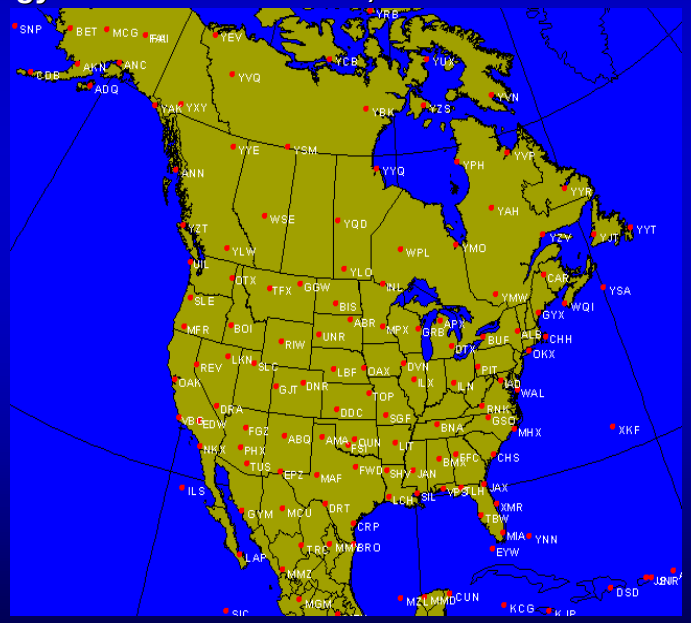
Radiosonde Replacement System

Briefing to the DOC Budget Office

Upper-Air Observing System

System Overview

- Radiosondes are a critical data source for NWS operations, climate uses and research
  - Primary data source for the initialization of NWS numerical weather prediction models used to support severe storm, aviation and marine forecasts
  - Provide input for pollution/dispersion models, climatology records and studies, and general research
- Observations are obtained from an extensive, nation-wide network
  - 102 operational sites launching over 200 sondes/day 80,000/year)
  - Provided measures of pressure, temperature, humidity and winds
  - Data archived at the National Climatic Data Center
- Current system udated in 1980s
  - Ground receiving system still contains 1950s vacuum tube technology
  - Data processing computer is a 1980s vintage IBM PC
  - Radio-frequency usage is inefficient and interference and loss of data is imminent

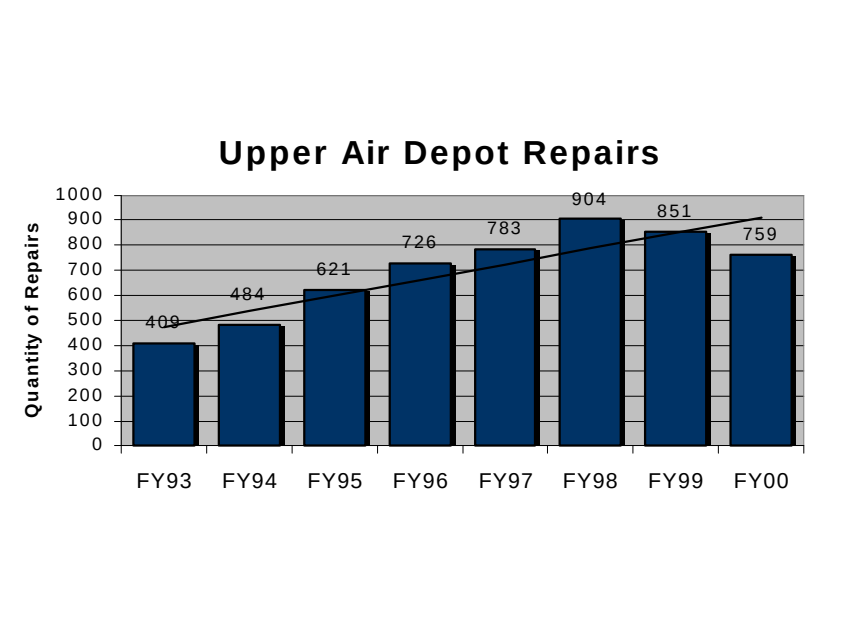


NWS Radiosonde Network Sites

Upper-Air Observing System

Current Status

- Current System continues to become more costly and increasingly resource intensive and difficult to maintain. For example:
  - Southern Region lost 231 flights in FY2000
  - 33 percent increase over 1998
  - 77 percent due to equipment failures
- Annual Maintenance costs expected to increase over $1M between FY2001 and FY2004
- Failed parts are becoming more difficult and costly to repair
  - Parts have finite number of repair cycles - must pay to re-engineer circuit card and electro-mechanical sub-systems
  - Fewer vendors available to work on old technology - not cost effective



The trend for Depot Maintenance Actions has almost doubled in 8 years

Radiosonde Replacement Program

What?

- Replaces current obsolete upper-air observing system before it fails

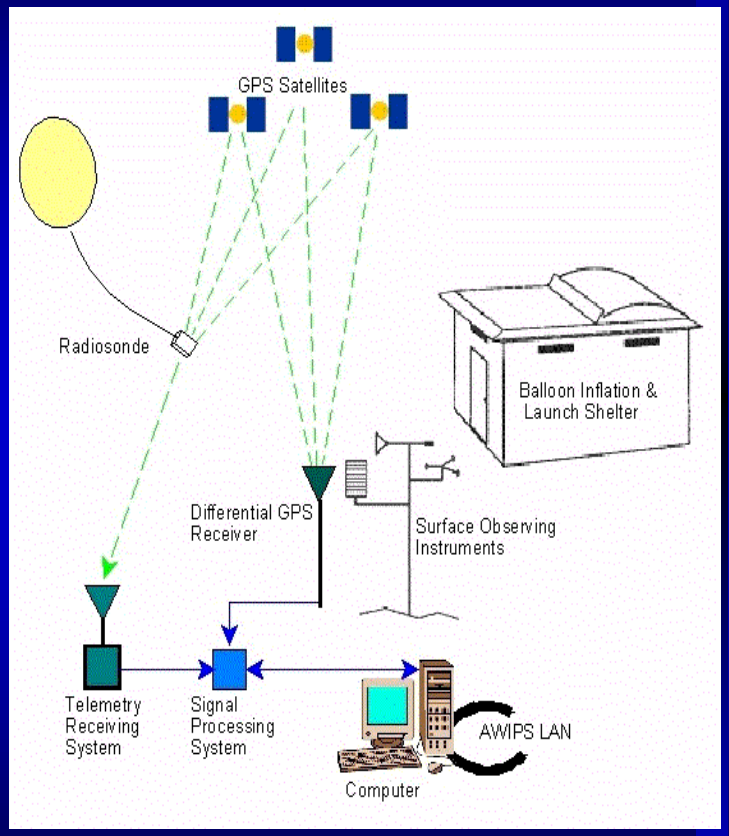
Why?

- Anticipate collapse of network by FY05/06
  - Risk of large-scale loss of radiosonde data
  - 20% data loss has major impacts on NWS weather prediction model outputs
- Comply with Congressional direction to vacate 1670-1675MHz frequency range (OBRA 0f 1993)
  - Three companies currently applying for authorization to operate in this band
- Leverage current technology for improved system performance
  - Higher resolution data and improved forecasts
  - Increased system reliability, availability and maintainability

Radiosonde Replacement Program

Scope

- Six major sub-systems/Seven contracts
  - Telemetry Receiving System
  - Radiosonde & Signal Processing Systems
  - Surface Observing System
  - Operator Workstation
  - Balloon Inflation and Launch Shelter
  - Software
- Deliverables include:
  - 102 systems plus spares (only 11 launch shelters)
  - ~ 80,000 radiosondes/year



Radiosonde Replacement System

Expected Results

- Deployment of a significantly improved upper-air network
  - New installations and resulting spares will improve availability of critical data and reduce maintenance burden
    - MTBF improves from 9.5 days to 151 days
  - Improved data accuracy
    - Higher resolution wind data (approx every 100m vs every 300m now)
    - Higher altitude pressure data (obs above 10 hPa (30km) greater than 60% vs 50% now)
  - Operates in reduced frequency spectrum (1675-1680 MHz)
    - Complies with Congressional direction
    - Greatly reduces potential for interference

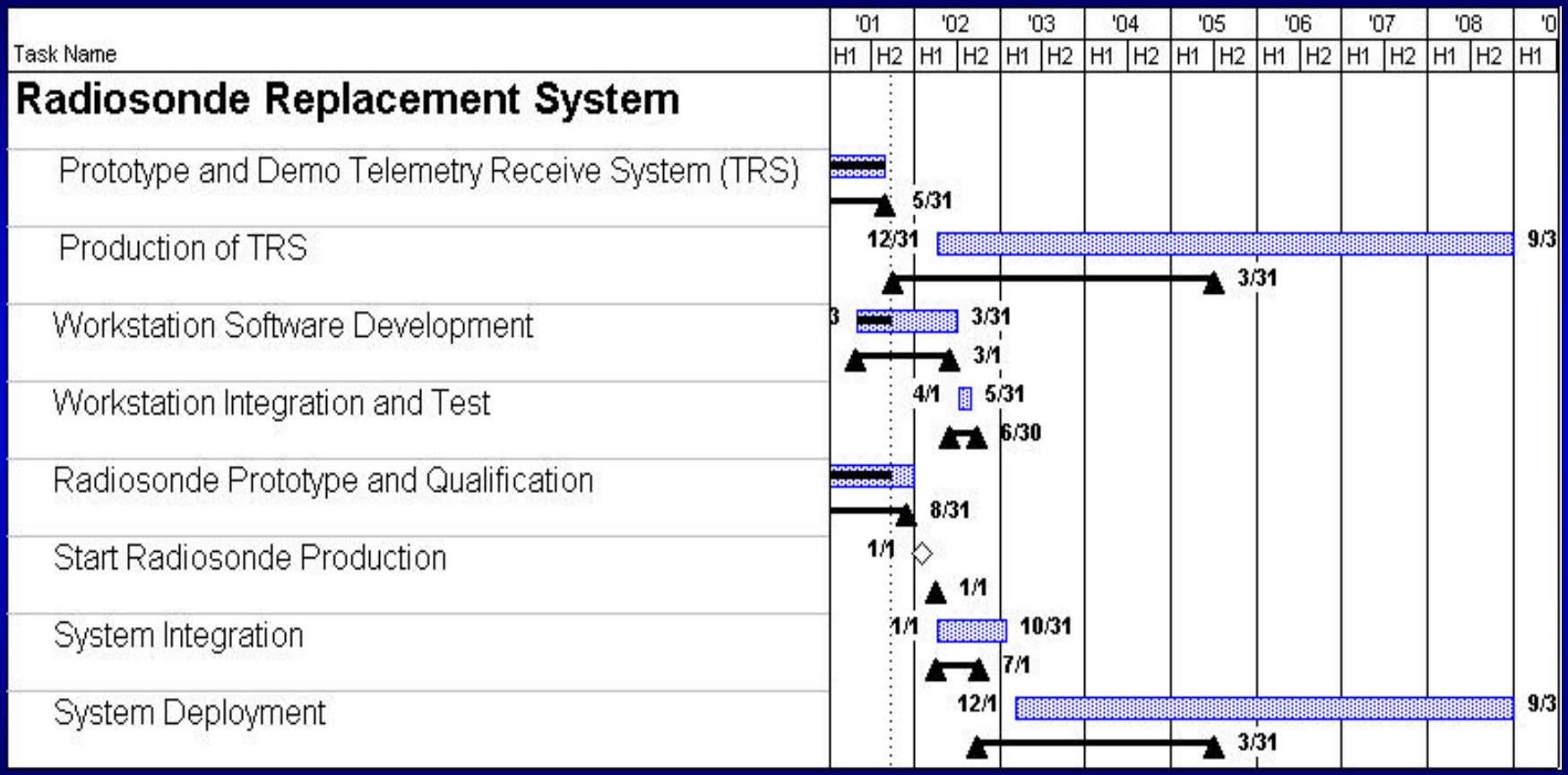
Continued availability of radiosonde observations is critical to achieving NOAA strategic goals

Radiosonde Replacement System

Current Status

- Telemetry Receive System
  - Production Release signed for 11 First Article Production units; deliveries begin Jan 2002
- GPS Radiosonde Qualification ongoing
  - Radiosonde production scheduled to start in Feb FY02
- Workstation software development, integration and test to complete by May 2002
- System Integration and Test to start May 2002
- System deployment to begin in Jan 2003
  - Deployment complete by end of FY08

Radiosonde Replacement System



Radiosonde Replacement Program Budget

($ in Thousands)

	FY00 & Prior	FY01	FY02	Cost to complete	Total	Recurring
Hardware	6,361	3,485	3,048	7,592	20,486	
Software	2,067	705	858	1,083	4,713	
Program Support	3,375	721	708	8,281	13,085	
Recurring	377	0	375	11,044	11,796	5,231
Total	12,180	4,911	4,989	28,000	50,080	

Radiosonde Replacement System

Issues

- Current funding level extends deployment through FY08
  - Increased risk of network collapse
  - Increased risk of radio-frequency interference
  - Increased risk of loss of critical weather observations
  - Increased risk of degradation in forecast accuracy and timeliness