES TOWARD COOPERATION

IF U.S. INDUSTRY DOES NOT YET UNDERSTAND WHAT IS GOING ON, WHAT IS THE SITUATION IN OTHER COUNTRIES?

UNFORTUNATELY FOR US, THERE IS A CONSIDERABLY GREATER DEGREE OF UNDERSTANDING -- ESPECIALLY IN JAPAN. I'LL JUST READ A FEW EXCERPTS FROM A DOCUMENT MANY OF YOU HAVE NO DOUBT SEEN: "THE VISION OF MITI POLICIES IN THE 1980'S."

(1) "THE DEVELOPMENT OF INNOVATIVE AND ORIGINAL TECHNOLOGY WILL BE PROMOTED TO HELP JAPAN STABILIZE ITS ECONOMIC FOUNDATIONS."

(2) "THE DEGREE OF MUTUAL DEPENDENCE WITH BOTH ADVANCED AND DEVELOPING NATIONS WILL BE HEIGHTENED."

(3) "IN DEALING WITH INDUSTRIALIZED NATIONS, JAPAN NEEDS TO INCREASE....THE PRODUCTION OF GOODS WITH LARGER ADDED VALUE, SPECIALIZING IN SECTORS WITH A COMPARATIVE ADVANTAGE. FURTHERMORE, 'INDUSTRIAL COOPERATION' AMONG INDUSTRIALIZED NATIONS WILL BECOME PREVALENT."

(4) AND, FINALLY, WITH REGARD TO TECHNOLOGY, THE DOCUMENT SAYS: "THE ABILITY TO DEVELOP ORIGINAL TECHNOLOGY MUST BE FOSTERED THROUGH THE COOPERATIVE EFFORTS OF THE
NOR IS ANY OF THAT JUST WORDS. THE JAPANESE ARE ACTING ON THEIR BELIEFS. COOPERATION AND COMPETITION ARE NOT MUTUALLY EXCLUSIVE CONCEPTS TO THE JAPANESE. AND THAT CHARACTERISTIC HAS BROUGHT THEM RAPID ADVANCEMENT NOT ONLY IN STEEL, SHIPBUILDING AND AUTOMOBILES — BUT IN OUR OWN INDUSTRY AS WELL. THERE WAS A CHART PUBLISHED IN 1978 WHICH CLEARLY SHOWS THE KIND OF TECHNOLOGICAL COOPERATION THE JAPANESE COMPUTER INDUSTRY HAS BEEN ABLE TO ACHIEVE WHILE STILL PROMOTING INTENSE MARKETPLACE COMPETITION. IN A MORE RECENT EXAMPLE, THE JAPANESE ARE PLANNING A NEW PROGRAM IN SUPERCOMPUTERS WHICH INVOLVES $140 MILLION OF GOVERNMENT MONEY — AND AS ALWAYS IMPORTANT COOPERATION IS PLANNED.

III. PERSPECTIVE

WELL I COULD GO ON WITH EXAMPLES, BUT IT IS EASY ENOUGH TO SEE WHAT IS HAPPENING.

(1) EVERYONE IN OUR INDUSTRY SENSES THAT MICROELECTRONICS IS THE ESSENTIAL FUEL THEY MUST HAVE TO SUCCEED. AND WHAT THEY SENSE IS RIGHT.
(2) BUT RATHER THAN CAREFULLY REFLECT ON THE NATURE OF THAT "FUEL", THE KNEE-JERK REACTION IS FOR EACH COMPANY TO GO GRAB SOME FOR ITSELF. IT IS HARD TO AVOID AN IMAGE OF EACH CEO DASHING OUT INTO HIS BACKYARD TO START DRILLING FOR OIL -- WITH A SHOVEL. IT'S NO ACCIDENT THAT THE "OIL" ANALOGY HAS COME INTO OUR LEXICON. IT'S A DIRECT REFLECTION OF THE UNDERLYING PSYCHOLOGY OF WHAT IS GOING ON. AND WHAT IS GOING ON IS WRONG.

(3) SENSING IN SOME VAGUE WAY THE NEED FOR HELP, THE SECOND KNEE-JERK REACTION SETS IN: THE GOVERNMENT! THE GOVERNMENT SHOULD SPONSOR MORE R&D AND, OF COURSE, GIVE BETTER TAX BREAKS. THIS APPEAL FOR GOVERNMENT SALVATION WAS SPELLED OUT IN ELABORATE DETAIL BY THE SIA IN TESTIMONY BEFORE CONGRESS IN JANUARY. WE DON'T STOP TO THINK THAT TO USE THAT MONEY EFFECTIVELY REQUIRES MORE THAN EVERYBODY JUST GRABBING A PIECE FOR THEMSELVES. BY CONTRAST, THE JAPANESE GOVERNMENT CAN SPEND A MERE 300 MILLION DOLLARS OVER FOUR OR FIVE YEARS AND BRING JAPANESE INDUSTRY FROM FAR BEHIND TO A STATE-OF-THE-ART SITUATION. IT WOULD TAKE MANY TIMES THAT AMOUNT TO ACHIEVE THE SAME DEGREE OF PROGRESS IN THE U.S. AND THAT IS NOT ONLY WRONG, IT'S INFLATIONARY.
(4) BUT THE GOVERNMENT AWAKENED BY THE ALARM OF INDUSTRY DOES REACT. HOW? BY PLACING EMBARGOES ON INTERNATIONAL TECHNOLOGY TRANSFER. WHICH IS NOT ALL THAT WRONG...IF YOU BELIEVE THIS ESSENTIAL FUEL THAT EVERYONE SEEMS SO ALARMED ABOUT CAN -- LIKE OIL -- BE "OWNED".

(5) MEANWHILE, OTHER COUNTRIES -- ESPECIALLY JAPAN -- ARE USING INDUSTRY COOPERATION AND INDUSTRY-GOVERNMENT COOPERATION TO GAIN LEVERAGE AND ARE RAPIDLY OVERTAKING US BECAUSE OF OUR DIFFUSED, REDUNDANT AND INADEQUATE APPROACH. AND THEIR APPROACH IS NOT ONLY RIGHT -- IT WILL WIN THE GAME.

WE URGENTLY NEED A DIFFERENT APPROACH. OUR DILEMMA IS THE ABSOLUTE AND EXPENSIVE NEED FOR CONTINUALLY ADVANCING THE STATE-OF-THE-ART IN MICROELECTRONICS WHILE AT THE SAME TIME GIVING HIGHEST PRIORITY TO THE EVEN MORE EXPENSIVE TASK OF APPLYING MICROELECTRONICS.

IV. THE ANSWER -- COOPERATION

AND THERE IS ONLY ONE ANSWER: BROAD-BASED TECHNOLOGICAL COOPERATION IN ADVANCED MICROCIRCUITS. UNFORTUNATELY, THAT IS EASIER SAID THAN ACHIEVED. EXPERIENCE TEACHES THAT THE TOP MANAGEMENT IN MOST LARGE CORPORATIONS IS INCAPABLE OF COPING WITH MAJOR CHANGES BEFORE THEY OCCUR. INSTEAD, THEY REACT TO

AND IF WE ARE TO CHANGE THE PATH STEIN SAYS WE ARE ON, IT CAN ONLY BE THROUGH TECHNOLOGICAL COOPERATION. WE KNOW FIRST HAND AT CONTROL DATA THE BENEFITS THAT CAN BRING. WE ALSO KNOW HOW HARD IT IS TO BRING COMPANIES TOGETHER. SOME 18 YEARS AGO, WE STARTED TO ESTABLISH A COOPERATIVE EFFORT IN PERIPHERAL EQUIPMENT. IT TOOK EIGHT YEARS TO GET THE FIRST PARTNER, NCR. THE REASON WE FINALLY GOT TOGETHER WAS, VERY FRANKLY, THAT WE WERE BOTH IN ENOUGH TROUBLE TO SEE THE LIGHT. A FEW YEARS LATER, HONEYWELL WAS FACING SERIOUS DIFFICULTY IN MAGNETIC MEMORY. WE WERE ABLE TO GET TOGETHER THE MAGNETIC PERIPHERALS JOINT VENTURE COMPANY. AND, SUBSEQUENTLY, TWO OTHER COMPANIES HAVE JOINED IN THIS COOPERATION IN PERIPHERALS. THE SUCCESS OF MPI IS WELL KNOWN. YOU DON'T HAVE TO GO ANY FURTHER FOR DEMONSTRABLE PROOF OF THE BENEFITS OF COOPERATION.
BUT IN THE CASE OF MICROELECTRONICS, IT WOULD BE FAR TOO COSTLY TO WAIT FOR THE IMPACT OF THE CHANGES COMING TO TAKE THEIR TOLL IN ORDER TO ESTABLISH THE RIGHT CLIMATE FOR COOPERATION. WE MUST ACT ON THE EXPERIENCE WE HAVE GAINED. THAT EXPERIENCE SHOWS THAT COOPERATION AND COMPETITION CAN EXIST SIMULTANEOUSLY AND EFFECTIVELY IF WE ADHERE TO FOUR BASIC PRINCIPLES:

(1) COOPERATION MUST BE LIMITED TO RESEARCH, DEVELOPMENT AND PRODUCTION — NO MARKETING.

(2) COOPERATION MUST BE BROAD-BASED — THAT IT IS NOT LIMITED TO JUST A FEW PARTICIPANTS.

(3) COOPERATION MUST FOCUS ON ADVANCED TECHNOLOGY — THOSE TECHNOLOGIES THAT ARE FIVE TO TEN YEARS OUT IN FRONT OF THOSE IN TODAY'S PRODUCTS.

(4) EACH PARTICIPANT MUST HAVE A CLEAR VALUE-ADDED STRATEGY WHICH CAN PROVIDE MARKET-PLACE DISTINCTIVENESS.

A PROPOSAL

USING THESE BASIC PRINCIPLES, A COOPERATIVE PROGRAM CAN BE CONSTRUCTED. WE BELIEVE AN ENTITY SHOULD BE FORMED TO PERFORM RESEARCH DEVELOPMENT AND PRODUCTION IN SEMI-CONDUCTOR TECHNOLOGIES AND PRODUCTS. LET ME CALL IT MICROELECTRONIC
ENTERPRISES, INC. (MEI). MEI WOULD DEVELOP STATE-OF-THE-ART MICROELECTRONIC TECHNOLOGY AND PROVIDE CIRCUITS INCORPORATING THIS TECHNOLOGY TO ITS SHAREHOLDERS -- BUT NOT TO THE MERCHANT MARKET. SPECIFICALLY, IT'S OBJECTIVE WOULD BE TO MATCH THE MOST ADVANCED CHIP IN THE INDUSTRY BY 1987 AND MAINTAIN A POSITION OF LEADERSHIP THEREAFTER.

MEI COULD SERVE AS AN UMBRELLA ORGANIZATION FOR USERS AND SEMI-CONDUCTOR MANUFACTURERS TO FUND LONG-TERM R&D. SPECIAL EMPHASIS IS NEEDED IN PROCESS TECHNOLOGY AND CAD. SAVINGS IN THE DEVELOPMENT OF EXPENSIVE SOFTWARE FOR SIMULATION AND DESIGN WOULD BE PARTICULARLY BENEFICIAL. MEI SHOULD ALSO SERVE TO CONSOLIDATE PRODUCTION REQUIREMENTS AND ARRANGE FOR MANUFACTURE OR, IF NEED BE, SET UP ITS OWN MANUFACTURING CAPABILITY. IT WOULD BE DRIVEN BY THE LONG-TERM NEEDS OF ITS PARTNERS. UNDER THIS UMBRELLA ORGANIZATION, A SERIES OF ENTITIES COULD BE FORMED FOR SPECIFIC PROJECTS. FOR EXAMPLE, SEPARATE ENTITIES COULD BE USED TO FUND EXPENSIVE WAFER FABRICATION EQUIPMENT WHICH NO ONE COMPANY COULD AFFORD. THIS APPROACH WOULD ALSO HELP COMPANIES MAKE BETTER USE OF THEIR PRESENT FACILITIES AND REDUCE EXPENDITURES FOR FACILITIES IN THE FUTURE.

THIS COOPERATIVE VENTURE, MEI, IS NO SMALL UNDERTAKING. IT WOULD REQUIRE 100 MILLION DOLLARS PER YEAR IN RESEARCH AND DEVELOPMENT EXPENDITURE AND, IF PRODUCTION FACILITIES ARE ALSO
INCLUDED, IT WOULD REQUIRE ABOUT THAT MUCH IN CAPITAL EXPENDITURES AS WELL.

MEI WOULD ALSO HELP TO FOCUS THE SUPPORT FOR UNIVERSITY RESEARCH PROGRAMS. RIGHT NOW THE SCRAMBLE FOR SUPPORT BY STANFORD, MIT, MINNESOTA, RPI, AND THE RESEARCH TRIANGLE IN NORTH CAROLINA -- TO NAME A FEW -- IS ONLY GOING TO SERVE TO FURTHER DISSIPATE SCARCE BASIC RESEARCH DOLLARS AVAILABLE FROM INDUSTRY AND GOVERNMENT. THE SPECTACLE OF CALIFORNIA AND NORTH CAROLINA DECLARING "WAR" ON EACH OTHER WITH REGARD TO MICROELECTRONICS RESEARCH WOULD BE LUDICROUS IF IT WEREN'T SERIOUS.

WELL, THERE ARE MANY OTHER ASPECTS OF A BROAD-BASED COOPERATION SUCH AS THAT I AM PROPOSING IN MEI AND CLEARLY THERE ARE MANY ATTITUDBINAL BARRIERS -- ESPECIALLY ATTITUDES REGARDING LEGAL PROBLEMS -- AS WELL, BUT IT CAN BE DONE. AND IT WOULD NOT ONLY INCREASE THE VITALITY OF CURRENT COMPETITION, IT WOULD PROVIDE OPPORTUNITY FOR MANY NEW COMPETITORS AND ACCELERATE THE TOTAL MARKET DEVELOPMENT OF MICROELECTRONICS. THE QUESTION IS: WILL IT BE DONE?

VI. CONCLUSION

THIS IS OUR CROSS ROADS. EITHER THE U.S. COMPUTER INDUSTRY WILL ADOPT A STRATEGY OF TECHNOLOGICAL COOPERATION ON A BROAD
BASIS -- OR IT WILL NOT. IF IT DOES, THERE WILL BE VITALITY AND GROWTH. IF IT DOES NOT, THEN THERE WILL BE ISOLATION AND SICKNESS -- IBM WILL BE THE GENERAL MOTORS OF THE 90'S -- THE REST OF US WON'T EVEN HAVE TO WORRY ABOUT IT.

WHERE WE GO -- IS UP TO US. I'M REMINDED OF THE TOURIST IN THE ELEVATOR OF THE WORLD TRADE CENTER IN NEW YORK. AS THEY WERE ZOOMING UP A HUNDRED FLOORS OR SO, SHE TURNED TO A FELLOW PASSENGER AND SAID, "SIR, IF THE CABLE IN THIS ELEVATOR SHOULD BREAK, WOULD I GO UP OR DOWN?"

TO WHICH HE REPLIED: "LADY, THAT ALL DEPENDS ON THE KIND OF LIFE YOU LIVED."

AND SO IT IS -- WHERE WE WIND UP IS OURS TO DECIDE -- AND WE MUST MAKE THAT CHOICE -- NOW.

THANK YOU.