

GENERAL JOHN L. PIOTROWSKI, USAF
AAAS CONGRESSIONAL SEMINAR
ON
STRATEGIC DEFENSE AND ASAT WEAPONS
WASHINGTON, D.C.
27 SEPTEMBER 1989

I WELCOME THIS OPPORTUNITY TO TALK TO YOU AND USE
SOME CHARTS FOR ILLUSTRATION. I AM GOING TO TALK
ABOUT ASAT FIRST, ANTISATELLITE WEAPONS.



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- PRESENTATION TO -

AAAS CONGRESSIONAL SEMINAR
ON
STRATEGIC DEFENSE AND ASAT WEAPONS
27 SEPTEMBER 1989

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U.S. AND USSR VIEW OF SPACE

- U.S. DEVELOPED SOPHISTICATED, HIGHLY CAPABLE SPACECRAFT
 - TO PROVIDE WARNING
 - TO PREVENT MILITARY AND TECHNOLOGICAL SURPRISE
- USSR DEVELOPED ROBUST, VERY RESPONSIVE SPACE INFRASTRUCTURE AND SPACE CONTROL WEAPONS
 - TO PROVIDE WARNING
 - TO PROVIDE TARGETING DATA DIRECTLY TO SOVIET MILITARY FORCES ON EARTH
 - CAPABLE OF WARFIGHTING
 - CAPABLE OF DENYING U.S./ALLIED USE OF SPACE

THIS INFORMATION IS REALLY MORE BY INSPECTION THAN BY INTENTION, AND WHAT WE FIND IS THAT UNITED STATES DEVELOPED SPACECRAFT TO PROVIDE WARNING----WARNING OF THE POSSIBLE OUTBREAK OF HOSTILITIES----AND TO PREVENT MILITARY AND TECHNOLOGICAL PROBLEMS.

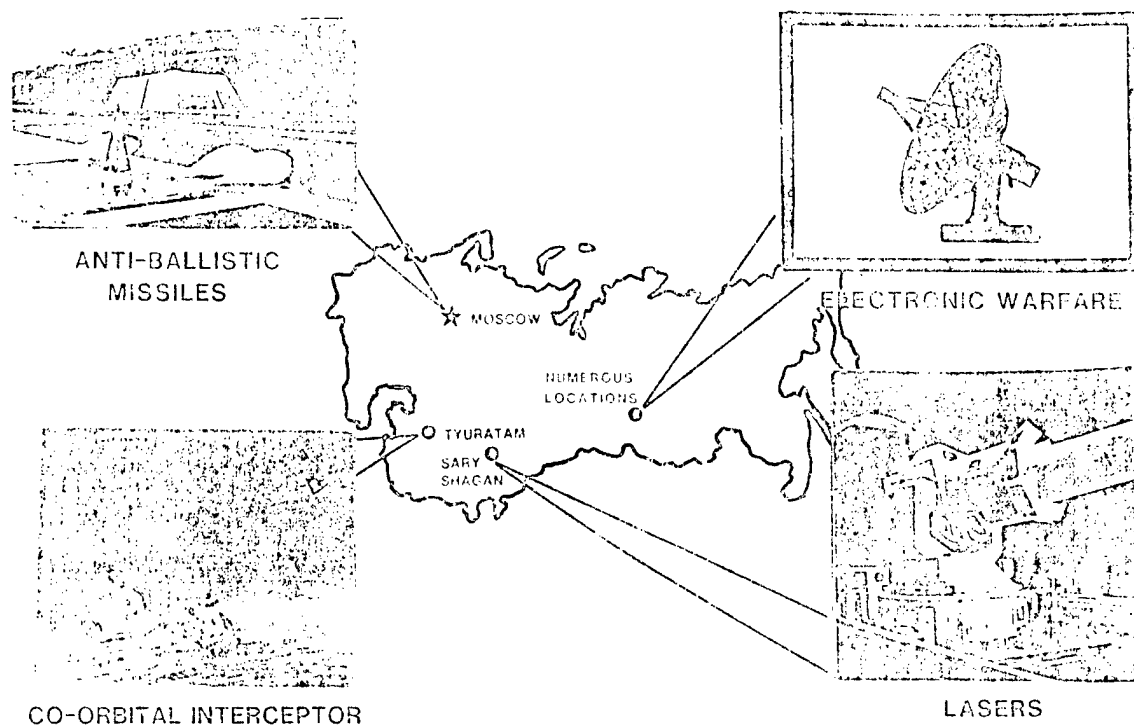
ALSO, BY INSPECTION, IT APPEARS CLEAR THAT WE DID NOT INTEND TO USE THOSE SPACECRAFT FOR WAR FIGHTING, OR IF WE DID, WE DIDN'T EXPECT THEM TO BE HELD AT RISK BECAUSE WE DON'T HAVE LARGE, ROBUST CONSTELLATIONS, AND WE DON'T HAVE A RAPID RESUPPLY CAPABILITY, NOR DID WE BUILD A LOT OF SURVIVABILITY IN THE SATELLITES. SO,

BY INSPECTION ONE HAS TO ASSUME THAT WE INTENDED TO USE THESE PRIOR TO A CONFLICT BUT NOT NECESSARILY DURING A CONFLICT.

ON THE OTHER HAND, WHEN WE LOOK AT SOVIET SPACE CAPABILITY, WE FIND THAT, FOR WHATEVER REASON, PERHAPS BECAUSE OF TECHNOLOGICAL INFERIORITY, THEY BUILT A SPACE INFRASTRUCTURE THAT ALLOWS THEM TO GET INTO SPACE VERY QUICKLY, ALLOWS THEM TO PUT A LOT OF SATELLITES UP IN A SHORT PERIOD OF TIME, AND IN FACT GIVES THEM THE KIND OF MILITARY CAPABILITY THAT ONE WOULD LIKE TO HAVE. I WILL DESCRIBE THAT IN GREATER DETAIL.



THREAT TO FRIENDLY SPACE SYSTEMS



THE THREATS TO OUR SPACE SYSTEMS GENERALLY ARE VIEWED AS THE SL-11-LAUNCHED CO-ORBITAL ASAT. HOWEVER, THE SOVIETS HAVE REALLY COVERED ALL BASES. THEY HAVE THE CO-ORBITAL ASAT, THEY HAVE AN ABM SYSTEM, NOT ONLY THE ONE THAT THEY PROTECT MOSCOW WITH, BUT THE ONE THAT THEY TEST THAT SYSTEM WITH AT SARY SHAGAN, WHERE THEY HAVE BATTLE-MANAGEMENT RADARS, SATELLITE-TRACKING RADARS, AS WELL AS SOME LAUNCHERS. THIS ENTIRE SYSTEM IS, BY THE WAY, TREATY COMPLIANT. AND THEN THEY HAVE A VERY ROBUST ELECTRONIC COMBAT CAPABILITY----AND I WILL TALK MORE TO THAT WHEN I TALK ABOUT SOME OF THE SYSTEMS. THEY ALSO MAINTAIN LASER CAPABILITIES THAT ARE POTENTIAL ASAT SYSTEMS.

SOVIET ASAT DOCTRINE

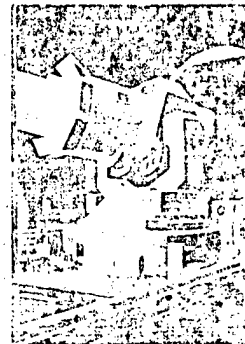


DURING THE COURSE OF A WAR
MILITARY SPACE SYSTEMS CAPABLE
OF DESTROYING SPACE TARGETS WILL
BE OF DECISIVE SIGNIFICANCE

SOVIET MILITARY ENCYCLOPEDIA 1977

"IT WOULD BE A MISTAKE TO ALLOW THE
IMPERIALIST CAMP TO ACHIEVE SUPERIORITY
IN SPACE. WE MUST OPPOSE THEM
WITH MORE EFFECTIVE MEANS AND
METHODS FOR THE USE OF SPACE FOR
DEFENSE PURPOSES."

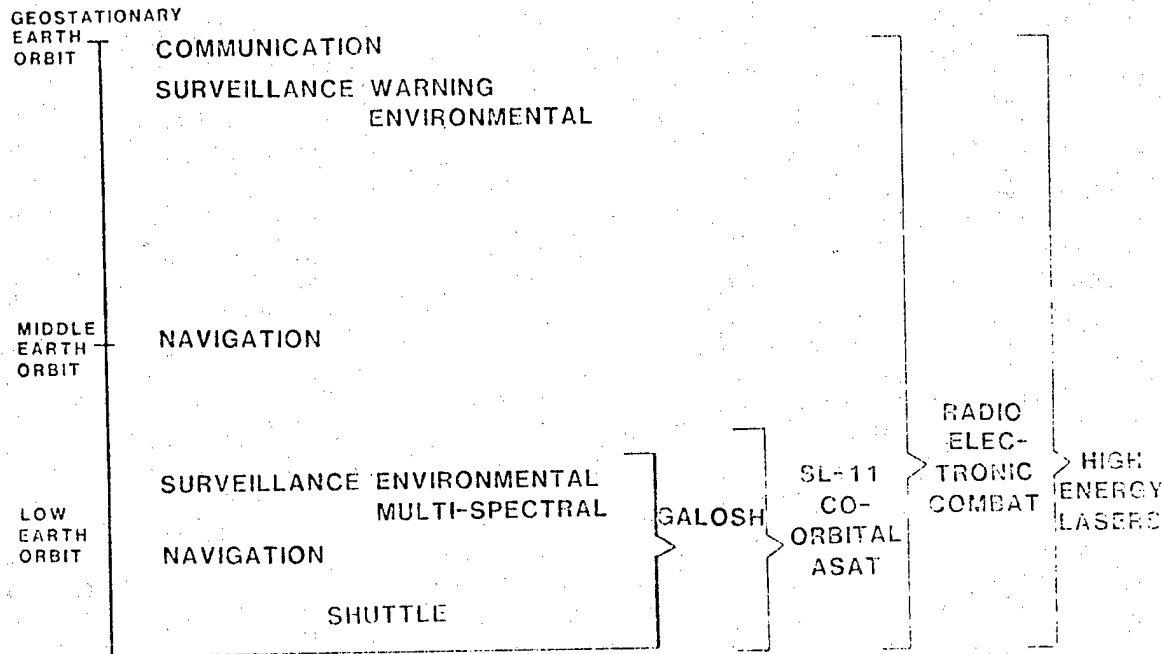
MARSHAL VASSILY SOKOLOVSKY,
AUTHOR OF SOVIET MILITARY STRATEGY



**CLEARLY, THEY HAVE STATED THEIR INTENT. WHEN WE
LOOK AT THEIR DOCTRINE, DESTROYING SPACE TARGETS WILL
BE OF DECISIVE SIGNIFICANT. IT IS IN THEIR ENCYCLOPEDIA,
AND THEIR MILITARY LEADERSHIP HAS MADE STATEMENTS
ABOUT THE NECESSITY OF DESTROYING U.S. SATELLITES, OF
NOT ALLOWING US TO USE THOSE SYSTEMS IN SPACE. THERE
ARE SOME MORE INSTRUCTIVE COMMENTS THAT I WILL GET
INTO LATER.**



POTENTIAL SPACECRAFT VULNERABILITY



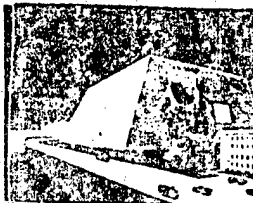
NOW, IF WE LOOK AT THE RANGE OF SATELLITES FROM LOW EARTH ORBIT, WHICH IS THE MOST IMPORTANT TO THE MILITARY PERSON, EXCEPT FOR COMMUNICATIONS AT GEOSYNCHRONOUS, AND GENERALLY NAVIGATION SYSTEMS, LIKE THE GLOBAL POSITIONING SYSTEM AT SEMI-SYNCHRONOUS ORBIT, WE FIND THAT THEY ARE THREATENED AT LOW EARTH ORBIT BY THE GALOSH, THE SL-11 CO-ORBITAL ASAT SYSTEM IN LOW EARTH ORBIT; AND POTENTIALLY BY ELECTRONIC JAMMING OR RADIOELECTRONIC COMBAT AND BY LASERS IN THE HIGHER ALTITUDES. BASICALLY THEY THREATEN THE WHOLE RANGE OF SATELLITES, BUT MOST SIGNIFICANT, I THINK, IS THE LOW EARTH ORBITING CAPABILITY.



SOVIET ABM IN AN ASAT ROLE



GALOSH ABM
INTERCEPTOR



PUSHKINO
ABM RADAR

"GUIDED MISSILE-INTERCEPTORS ARE DESIGNED TO DEFEAT NOT ONLY MISSILES BUT SPACECRAFT AS WELL. THIS MEANS THAT THEY CAN CARRY OUT BOTH DEFENSIVE AS WELL AS OFFENSIVE FUNCTIONS - - THEY CAN CONDUCT THE BATTLE FOR SUPREMACY IN SPACE..."

GENERAL-MAJOR YURIY V. LEBEDEV
DEPUTY CHIEF,
NEGOTIATION DIRECTORATE
GENERAL STAFF

2 JULY 87

THIS IS A RATHER INSTRUCTIVE STATEMENT BY GENERAL LEBEDEV IN JULY OF 1987, WHEN HE TALKED ABOUT THE GALOSH ABM SYSTEM---AND AGAIN, I AM TALKING ABOUT THE SYSTEMS THAT THEY HAVE AT SARY SHAGAN. HE SAID THESE MISSILES WERE DESIGNED NOT ONLY TO ATTACK BALLISTIC MISSILES BUT ALSO TO ATTACK AND DESTROY SATELLITES, AND WE INTEND TO USE THEM FOR THAT. WELL, THAT IS VERY INSTRUCTIVE. WE KNOW THEY HAVE THE SYSTEMS; THEY KNOW THE SYSTEMS ARE WELL-TESTED; AND WE HAVE STATEMENTS OF INTENT TO USE.



SOVIET CO-ORBITAL ASAT

- RADAR SENSOR/ PELLET-TYPE WARHEAD
- TWO LAUNCH PADS WITH STORAGE FOR SEVERAL INTERCEPTORS
- MULTIPLE LAUNCHES DAILY
- TESTED IN SPACE
- COMPONENTS ROUTINELY TESTED
 - OVER 100 SL-11 LAUNCHES
 - RADARS TRACK OVER 7000 OBJECTS DAILY



SOVIET SL-11
BOOSTER

WHEN WE LOOK AT THE CO-ORBITAL SYSTEM, IT HAS BEEN WELL-TESTED. IT IS A SHOTGUN TYPE WEAPON THAT FLIES IN FORMATION WITH THE VICTIM SATELLITE AND DESTROYS THAT SATELLITE BY FIRING A PELLET CHARGE. THIS SYSTEM HAS BEEN TESTED IN SPACE NUMEROUS TIMES AND HAS A PROBABILITY OF KILL OF BETTER THAN ANYTHING I HAVE GONE INTO COMBAT WITH.

NOW, IT IS IMPORTANT TO NOTE THAT THIS SYSTEM WAS FULLY TESTED END-TO-END BY COMBAT CREWS THAT WOULD LAUNCH IT FROM THE LAUNCHERS, IN WHICH THEY WOULD LAUNCH IT AGAINST REAL SPACE TARGETS INSTEAD OF TEST SPACE TARGETS OF THEIR OWN. THAT IT WAS LAUNCHED IN ITS ENTIRETY----IN OTHER WORDS, IT WENT

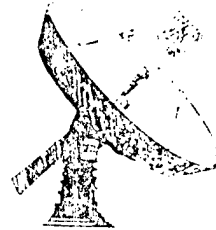
THROUGH A FULL DETONATION OF ITS WARHEAD AND THE LIKE. THEY HAVE LAUNCHED THE BOOSTER, WHICH IS THE BRAINS OF PUTTING IT CO-ORBITAL, WELL OVER 100 TIMES.

IF I MAKE A COMPARISON BETWEEN THIS SYSTEM AND THE MX PEACEKEEPER, WHICH HAS BEEN TESTED 19 TIMES, NEVER BEEN LAUNCHED FROM AN OPERATIONAL SILO, NEVER BEEN LAUNCHED IN THE DIRECTION IT WOULD BE LAUNCHED IN ANGER, NEVER TESTED IN ITS ENTIRETY BECAUSE IT CANNOT BECAUSE OF TREATY COMPLIANCE WITH TESTING WARHEADS IN SPACE OR ON THE SURFACE OR TESTING WARHEADS OF CERTAIN YIELDS; SO IF ONE MAKE'S A COMPARISON BETWEEN THESE TWO, THE SOVIETS HAVE FAR MORE CONFIDENCE IN THIS SYSTEM THAN WE SHOULD HAVE CONFIDENCE IN THE MX, AND YET I AM ABSOLUTELY CONFIDENT THAT THE PEACEKEEPER MISSILE IS TESTED WELL AND WILL WORK.



SOVIET RADIO ELECTRONIC WARFARE

- THE SOVIETS LEAD THE WEST IN DEVELOPING HIGH POWER RADIO-FREQUENCY AND MICROWAVE SOURCES
- RECENT DEVELOPMENTS COULD LEAD TO WEAPONS CAPABLE OF JAMMING OR DESTROYING ELECTRONICS

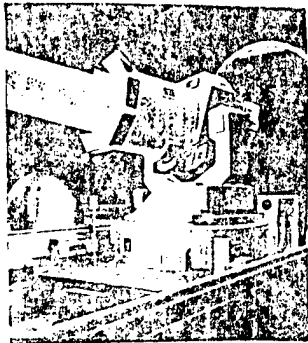


TURNING TO RADIOELECTRONIC COMBAT, RADIOELECTRONIC COMBAT IS SOMETHING THAT THE SOVIETS HOLD IN VERY HIGH REGARD IN THEIR QUIVER OF WEAPONS. IT IS SOMETHING THEY HAVE FOR JAMMING COMMUNICATIONS AND JAMMING WEAPONS SYSTEMS. IT IS CLEAR FROM THEIR LITERATURE THAT THEY HAVE A VERY, VERY STRONG CAPABILITY IN THIS AREA.

NOW, RECENTLY WE HAVE FIELDDED THE SECOND GENERATION OF DEFENSE COMMUNICATIONS SATELLITES WHICH ARE JAM-RESISTANT TO A LARGE DEGREE, AND WE ARE PLANNING TO FIELD MILSTAR, WHICH IS EVEN MORE JAM RESISTANT, BUT NOT ALL OF OUR OTHER SYSTEMS ARE CAPABLE OF DEALING WITH THIS POTENTIAL THREAT.



SPACE-RELATED LASER ACTIVITY

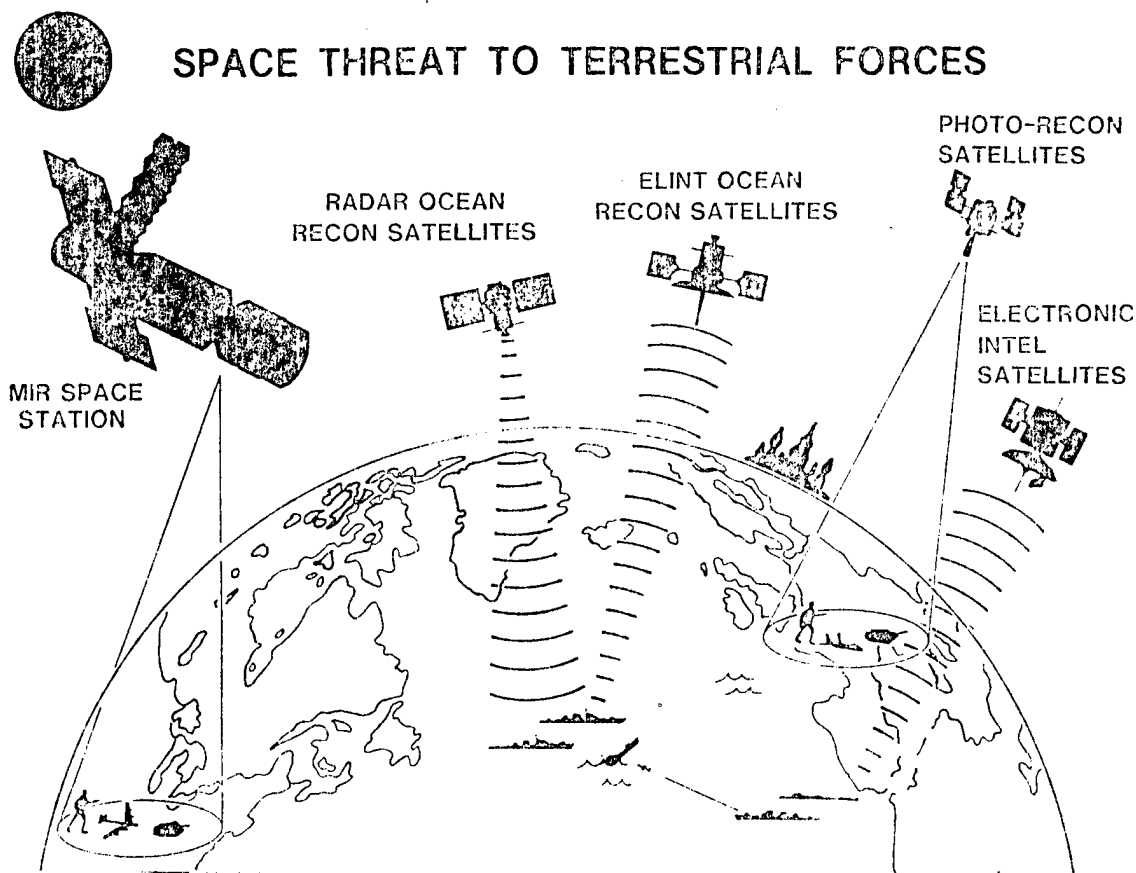


SARY SHAGAN LASER

- 10,000 SCIENTISTS ENGINEERS
- 6 R&D FACILITIES
- CAPABILITY TO ATTACK U.S. SATELLITES

TALKING ABOUT LASERS, WELL, OF COURSE THERE IS THE WELL-ADVERTISED VISIT TO THE SOVIET UNION TO LOOK AT 19 RUBY LASERS AT SARY SHAGAN. THERE ARE OTHER LASER INSTALLATIONS IN THE SOVIET UNION WHICH ARE ALSO OF CONCERN. THEY HAVE SIX MAJOR R&D FACILITIES. THEY HAVE SOME 10,000 SCIENTISTS WORKING ON THIS TECHNOLOGY. I THINK THE FRENCH PUBLISHED A PICTURE OF A FACILITY NORTH OF AFGHANISTAN CALLED DUSHANBE WHICH REPRESENTS A SIGNIFICANT TECHNOLOGICAL ADVANCE AND REPRESENTS THE KIND OF CAPABILITY THAT COULD THREATEN OUR SATELLITES.

NOW, LET'S TALK ABOUT THE POWER OF LASERS. THE SOVIETS, TO MY UNDERSTANDING, HAVE LASERS IN THE ONE-TO TWO-MEGAWATT CLASS IN THEIR R&D PROGRAM. WHEN I ASK OUR ENGINEERS WHAT COULD THAT DO, THEY SAY, WELL, IF IT IS A CARBON MONOXIDE OR CARBON DIOXIDE LASER OF THAT CLASS, YOU COULD DESTROY SOLAR CELLS OF LOW EARTH ORBITING SATELLITES. ALL OUR SATELLITES ARE POWERED BY SOLAR CELLS, WHICH MEANS YOU COULD PUT SATELLITES INTO A POWER DECAY AND EVENTUALLY POWER DEPLETION.



TURNING TO THREATS AGAINST OUR TERRESTRIAL FORCES AS OPPOSED TO THREATS AGAINST OUR SATELLITES, THE SOVIETS HAVE A WIDE RANGE OF OPTIONS. THERE IS THE MIR SPACE STATION, OF COURSE. ONE DOES NOT KNOW

WHAT THAT IS CAPABLE OF DOING, EXCEPT THAT OUR ASTRONAUTS HAVE POINTED OUT THAT THEY CAN TRACK CAPITAL SHIPS, HOURS, IN FACT DAYS, AFTER THEY HAVE PASSED BECAUSE OF THE DISTURBANCE THAT THEY CREATE IN THE WATER. SO JUST AS AN OBSERVATION PLATFORM, IT IS VERY USEFUL. ONE OF OUR ASTRONAUTS DESCRIBED A TANK BATTLE BETWEEN IRAN AND IRAQ WITH EXQUISITE ACCURACY SIMPLY BY OBSERVING IT FROM SPACE WITH A SMALL AID TO THE HUMAN EYE.

THEY HAVE RADAR OCEAN RECONNAISSANCE AND ELECTRONIC OCEAN RECONNAISSANCE SATELLITES WHICH ARE DESIGNED TO DETECT AND TRACK OUR RESUPPLY AND REINFORCEMENT SHIPS. YOU KNOW, OUR STRATEGY IS ONE OF FORWARD DEFENSE. IN SUPPORTING NATO, WE HAVE TO GET A LOT OF FORCES THERE QUICKLY. THEY ARE GOING TO GO BY SHIPS WHICH ARE GOING TO BE TRACKED LARGELY BY THESE SOVIET SPACE SYSTEMS.

IN AN EARLIER DISCUSSION, A QUESTION WAS ASKED BY A YOUNG LADY ABOUT JAMMING THESE SYSTEMS, AND IT WAS POINTED OUT THAT ANYTHING THAT RECEIVES ELECTRONS CAN BE JAMMED, BUT ANY RADAR THAT YOU JAM HIGHLIGHTS WHERE THE JAMMING SOURCE IS. SO IF THE JAMMING COMES FROM THE SHIPS, IT ILLUMINATES THE SHIPS. AND, OH, BY THE WAY, THESE TWO SYSTEMS CAN FLY IN CLOSE PROXIMITY,

SO IF YOU JAM THE RORSAT THEN THE EOPSAT PICKS UP THE JAMMING SIGNAL AND LOCATES THE SOURCE. SO IT IS A VERY CLEVER ARRANGEMENT.

THEY HAVE PHOTO RECONNAISSANCE SYSTEMS AND OTHER ELECTRONIC INTELLIGENCE SYSTEMS, ALL VERY CAPABLE OF LOCATING OUR SYSTEMS----THEY ARE GUNSIGHTS IN SPACE, IF YOU WILL. WHILE WE WILL NOT LET RECONNAISSANCE AIRPLANES FLY FREE OVER THE BATTLEFIELD, WE HAVE SOMEHOW IN THE PAST AGREED THAT SATELLITES THAT DO THE SAME WORK, ONLY MORE EFFICIENTLY, IN SPACE CAN BE ALLOWED TO FLY FREE OVER THE BATTLEFIELD.



SOVIET MILITARY SPACE SUPPORT

"THE IMPLEMENTATION OF SPACE PROGRAMS
FOR MILITARY PURPOSES WILL ENHANCE THE
COMBAT EFFECTIVENESS OF OUR ARMED FORCES
BY A FACTOR OF 1.5 TO 2 "

ARMY GENERAL M. MOISEYEV
CHIEF, USSR ARMED FORCES
GENERAL STAFF

11 JUNE 89

NOW, THIS IS A VERY INSTRUCTIVE STATEMENT ON
THOSE SYSTEMS. IT COMES FROM GENERAL MOISEYEV, WHO
IS THE HEAD OF THE SOVIET DEFENSE STAFF, AND IT SAYS
JUST A SMALL INVESTMENT IN THOSE SATELLITES LEVERAGES
THEIR FORCES BY 150 TO 200 PERCENT. I DO NOT KNOW IF HE
MEANS JUST ONE-AND-A-HALF TIMES AS BIG OR
ONE-AND-A-HALF-PLUS TIMES AS BIG, BUT HE IS SAYING
THAT 200 DIVISIONS WOULD BE WORTH 300 OR 400 OR 500
DIVISIONS, OR THAT 10,000 AIRCRAFT ARE WORTH 20,000 OR
30,000 OR 40,000 AIRCRAFT, DEPENDING ON HOW YOU APPLY
THAT MULTIPLIER.

SOME SUGGEST THAT, BECAUSE WE ARE MORE DEPENDENT ON SATELLITES THAN THE SOVIETS, WE SHOULD NOT PROTECT OUR SATELLITES NOR SHOULD WE BE ABLE TO REDUCE SOVIET RELIANCE ON SATELLITES. I THINK IT IS A VERY INSTRUCTIVE STATEMENT THAT THE SOVIETS ARE VERY RELIANT ON SATELLITES AND IN FACT ARE INCREASING THEIR RELIANCE ON THEM.

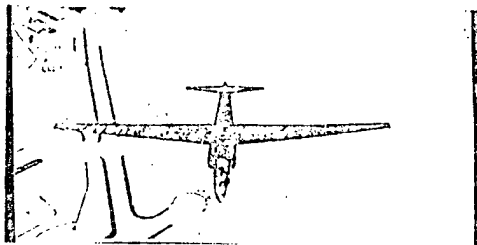
LET ME MAKE ONE OTHER POINT WHILE THIS CHART IS UP. DURING THE FALKLANDS CONFLICT, DURING THE 69-DAY PERIOD OF THE FALKLANDS CONFLICT, THE SOVIETS CONDUCTED 29 SPACE LAUNCHES WHICH INCLUDED A NUMBER OF SOVIET SATELLITES THAT THREATEN OUR FORCES. NOW, THAT IS MORE SATELLITES THAN WE HAVE LAUNCHED IN THREE YEARS, AND THEY LAUNCHED THEM IN A 69-DAY PERIOD.

WHAT IS MORE INSTRUCTIVE IS THAT THEY WERE LARGELY WAR-FIGHTING SATELLITES THAT FOCUSED THEIR ENERGY ON THE FALKLANDS----A VERY, VERY DEMONSTRATIVE CAPABILITY OF THE SOVIETS' ABILITY TO LAUNCH SATELLITES THAT CAN GAIN INFORMATION ABOUT A CONFLICT. NOW, WHETHER THEY SAW THAT AS AN OPPORTUNITY TO SEE HOW A WARSAW PACT ADVERSARY, THE BRITISH, WERE GOING TO USE THEIR COMBINED ARMS-----THEIR LAND, SEA, AND AIR FORCES----OR

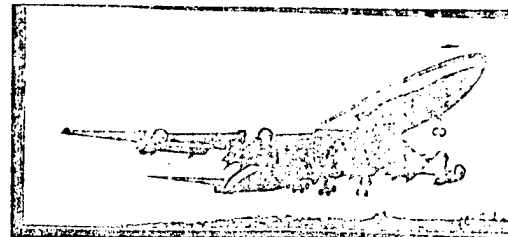
WHETHER THEY WERE JUST CURIOUS, I DO NOT KNOW, BUT CERTAINLY THEY DEMONSTRATED A SIGNIFICANT MILITARY CAPABILITY.



WOULD THE SOVIETS USE THEIR ASAT



GARY POWERS



KAL 007



EAST GERMANY

I HAVE OFTEN BEEN ASKED, DO YOU THINK THE SOVIETS WOULD SHOOT DOWN ONE OF OUR SATELLITES? WOULDN'T THAT PRECIPITATE A RESPONSE OF THE SIOP AND THEREFORE DETER THE SOVIETS FROM ATTACKING OUR SATELLITES?

THEY CERTAINLY SHOT DOWN GARY POWERS. THEY SHOT DOWN KAL-007, KNOWING THERE WERE PEOPLE ON BOARD. THEY THOUGHT IT WAS A RECONNAISSANCE PLATFORM; THEY DID NOT KNOW IT WAS A KOREAN AIRLINER. BUT THEY SHOT IT DOWN WILLING TO ACCEPT FLAG-DRAPED COFFINS AND GRIEVING WIDOWS ON NATIONAL TELEVISION

**MOURNING THE LOSS OF THE LIVES OF THOSE PEOPLE. AND
THEY SHOT MAJOR NICHOLSON WITH AN OBSERVER STANDING
BY WATCHING THEM SHOOT HIM IN COLD BLOOD.**

**WOULD THEY SHOOT DOWN A MECHANICAL DEVICE IN
SPACE THAT THEY VIEWED AS A THREAT TO THEIR NATIONAL
SECURITY? YOU BET THEY WOULD.**



SOVIET ASAT USE

**"A WORLD WAR FOUGHT WITH CONVENTIONAL
WEAPONS WOULD ENVELOP NOT ONLY THE MAJORITY
OF THE WORLD'S CONTINENTS, OCEANS AND SEAS,
BUT WOULD INCLUDE THE NEAR-EARTH ORBIT
AEROSPACE REGION ALSO"**

D.T. YAZOV

**IN FACT, THIS IS WHAT THE MINISTER OF DEFENSE
SAID----HE SAID IT TWO YEARS AGO----THAT A WORLD WAR
FOUGHT WITH CONVENTIONAL WEAPONS WOULD ENVELOP NOT
ONLY THE MAJORITY OF THE WORLD'S CONTINENTS AND
OCEANS BUT ALSO LOW EARTH ORBITS IN SPACE. SO,**

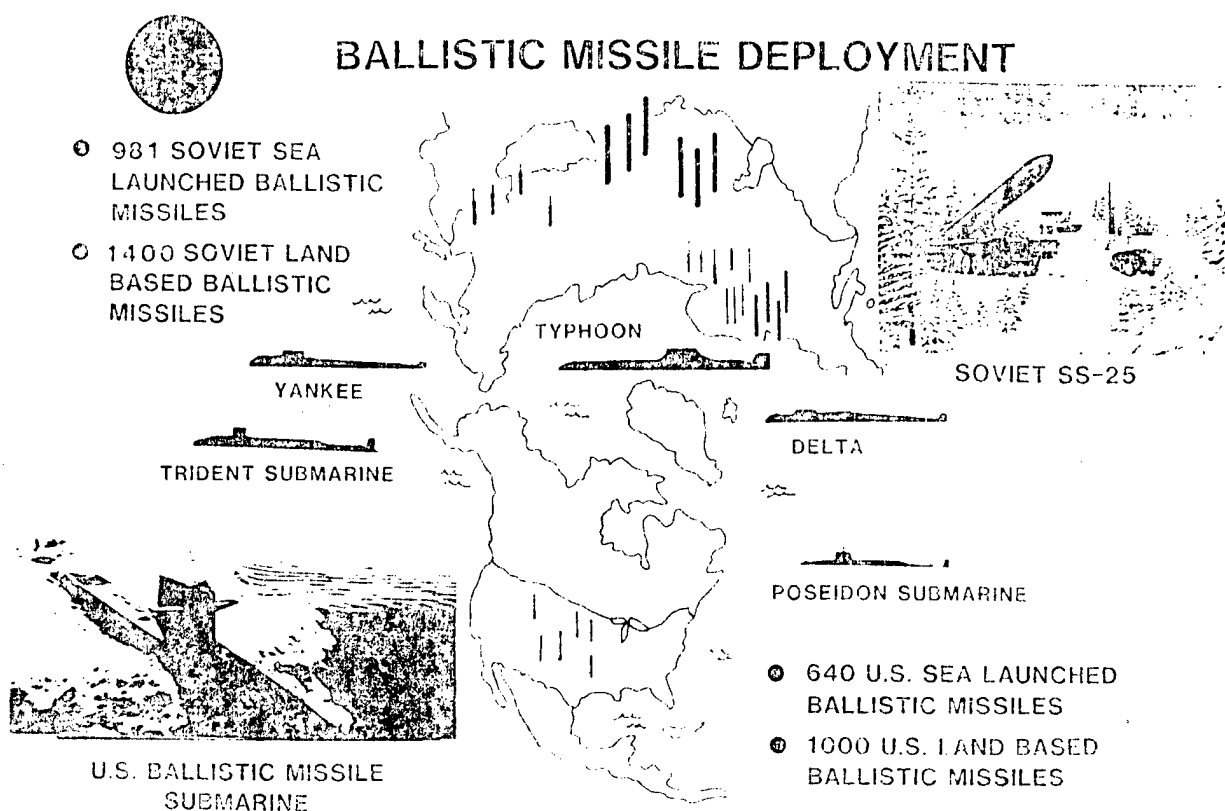
CLEARLY, THE MINISTER OF DEFENSE, TWO YEARS AGO, SAID THAT IN A CONVENTIONAL WAR THE SOVIETS WOULD SHOOT DOWN OUR SATELLITES. I THINK THEY WOULD.



CURRENT U.S. OPTIONS

- DO NOTHING
- PROTEST
- TARGET TERRESTRIAL FACILITIES

AND WHAT WOULD OUR RESPONSE BE? WELL, OUR RESPONSES TO SUCH AN ATTACK ARE LIMITED. WE DO NOT HAVE AN ANTISATELLITE WEAPON TO RESPOND IN KIND. WE COULD SEND A STRONG DEMARCHE WITH A STRONGER MESSAGE TO FOLLOW. OR WE COULD TARGET THEIR TERRESTRIAL SPACE SUPPORT FACILITIES IN THE SOVIET UNION, BUT BECAUSE THEY ONLY EXIST IN THE SOVIET UNION, SUCH A RESPONSE IS SERIOUSLY ESCALATORY IN NATURE AND SOMETHING THAT I DO NOT THINK THIS NATION WOULD DO. SO THOSE ARE THE RESPONSES THAT WE HAVE, ABSENT AN ASAT.



NOW, I WOULD LIKE TO SHIFT TO BALLISTIC MISSILE DEFENSE. THIS SOMEWHAT ILLUSTRATES THE THREAT WITH THE TYPHOON AND DELTA SUBMARINES COMING MORE AND MORE INTO THE FORE, SOME NEARLY 1,000 SOVIET-LAUNCHED BALLISTIC MISSILES, SEA-LAUNCHED BALLISTIC MISSILES, AND 1,400 LAND-LAUNCHED BALLISTIC MISSILES COMPARED TO ABOUT 1,600; SO ABOUT 2,300 VERSUS 1,600 OF OURS.

WHEN THIS NATION REJECTED BALLISTIC MISSILE DEFENSE IN THE 1960s, IT WAS BELIEVED THAT, ONE, WE HAD STRATEGIC NUCLEAR SUPERIORITY, WHICH WE DID; THAT THE WORLD WAS BIPOLAR, WHICH IT WAS; AND THAT IT DID NOT

APPEAR THAT THE TECHNOLOGY WAS AVAILABLE TO ALLOW US TO DEFEND MORE ECONOMICALLY THAT WE COULD ADD OFFENSIVE WEAPONS.

WHAT HAS CHANGED? THE SOVIETS HAVE A LARGER NUMBER OF STRATEGIC MISSILES THAN WE DO; IT IS CALLED PARITY OR STRATEGIC EQUIVALENCE. THE WORLD IS NO LONGER BIPOLAR. WE FIND THAT THE CHINESE, THE SAUDI ARABIANS----IN FACT, I THINK IT WAS JUDGE WEBSTER WHO INFORMED THE CONGRESS THAT SOME 20 NATIONS WOULD HAVE THE CAPABILITY TO DELIVER BALLISTIC WEAPONS WITH WARHEADS OF MASS DESTRUCTION, LARGELY CHEMICAL, BY THE TURN OF THE CENTURY, AND IT APPEARS THAT TECHNOLOGY IS HERE TO ALLOW US TO DEFEND AGAINST BALLISTIC MISSILES.



SS-24/25 DEPLOYMENTS



- ROAD-MOBILE SS-25 AND RAIL-MOBILE SS-24 ICBMs DEPLOYED IN 1987
- MAY COMPRISE 50% OF SOVIET ICBM FORCE BY MID 1990s
- CONCEALMENT AND DISPERSAL SIGNIFICANTLY ENHANCE SURVIVABILITY
- MOBILE ICBMs REPLACING OLDER MISSILES

IT IS ALSO INTERESTING THAT THE SOVIETS HAVE ADDED MOBILE SYSTEMS. THE REASON FOR THE INSET OF THE UNITED STATES ON THIS GEOGRAPHY IS THAT THE AREA IN WHICH THEIR RAIL-LAUNCHED BALLISTIC MISSILES AND ROAD-LAUNCHED OR ROAD-MOBILE AND RAIL-MOBILE BALLISTIC MISSILES COULD ROAM IS LARGER THAN THE ENTIRE AREA OF THE UNITED STATES.

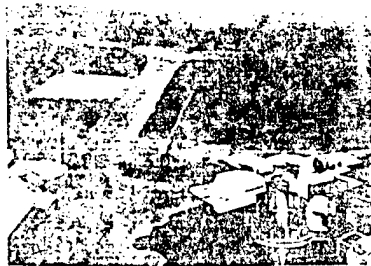


SOVIET SS-18 ATTACK

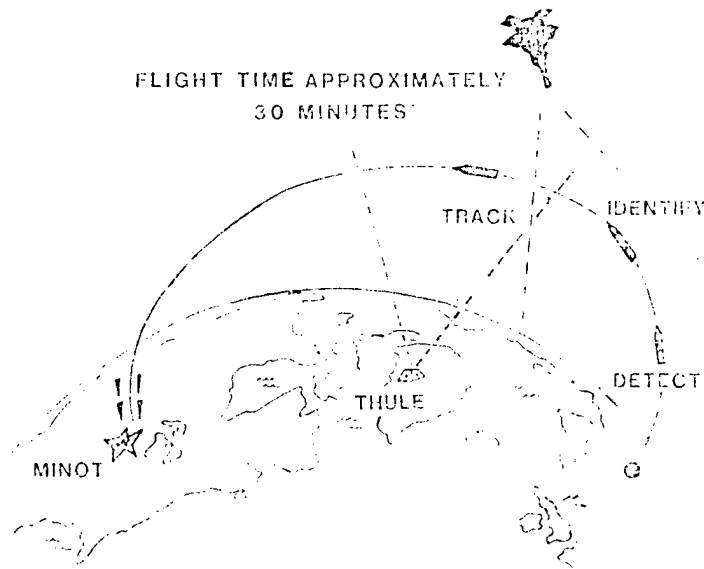
- ④ TACTICAL WARNING AND ASSESSMENT RESPONSE
- LAUNCH NOTIFICATION WITHIN 2 MINUTES

DEFENSE
SUPPORT
PROGRAM

FLIGHT TIME APPROXIMATELY
30 MINUTES



SS-18 ATTACK



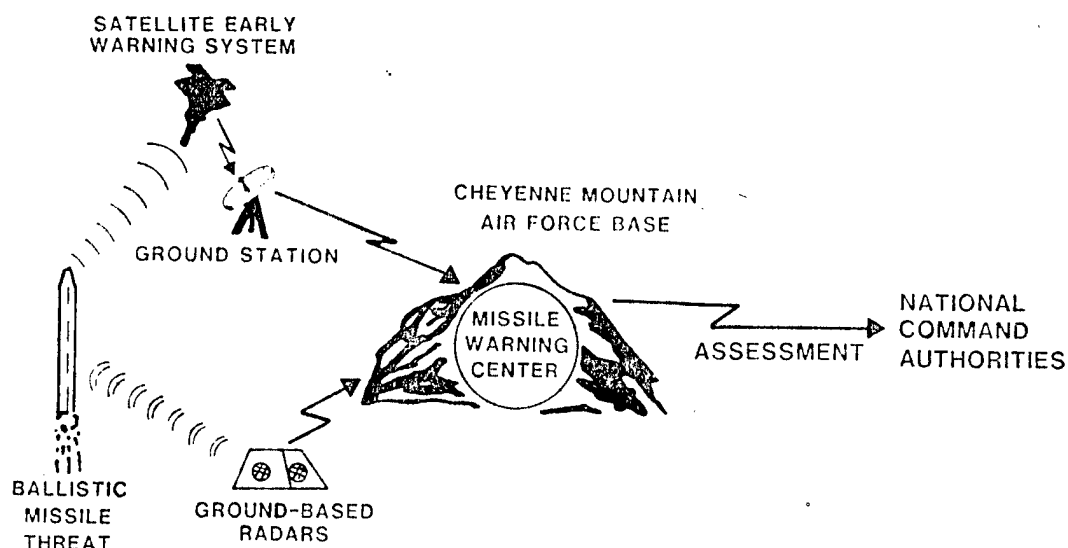
WHAT I WANT TO TALK ABOUT HERE IS WHAT WE DO TODAY, WHAT I DO AS COMMANDER IN CHIEF OF NORAD, AND THAT IS PROVIDE WARNING TO THE NATIONAL COMMAND AUTHORITIES OF A POTENTIAL ATTACK ON NORTH AMERICA. NOW, WE DO THAT WITH SPACE-BASED SYSTEMS AND GROUND-BASED RADAR, AND IF THERE WERE A LAUNCH OUT OF THE SOVIET UNION, SAY TOWARD MINOT, NORTH DAKOTA, THAT FLIGHT WOULD TAKE ABOUT 30 MINUTES.

THE SATELLITE EARLY WARNING SYSTEM, POSITIONED AROUND THE GLOBE, DETECTS MISSILE LAUNCHES AND PROVIDES THAT INFORMATION TO MY MOUNTAIN COMMAND CENTER.

I WANT TO TELL YOU THE WAY THAT WORKS. EVERY SATELLITE IS HOOKED TO TWO SEPARATE GROUND STATIONS USING DIFFERENT SOFTWARE, DIFFERENT ALGORITHMS, AT DIFFERENT LOCATIONS AND DIFFERENT PEOPLE. WHEN THAT SATELLITE DETECTS A BALLISTIC MISSILE LAUNCH, THE GROUND OPERATOR SEES A MOVING TARGET MUCH LIKE AN AIRPLANE, ONLY THE DIFFERENCE BETWEEN A BALLISTIC MISSILE AND AN AIRPLANE IS THAT THE BALLISTIC MISSILE IS ACCELERATING RAPIDLY AND FLIES IN A PARABOLIC MANNER, AND THAT IS EASILY DISCERNIBLE TO THAT HUMAN OPERATOR.



TACTICAL WARNING AND ASSESSMENT TODAY



WHEN THAT PERSON, WHEN THAT MAN OR WOMAN, OFFICER IN THE UNITED STATES AIR FORCE, BELIEVES THEY ARE SEEING A MISSILE, THEY SEND A SIGNAL WHICH ALERTS US IN THE MOUNTAIN. SHORTLY THEREAFTER, THEY PROCESS

THAT THROUGH THEIR COMPUTER AND GET ADDITIONAL INFORMATION WHICH IN FACT TELLS US WHERE THE MISSILE CAME FROM, WHERE IT IS GOING, AND IN SOME CASES A PRETTY GOOD IDEA OF WHAT IT IS.

NOW, HOW OFTEN DO WE THAT? HOW GOOD IS THE SYSTEM? IN 1987 AND 1988, THERE WERE NEARLY 1,700 LAUNCHES IN THE WORLD. SO WE SEE ABOUT THREE LAUNCHES A DAY IN THAT HEADQUARTERS.

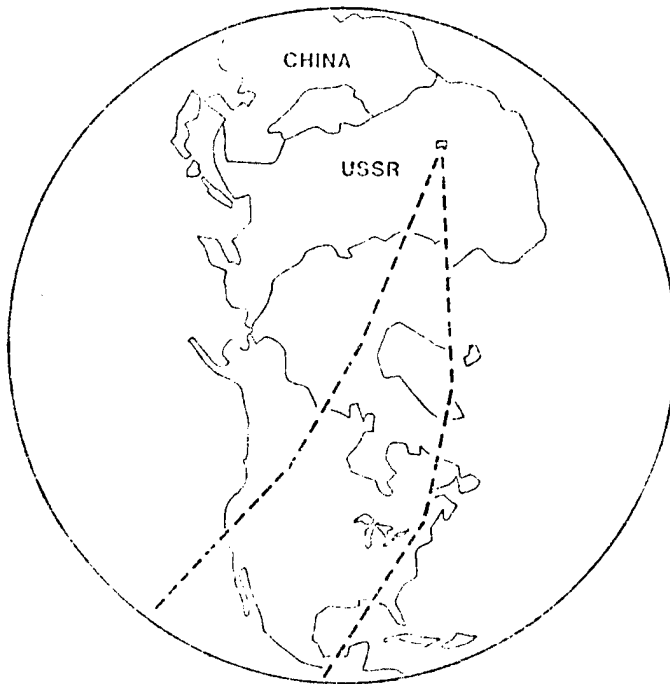
THE MAJORITY OF THOSE LAUNCHES ARE CONDUCTED BY THE SOVIET UNION, REPRESENTING A TREMENDOUS INFRASTRUCTURE OF PROPELLANT, ROCKETS, BOOSTERS, LAUNCH PADS, AND THE LIKE.

SO OUR WARNING SYSTEM IS WELL EXERCISED. IN FACT, A GENTLEMAN IN CONGRESS ASKED ME NOT TOO LONG AGO. HOW DO I KNOW THE SYSTEM WORKS? HAVE YOU EVER GIVEN IT A VALID NO-NOTICE TEST? I POINTED OUT THAT THE SOVIETS TEST IT ABOUT 600 TIMES A YEAR. SO IT IS WELL TESTED, AND WE UNDERSTAND IT WELL.



MISSILE EVENT SCOPE DISPLAY

BALLISTIC MISSILE LAUNCH



○ MISSILE EVENT
NOTIFICATION IN
APPROXIMATELY 2 MINS

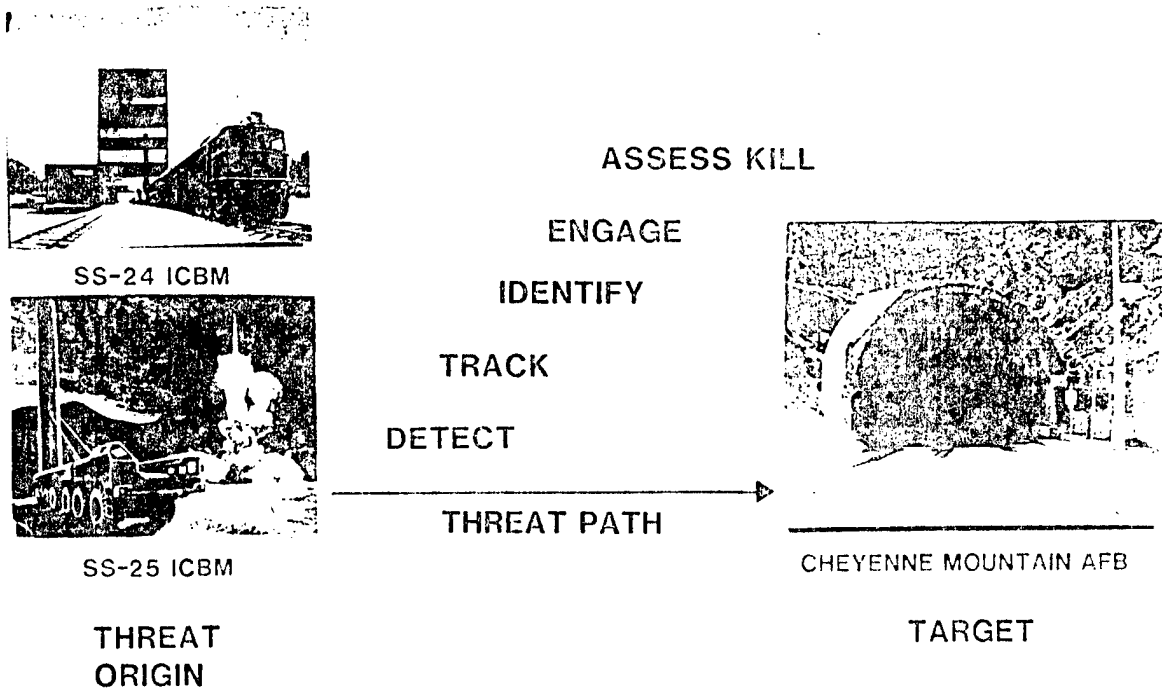
WHAT WE SEE IN THE COMMAND CENTER IN LESS THAN TWO MINUTES AFTER A LAUNCH IS A FAN FROM THE LAUNCH LOCATION IN THE DIRECTION THAT THE MISSILE IS GOING, DESCRIBING THE POSSIBLE LATITUDE OF MIRVed WARHEADS FROM THAT MISSILE AND INDICATING THE MAXIMUM RANGE AND LIKELY RANGE OF THAT MISSILE.

WHEN WE SEE A DISPLAY LIKE THAT, OF COURSE, I AM ON THE PHONE WITH THE NATIONAL MILITARY COMMAND CENTER. MOST OF THE TIME WE SEE FANS THAT GO FROM THE SOVIET UNION LAUNCH TO KAMCHATKA OR OTHER PLACES.

SO THAT IS THE WAY THE SYSTEM WORKS. MAN IN THE LOOP; IN LESS THAN TWO MINUTES WE HAVE THAT KIND OF INFORMATION ABOUT A LAUNCH.



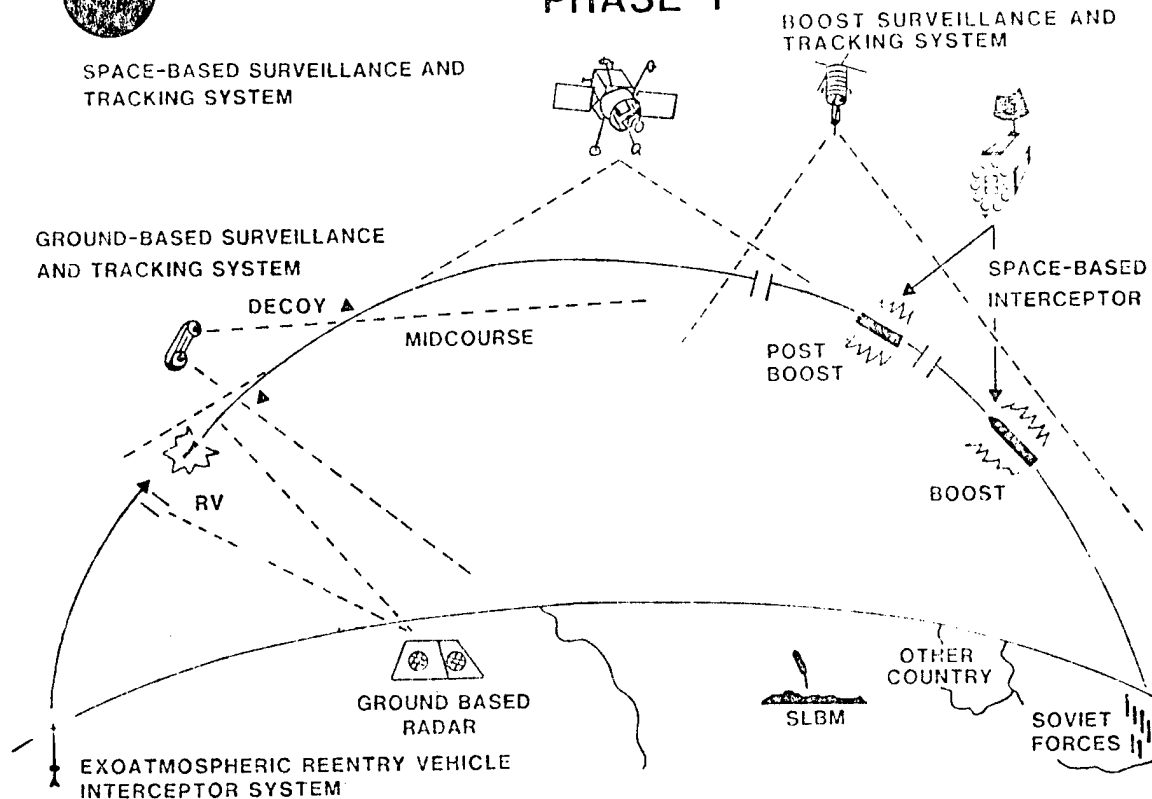
DEFENSE FUNCTIONS



WHAT WE DO TODAY IS DETECT, TRACK, AND IDENTIFY. WHAT WE WOULD HAVE TO DO TO DEFEND AMERICA IS TO DEPLOY SOMETHING TO ENGAGE WITH, AND THEN ASSESS THE EFFECTIVENESS OF THAT ENGAGEMENT AND THEN ENGAGE AGAIN IF WE WERE NOT SATISFIED.



BALLISTIC MISSILE DEFENSE ELEMENTS PHASE 1



WHAT IS PROPOSED, OF COURSE, IN THE SDI, THE STRATEGIC DEFENSE INITIATIVE, IS TO USE THESE SYSTEMS TO DO THAT, OR PERHAPS BRILLIANT PEBBLES.

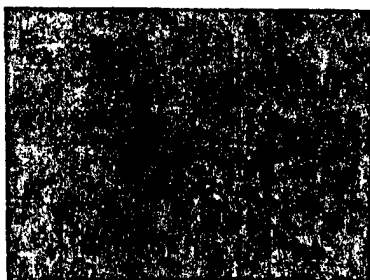
LET ME JUST SAY THAT IF WE WERE NOT GOING TO DO BALLISTIC MISSILE DEFENSE, WHICH I AM CONFIDENT WE SHOULD DO, WE WOULD STILL WANT TO BUILD A BOOST SURVEILLANCE AND TRACKING SYSTEM, AND WE WOULD STILL WANT TO BUILD A SPACE SURVEILLANCE AND TRACKING SYSTEM, BECAUSE THIS REPLACES THE SATELLITE EARLY WARNING SYSTEM WE HAVE TODAY WITH BETTER TECHNOLOGY, MORE CAPABILITY, FASTER WARNING, SO THAT THE PRESIDENT CAN MAKE A DECISION, AND THIS

REPLACES SOME 30-ODD EARTH-BASED SURVEILLANCE SYSTEMS WITH WHICH WE TRACK SOME 6,700 OBJECTS IN SPACE, OF WHICH OVER 160 ARE ACTIVE SOVIET SATELLITES. SO WE WOULD WANT TO DO THAT SO WE CAN GET AWAY FROM THE POLITICAL CONSTRAINTS AND THE GEOGRAPHIC LIMITATIONS OF HAVING SYSTEMS ON EARTH.

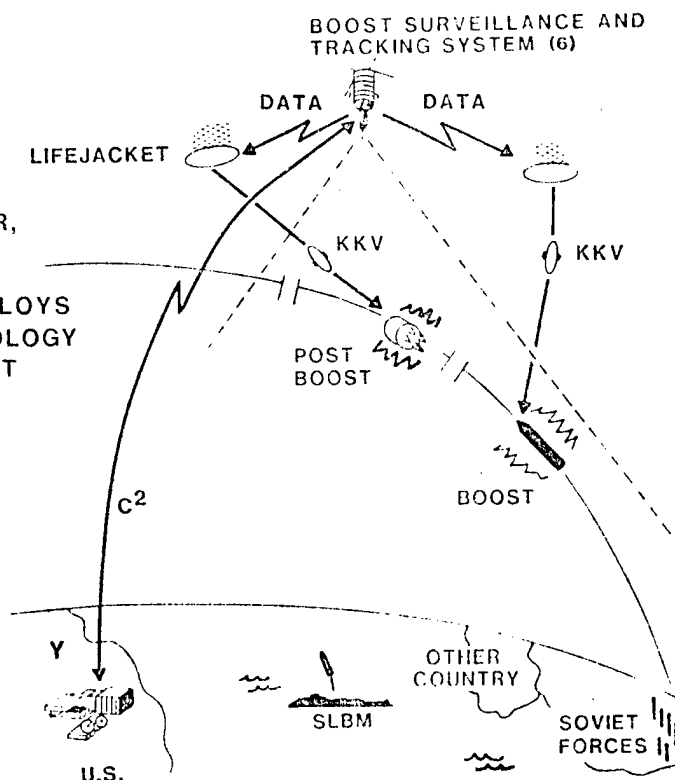


BRILLIANT PEBBLES

- LLNL CONCEPT UNDER STUDY BY SDIO
- LIFEJACKET PROVIDES PROTECTIVE SHELL, POWER, AND COMMUNICATION LINK
- KINETIC KILL VEHICLE EMPLOYS AVAILABLE SENSOR TECHNOLOGY FOR BOOST AND POSTBOOST KILL CAPABILITY



BRILLIANT PEBBLE

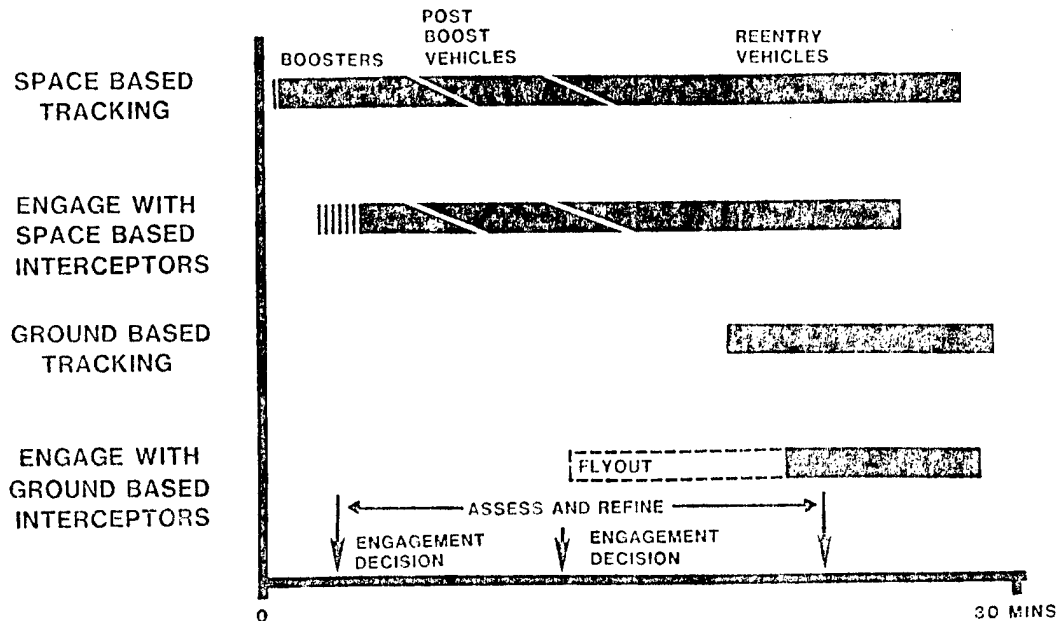


OF COURSE, BRILLIANT PEBBLES IS ANOTHER CONCEPT FOR THE SPACE-BASED INTERCEPTOR, AND ALL I WANT TO SAY IS THAT BRILLIANT PEBBLES APPEARS TO HAVE A LOT OF POTENTIAL, BUT THE WORLD SEEMS TO VIEW BRILLIANT PEBBLES AND A SPACE-BASED INTERCEPTOR AS BINARY: YOU EITHER DO ONE OR YOU DO THE OTHER. I HAVE THE VIEW THAT THERE ARE SOME ADVANTAGES IN BOTH, AND WE

**UGHT TO TAKE THE BEST TECHNOLOGY AND THE BEST IDEAS
AND MARRY THEM FOR WHATEVER IS BEST AND LEAST
EXPENSIVE FOR DEFENSE OF AMERICA.**



BALLISTIC MISSILE ATTACK



● ENGAGING BOOSTERS IS TIME SENSITIVE BUT PROVIDES HIGH LEVERAGE IN THINNING ATTACK

⊙ ENGAGING RVs REQUIRES COMPLEX DISCRIMINATION BUT AFFORDS AN ADAPTIVE, FLEXIBLE DEFENSE

**NOW, WHAT THIS CHART SHOWS IS, IF WE WERE
DETECTING AND TRACKING BOOSTERS, POST-BOOST
VEHICLES, AND MISSILES, THAT WE COULD ENGAGE WITH
SPACE SYSTEMS IN THIS TIME FRAME. SO WHAT I FIND IS
THAT THERE ARE MORE BOOSTERS THAT CAN BE SHOT AT
WITHIN THE TIME FRAME, BASED ON WHAT WE KNOW TODAY,
THAN I WOULD HAVE WEAPONS, ABSENT THE BRILLIANT
PEBBLES CONCEPT. SO WE CAN THIN THE ATTACK TO THE
DEGREE THAT WE HAVE WEAPONS.**

THEN THERE IS PLENTY OF TIME IN HERE BETWEEN THE INITIAL ENGAGEMENTS AND THE DECISION TO USE A LAND-BASED ERIS, FOR EXAMPLE, WEAPONS SYSTEM IN THE UNITED STATES, TO ADJUST AND DO ADAPTIVE AND FLEXIBLE DEFENSE.



OBSERVATIONS

- THE TECHNOLOGY IS AVAILABLE
- THE COMMAND AND CONTROL ARCHITECTURE CAN ACHIEVE THE REQUIRED RESPONSIVENESS
- WE CAN DEFEND AMERICA AGAINST BALLISTIC MISSILES

I THINK THE TECHNOLOGY IS AVAILABLE. IT IS YET TO BE DEMONSTRATED AND MAY NOT BE READY FOR A DECISION FOR TWO OR THREE OR FOUR YEARS. I AM CONVINCED THAT BASED ON WHAT WE DO TODAY WITH---WELL, IN FACT, THIS YEAR THERE HAVE BEEN OVER 1,000 LAUNCHES---SO WHAT WE DO TODAY WITH OVER 1,000 LAUNCHES IN 1989 IS ESSENTIALLY THE BASIS OF WHAT WE WOULD BE DOING IN DEFENDING AMERICA, EXCEPT WE HAVE NOT SENT A

COMMAND TO A WEAPON TO DEFEND. AND WE CAN DEFEND AMERICA AGAINST BALLISTIC MISSILES, AT LEAST FROM THE OPERATIONAL STANDPOINT, IF THE WEAPONS ARE AVAILABLE.

SO I AM CONFIDENT THAT, BASED ON OUR EXPERIENCE TODAY, BASED ON THE TECHNOLOGY THAT IS BEING DEVELOPED, WE CAN DEFEND AMERICA. I AM CONVINCED, BASED ON SOVIET STATEMENTS AND THE IMPORTANCE OF THE DATA THAT COMES FROM OUR SATELLITES, THAT WE NEED AN ANTISATELLITE WEAPON TO PROTECT OUR TROOPS, TO RESPOND IN KIND AND, HOPEFULLY, TO DETER THE SOVIETS FROM USING A SYSTEM IN THE FIRST INSTANCE.

THANK YOU VERY MUCH.