

## MICROWAVE LANDING SYSTEMS”(MLS)

**Abstract:** This paper is based on the topic of “Microwave Landing Systems”(MLS) .This explains about the basic principle of MLS, its operation, its advantages over Instrument Landing systems(ILS)which is currently in use. This is a new and fast emerging technology, in which its design of landing gears is purely mechanical and its operation is based upon electronics. This technology has not been adopted by any of the Aircraft manufacturers. This technology is expected to hit the field of Aviation by the end of 2017.

What is MLS?

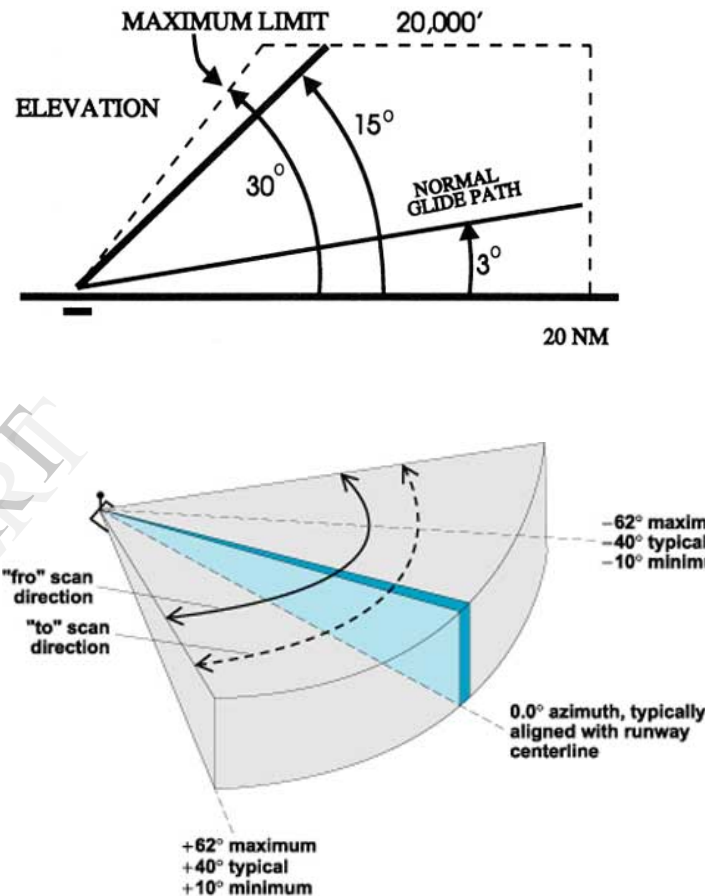
MLS is expanded to as “Microwave landing systems” which is an replacement of “Instrument landing systems”(ILS) which is currently in use by all the type of passenger aircrafts, civilian aircrafts since 1949. This MLS is a new fast emerging technology and has it can be used in all weather conditions. This system extensively requires global positioning system(GPS) and Wide area Augmentation systems(WAAS).This GPS should be installed in Aircraft, and the airport should be enriched with WAAS systems. This provides information such as azimuth, elevation, range. This MLS idea was proposed at the end of 1978. This technology was initially adopted by USA,EUROPE in their touchdown points. Since GPS and WAAS systems lacked during the period of 1978,the MLS operating Airports was completely turned off by FAA(Federal Aviation Administration) and added that turning off the MLS equipped airports due to lack of passenger safety.

Principle of MLS:

MLS uses extensively a channel of 5GHZ(5000MHZ). This can calculate the azimuth, elevation, range of the runways and airport. The azimuth can be calculated at 40 degrees at the end of the runway, and elevation can be calculated at 15 degrees from the side of the runway. When using an advanced MLS systems the degree of azimuth is raised at 60 degrees(from left and also right). When aircraft is turned 60 degrees to the runway and at of altitude 20,000ft this system calculates the position of the runway. The azimuth approach transmitter is at the end of the runway and the elevation transmitter is located near the threshold of the runway. The aircraft sends two beams from its antenna. Two beams approach the azimuth approach transmitter at the end of the runway. This transmitter transmits the beam back to the aircraft. The MLS airborne equipment(inside the cockpit) calculates the timing of two pulses. When distance between two pulses gets reduced you are parallel to the runway. The same

procedure is to be followed for calculating elevation from the ground level. This MLS can be used when aircraft is left or right of the runway.

MLS(Elevation And Azimuth):

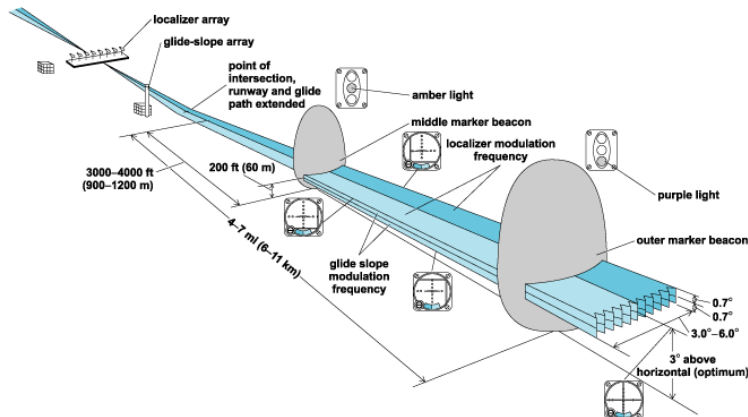


Advantages of MLS over ILS

The Advantage of MLS is it can be used at any weather conditions. MLS provides higher range of altitude(20000ft) and azimuth(60 degrees) comparing to ILS. In ILS the aircraft should be parallel to the runway and at altitude of 3000ft and azimuth(5 degrees). MLS can provide 200 channels (5xof ILS) but ILS provides 20 channels. It can accommodate both segment and curved approaches. It also provides back azimuth guidance for missed approaches and departure guidance. It can eliminate the service interruption caused by weather accumulation. This provides lower costs preparation, lower repair costs, lower costs for maintenance. Category

III landings(blind landings)(as classified by FAA) can easily done. The frequency with the nearby airports will not be interfered.

ILS Systems:



Disadvantages of MLS:

MLS needs GPS, WAAS which cannot be done to every airports. Since now all the airport operates at ILS and equipped with ILS runways it is harder to change to MLS equipped runway. In ILS equipped runway MLS aircraft cannot be made to touchdown.

Conclusion:

This is a fast growing technology, if disadvantages are overcome this will make the field of Aviation and Avionics to be one of the best field in the world.