



ENHANCEMENT FOR AIR SURVEILLANCE RADAR SYSTEMS (EARS)

ENHANCEMENT FOR AIR SURVEILLANCE RADAR SYSTEMS (EARS) IS A SOFTWARE INTENSIVE SYSTEM WHICH PROVIDES SIGNAL ACQUISITION, PLOT-EXTRACTION, TARGET TRACKING, AIR PICTURE PRESENTATION, HUMAN COMPUTER INTERACTION (HCI), AND OTHER CAPABILITIES TO AN AIR SURVEILLANCE RADAR SYSTEM. IT CAN BE USED WITHIN NEWLY DESIGNED RADARS OR AS A PART OF AN UPGRADE KIT FOR LEGACY RADARS. EARS IS BASED ON LATEST GENERATION OF SOFTWARE AND HARDWARE TECHNOLOGY, AND UTILIZES A MODULAR ARCHITECTURE WHICH ENSURES EASY MAINTENANCE AND UPGRADING. HIGHLY PORTABLE SOFTWARE MODULES ARE DESIGNED TO RUN ON OF-THE-SHELF HARDWARE PLATFORMS WHICH LOWERS SYSTEM COSTS SIGNIFICANTLY.

Radars Signal Acquisition Device (RSAD)

is a dedicated hardware module which accepts video, trigger, and azimuth signals from primary surveillance radar (PSR) receiver and secondary surveillance radar (SSR) receiver and converts stream of pulses into digital format, which is then distributed via an Ethernet link. Optionally RSAD can accept two additional video signals.

It features a standard 3U 19" rack-mount enclosure.

Extractor

provides plot extraction from digitalized PSR and SSR video signals, and combining of extracted plots to eliminate redundancy. In addition, Extractor removes asynchronous interference pulses from PSR video and false replies unsynchronized in time (FRUIT) from SSR video.

Tracker

provides target tracking using plots as inputs. For each target under track, position, altitude, heading and velocity are estimated. Tracking filter is carefully designed to reduce estimation errors during uniform target motion, while keeping good responsiveness to target maneuvers. In addition, Tracker filters out erroneous SSR codes, thus enhancing the air picture.



Radars cabin for Kenyan Air Force (KAF)



Plane position indicator for KAF

Operations Display

is the main HCI component of EARS. It displays air picture (raw picture in PPI format, plots, HFR replies, IFF replies, tracks) and additional overlay graphics such as vector and raster maps, aeronautical information (air traffic corridors, navigation aids, various zones), code grid, range and bearing markers, etc. Display is organized into layers, which can be shown or hidden, and configured, according to operator's preference.

Recorder/Player

provides recording and playback of VoIP audio traffic, raw radar video, plots and tracks. Audio, plots and tracks are recorded all the time, while video recording is initiated on demand. It is capable to simultaneously playback recorded audio and radar video and data, for the purpose of investigation of incidents and critical situations. Audio is played through speakers while video and data are visualized on the Operations Display.

Max. input signal amplitude	5 V (video), 30 V (azimuth and trigger)
Azimuth	13 bit parallel, ACP/ARP
Video signal sampling rate	20 MHz
Max. number of PSR plots	200 per second
Max. asynchronous interference rate, when 2000 targets are present	8000 Hz
Max. number of SSR plots	200 per second
Max. FRUIT rate, when 2000 targets are present	4000 Hz
SSR modes supported	1, 2, 3/A, C
Max. number of targets under track (with 10 s antenna rotation period)	1000
Max. target acceleration	50 m/s ²
Max. number of video channels displayed	4
Radar video colour	fully configurable
Radar video fade rate	fully configurable
Radar video fading emulation	real-time, dual phosphor effects
Trails retained on view change	yes
Audio recording compliance	ED-137/4B
Max. number of recorded audio channels	12
Supported audio codecs	G.711 A-law

