STATEMENT OF ALBRERT P. ALBRECHT, ASSOCIATE ADMINISTRATOR FOR ENGINEERING AND DEVELOPMENT, FEDERAL AVIATION ADMINISTRATION, BEFORE THE HOUSE COMMITTEE ON SCIENCE AND TECHNOLOGY, SUBCOMMITTEE ON TRANSPORTATION, AVIATION, AND MATERIALS, CONCERNING COLLISION AVOIDANCE SYSTEM AND AIR TRAFFIC CONTROL SAFETY IN THE LOS ANGELES AREA. SEPTEMBER 2, 1981.

MR. CHAIRMAN AND MEMBERS OF THE SUBCOMMITTEE, IT'S A PLEASURE TO BE WITH YOU THIS MORNING HERE AT VAN NUYS AIRPORT TO DISCUSS THE FAA'S PROGRAM FOR COLLISION AVOIDANCE SYSTEMS.

AS YOU KNOW, ON JUNE 23, 1981, ADMINISTRATOR HELMS ANNOUNCED HIS DECISION TO PROCEED WITH THE IMPLEMENTATION OF AN AIRBORNE COLLISION AVOIDANCE SYSTEM.

THE SYSTEM HE DECIDED UPON IS CALLED THE TRAFFIC ALERT AND COLLISION AVOIDANCE SYSTEM (TCAS). IT BUILDS DIRECTLY ON ALL THE PREVIOUS WORK DONE IN THIS AREA, AND SPECIFICALLY ON DEVELOPMENT EFFORTS RELATING TO THE BEACON COLLISION AVOIDANCE SYSTEM (BCAS).

THE STRATEGY ASSOCIATED WITH THE APPROACH IS BASED UPON THE FOUNDATION OF:

A. PROVIDING A COLLISION AVOIDANCE CAPABILITY WHICH IS TOTALLY INDEPENDENT OF THE GROUND AND CAN RELIABLY OPERATE IN ALL HIGH DENSITY TRAFFIC PREDICTED FOR THE YEAR 2000.

B. PROVIDING A PROGRAM STRATEGY WHICH INSURES THE EARLIEST SYSTEM AVAILABILITY CONSISTENT WITH ATC SYSTEM NEEDS AND WILL ALLOW INDUSTRY TO BEGIN MANUFACTURING AND MARKETING THESE DEVICES AS EARLY AS POSSIBLE.

C. INSURING A SYSTEM DESIGN WHICH IS COMPATIBLE WITH THE PLANS FOR EVOLUTION AND UPGRADING OF THE ATC SYSTEM.

THE ADMINISTRATOR IS FIRMLY COMMITTED TO THIS PROGRAM AND WE ARE CONFIDENT THAT OUR GOALS OF PROVIDING EARLY AND COMPLETE COLLISION AVOIDANCE PROTECTION CAN BE ACHIEVED.

THERE WILL BE TWO-LEVELS OF TRAFFIC ALERT AND COLLISION AVOIDANCE CAPABILITY CALLED TCAS I AND TCAS II. OTHER LEVELS OF CAPABILITY BUILT AROUND THESE TWO BASIC SYSTEMS ARE POSSIBLE, AND I'LL REFER TO THESE AS TCAS I ENHANCEMENTS, OR TCAS II ENHANCEMENTS.

TCAS I

THE BASIC TCAS I IS DIRECTED AT PROVIDING A LOW-COST CAPABILITY TO THE GENERAL AVIATION USER. TCAS I IS ESSENTIALLY A MODE S (THE INTERNATIONAL NAME FOR DABS) ATC TRANSPONDER, A PROXIMITY ALERTER, AND A CROSSLINK FOR COMMUNICATIONS WITH THE MORE COMPLETE TCAS II.

TCAS I PROVIDES FEATURES APPLICABLE TO THE GENERAL AVIATION USER. IT CONTAINS A STANDARD ATC TRANSPONDER WITH BUILT IN MODE S SURVEILLANCE AND DATA LINK CAPABILITY. IT INCLUDES AN ENCODING ALTIMETER.

TCAS I PROVIDES A SIMPLE AUDIO AND VISUAL ALERT TO THE PROXIMITY OF AN AIRCRAFT EQUIPPED WITH A TRANSPONDER OR WITH A TCAS. IN ITS BASIC FORM, A SIMPLE "PRESENCE" LIGHT IS ENVISIONED BUT MORE SOPHISTICATED VERSIONS CAN OFFER ADDITIONAL LEVELS OF CAPABILITY--TCAS I TO TCAS I SERVICE WILL BE PROVIDED IN ALL AIRSPACE.

TCAS I ALSO INCLUDES AN AIR-TO-AIR DATA LINK CAPABILITY (OR CROSSLINK) BETWEEN ITSELF AND TCAS II EQUIPPED AIRCRAFT. THIS LINK WILL BE USED BY THE TCAS II SYSTEM TO TRANSMIT TO TCAS I DATA ABOUT THE TCAS II POSITION AND MANEUVER INTENT FOR TCAS I/TCAS II CONFLICTS.

SEVERAL ENHANCEMENTS ARE ENVISIONED FOR THE BASIC TCAS I. THESE INCLUDE THE USE OF AN ON-BOARD AIRBORNE DIRECTIONAL ANTENNA THROUGH WHICH THE "DIRECTION OF THREAT" INFORMATION CAN BE PROVIDED TO THE PILOT (O'CLOCK POSITION). ENHANCEMENTS MAY ALSO INCLUDE AN AIR-TO-AIR RANGING CAPABILITY SO THAT THE TCAS I EQUIPPED AIRCRAFT CAN OBTAIN THE EXACT DISTANCE (RANGE) TO THE PROXIMATE AIRCRAFT.

OUR BASIC INTENT IS TO ENCOURAGE INDUSTRY TO INNOVATE IN THIS DIRECTION BUT WE ARE ALSO CAREFUL TO NOTE THAT CERTAIN CONSTRAINTS WILL HAVE TO BE APPLIED SUCH AS ALLOWABLE INTERROGATION RATE, TO PREVENT INTERFERENCE WITH THE GROUND SURVEILLANCE SYSTEM.

OUR SCHEDULE FOR TCAS I IS VERY NEAR TERM--IN FACT, WE ARE NOT PLANNING ADDITIONAL DEVELOPMENT WORK FOR THIS SYSTEM. BASED UPON THE FACT THAT WE HAVE RECEIVED THE NECESSARY FREQUENCY CLEARANCE FOR THE USE OF THE MODE S SYSTEM, WE EXPECT TO ISSUE GENERAL GUIDANCE TO INDUSTRY FOR TCAS I DESIGN AND ASSOCIATED DATA LINK FORMATS BY APRIL 1982. FROM THAT POINT ON, WE ARE CONFIDENT THAT INDUSTRY WILL BEGIN TO MANUFACTURE TCAS I SYSTEMS FOR SALE TO THE COMMUNITY.

TCAS II

LET ME TALK NOW TO THE TCAS II DESIGN WHICH IS ESSENTIALLY TARGETED FOR THE AIR CARRIER COMMUNITY.

TCAS II IS A TOTALLY ACTIVE SYSTEM WHICH WILL PROVIDE HIGH QUALITY PROTECTION IN THE DENSE ENVIRONMENTS PREDICTED FOR THE FUTURE. YOU MAY RECALL THAT EARLIER STUDIES HAD INDICATED THAT IT WOULD NOT BE POSSIBLE TO PROVIDE THIS COMPLETE PROTECTION SOLELY WITH AN ACTIVE MODE. HOWEVER, RECENT WORK UNDER THE FULL BCAS PROGRAM, COUPLED WITH

RECENTLY DEVELOPED AIRBORNE ANTENNA TECHNIQUES HAS LED TO THE REALIZATION THAT THIS CAPABILITY CAN BE PROVIDED. THE ADDITION OF DIRECTIONAL ANTENNAS COUPLED WITH A TECHNIQUE CALLED "ADAPTIVE INTERROGATION" (TO ELIMINATE INTERFERENCE WITH THE GROUND SYSTEM) WILL ALLOW THE TCAS SYSTEM TO OPERATE IN THE HIGH DENSITY AIRSPACE PREDICTED FOR THE FUTURE WITHOUT THE NEED FOR GROUND DEPENDENCY. ACCORDINGLY, WE HAVE STOPPED THE ADDITIONAL WORK ON THE PASSIVE MODES WHICH WE WERE PURSUING ON OUR FULL BCAS PROGRAM.

IN ADDITION TO THE CAPACITY IMPROVEMENT OBTAINED THROUGH USE OF THE DIRECTIONAL ANTENNA FOR TCAS II, THIS SAME TECHNIQUE CAN BE USED TO PROVIDE A PROXIMITY WARNING INDICATION (PWI) (OR BEARING CAPABILITY) IF THE OPERATORS SO CHOOSE. THIS CAPABILITY WILL CERTAINLY BE GOOD ENOUGH TO SUPPORT AN O'CLOCK BEARING POSITION FOR PWI AND MAY PROVE TO BE CONSIDERABLY BETTER.

THE BASIC TCAS II WILL PROVIDE VERTICAL AVOIDANCE MANEUVERS. WE ARE HOPEFUL THAT LATER ENHANCEMENTS WILL ALLOW A HORIZONTAL MANEUVER CAPABILITY, BUT WE MUST COMPLETE ADDITIONAL DEVELOPMENT WORK BEFORE THIS CAN BE ASSURED.

AS YOU REQUESTED, I WOULD NOW LIKE TO TALK BRIEFLY ABOUT THE DIFFERENCES BETWEEN OUR TCAS II DESIGN AND THE EARLIER ACTIVE BCAS PROGRAM. FIRST, TCAS II IS AN UPGRADED VERSION OF THE EARLIER ACTIVE BEACON COLLISION AVOIDANCE SYSTEM TO WHICH AIRBORNE DIRECTIONAL ANTENNAS AND A CROSSLINK HAVE BEEN ADDED.

THE ADDITION OF THE AIRBORNE DIRECTIONAL ANTENNA PLUS THE "ADAPTIVE INTERROGATION" TECHNIQUES WILL ALLOW US TO AVOID INTERFERENCE WITH THE GROUND. THE "O'CLOCK" PWI CAPABILITY IS ANOTHER BUILT-IN IMPROVEMENT OVER THE OMNI-DIRECTIONAL ACTIVE BCAS.

THE REMAINING DEVELOPMENT EFFORTS ARE FOCUSED ON AN IMPROVED DIRECTIONAL RECEPTION AIRBORNE ANTENNA DESIGN FOR TCAS II. THE OTHER PORTIONS OF THE SYSTEM ARE WELL UNDERSTOOD AND HAVE BEEN EXTENSIVELY TESTED AS PART OF THE ON-GOING COLLISION AVOIDANCE TEST PROGRAM. WE ARE CURRENTLY IN THE PROCESS OF CONTRACTING WITH INDUSTRY TO PROVIDE THIS DIRECTIONAL ANTENNA AND CROSSLINK CAPABILITY WHICH WILL BE ADDED TO THE DESIGN FOR THE ACTIVE BCAS.

WE EXPECT THAT WE CAN COMPLETE THE DESIGN AND TESTING OF TCAS I IN 18-21 MONTHS AND EXPECT FULL PRODUCTION AND INSTALLATION TO BE UNDER WAY IN 36-48 MONTHS. WE WILL MAKE

ALL OF OUR DESIGN INFORMATION AVAILABLE TO INDUSTRY AS PART OF THE PROCESS AND ENCOURAGE MANUFACTURERS TO MOVE OUT ON THEIR OWN.

IN RESPONSE TO QUESTIONS CONCERNING THE ROLE OF OMNI-DIRECTIONAL CAS SYSTEMS IN THE NEAR-TERM, THE FAA, IN ORDER TO PROVIDE EARLIEST POSSIBLE COLLISION PROTECTION, WILL CONSIDER APPROVING COLLISION AVOIDANCE SYSTEMS WITHOUT DIRECTIONAL INTERROGATION OR RECEIVING CAPABILITY DURING AN INTERIM PERIOD, IF THE APPLICANT DEMONSTRATES PROVISIONS FOR UPGRADING SYSTEM PERFORMANCE TO THE MINIMUM TCAS II CAPABILITIES. FOR SUCH SYSTEMS THE CROSSLINK CAPABILITY NEED NOT INCLUDE TRANSMISSION OF RELATIVE AZIMUTH.

THAT CONCLUDES MY PREPARED REMARKS. AT THIS TIME, MR. SMITH WILL READ HIS STATEMENT CONCERNING THE AIR TRAFFIC CONTROL SYSTEM IN THE LOS ANGELES BASIN.