

RADIO MODELS							
Bandsplit:					VHF BAND 136-174 MHz	UHF Band 403-470 MHz 450-520 MHz	800 MHz Band 806-870 MHz
Model	Display	Keypad	Channel Capability	FLASHport Memory	Model Numbers	Model Numbers	Model Numbers
I	None	None	16/32	512K 1 MB as of 6-1-96	HO4KDC9PW5AN	403-470 MHz HO4RDC9PW5AN 450-520 MHz HO4SDC9PW5AN	HO4UCC9PW5AN
II	2 Lines/14- Characters per line Liquid Crystal Display	3x2 button	255	512K 1 MB as of 6-1-96	HO4KDF9PW7AN	403-470 MHz HO4RDF9PW7AN 450-520 MHz HO4SDF9PW7AN	HO4UCF9PW7AN
III	2 Lines/14- Characters per line Liquid Crystal Display	3x6 button	255	512K 1 MB as of 6-1-96	HO4KDH9PW7AN	HO4RDH9PW7AN (403-470) HO4SDH9PW7AN (450-520)	HO4UCH9PW7AN
<b>FCC Designations:</b>					AZ489FT3770	AZ489FT4782 (403-470) AZ489FT4783 (450-512)	AZ489FT5750
<b>Power Supply:</b> One rechargeable nickel-cadmium battery or one rechargeable nickel-metal hydride battery							
<b>Dimensions (H x W x D):</b> <b>Less Battery:</b> 5.20" x 2.64" / 2.94" x 1.18" (132.07x67.05/74.67x29.97 mm) <b>with Ultra High Capacity NiCd:</b> 9.10"x2.94"x1.18" (231.12x74.67x29.97 mm) <b>with Medium Capacity NiCd:</b> 8.34"x2.94"x1.18" (211.12x74.67x29.97 mm) <b>with High Capacity NiMH:</b> 8.34"x2.94"x1.18" (211.12x74.67x29.97 mm) Note: (2.64" represents width at PTT; 2.94" represents width at Top)							
<b>Weight:</b> <b>Less Battery:</b> 12.8 oz.(366 g) <b>with Ultra High Capacity NiCd:</b> 26.62 oz. (760 g) <b>with Medium Capacity NiCd:</b> 24.55 oz. (701 g) <b>with High Capacity NiMH:</b> 26.2 oz.(748 g)							
<b>FCC Emissions Designators:</b> 8K10F1E, 10K0F1D, 11K0F1D, 15K0F1D, 16K0F3E, 20K0F1D 8K10F1D, 10K0F2D, 11K0F2D, 15K0F2D, 20K0F1E 11K0F3E							

CE Approved

APPLICABLE MILITARY STANDARD 810E, 810D & 810C MECHANICAL SPECIFICATIONS			
Standard	U.S. Military Spec 810E Method/Procedure	U.S. Military Spec 810D Method/Procedure	U.S. Military Spec 810C Method/Procedure
Low Pressure	500.3/II	500.2/I	500.1/I
High Temperature (Storage)	501.3/I	501.2/I Category A1 (Induced)	501.1/I
High Temperature (Operational)	501.3/II	501.2/II Category A1 (Induced)	501.1/II
Low Temperature	502.3/I	502.2/I Category C1 (Induced)	502.1/I
Temperature Shock	503.3/I	503.2/I	503.1/I
Solar Radiation	505.3/I	505.2/I Figure 505.2	505.1/I
Rain & Blowing Rain	506.3/II&I	506.2/II&I	506.1/I&II
Humidity	507.3/II (Cycle-5)	507.2/II (Cycle-5)	507.1/II
Salt Fog	509.3/I	509.2/I	509.1/I
Dust	510.3/I	510.2/I	510.1/I
Vibration	514.4/I (Category 10)	514.3/I (Category 10)	514.2/IVIII (Curve W)
Shock	516.4/I, IV & VI	516.3/I, IV & VI	516.2/I, II & V

# ASTRO Digital SABER

## SPECIFICATIONS

### GENERAL PERFORMANCE SPECIFICATIONS

<b>Modulation:</b>	C4FM of QPSK-C family (Compatible Quadrature Phase Shift Keying)		
<b>Protocol:</b>	ASTRO: 4.8 kbps VSELP, 2.1 kbps Error Correction Coding, 2.7 kbps Embedded Signalling PROJECT 25-CAI: 4.4 kbps IMBE, 2.8 kbps Error Correction Coding, 2.4 kbps Embedded Signalling SECURENET: 12 kbps CVSD		
<b>Channel Bandwidth:</b>	ASTRO VSELP, Project 25-CAI, & Analog:	12.5 kHz	
	SECURENET & Analog:	20/25/30 kHz	

### VOICE CODER (ASTRO MODE)

<b>Voice Coding Method:</b>	VSELP: Vector Sum Excited Linear Predictive Coding IMBE (CAI): Improved Multiband Excitation CVSD: Continuously Variable Slope Delta Modulation (for SECURENET mode)		
<b>Voice Truncation:</b>	None (250 msec for SECURENET mode)		
<b>Frame Re-sync Interval:</b>	180 msec (clear digital mode)		
<b>Forward Error Correction:</b>	Golay code		
<b>Error Mitigation:</b>	Dual Level Level 1: Extrapolates and replaces 30 msec voice frames that exceed the error correction algorithm tolerance. Level 2: Progressive muting of 30 msec voice frames that are too severely damaged for Level 1 replacement		
<b>Error Migration:</b>	P25-CAI (IMBE): Dual Level Level 1: Extrapolates and replaces 20 msec voice frames that exceed the error correction algorithm tolerance. Level 2: Progressive muting of 20 msec voice frames that are too severely damaged for Level 1 replacement.		
<b>Code Book Structure:</b>	ASTRO VSELP: Linear sum of basis vectors Project 25 (IMBE): No code book		

### SIGNALLING (ASTRO MODE)

<b>Signalling Rate:</b>	9.6 kbps		
<b>Digital ID Capacity:</b>	16,700,000 IDs		
<b>Digital Network Access Codes:</b>	4,096 network site addressess		
<b>Digital User Group Addresses:</b>	4,094		
<b>Energy Management:</b>	Automatic 3dB RF feedback based on infrastructure RSSI signalling		
<b>Error Correction Techniques:</b>	Golay, BCH, Reed-Solomon codes		
<b>Data Access Control:</b>	Slotted CSMA: Utilizes infrastructure-sourced data status bits embedded in both voice and data transmissions.		

### ENCRYPTION

<b>Encryption Algorithm Capacity:</b>	2 algorithms per radio		
<b>Encryption Keys per Radio:</b>	16 keys (ASTRO and SECURENET compatible)		
<b>Encryption Frame Re-sync Interval:</b>	ASTRO: 360 msec SECURENET: 500 msec Project 25-CAI: 360 msec		
<b>Encryption Keying:</b>	Over-the-air Rekeying and Key Loader		
<b>Synchronization:</b>	Counter Addressing and Cipher Feedback		
<b>Code Key Generator:</b>	External hand held microprocessor controlled key variable loader		
<b>Encryption Key Tag Capacity per System:</b>	65,000		
<b>Encryption Type:</b>	Digital		
<b>Number of Unique Keys:</b>	Dependent on encryption algorithm		
<b>Code Key Initialization:</b>	Internally derived pseudo-random initializing vector		
<b>Key Storage:</b>	Volatile electronic memory or non volatile electronic memory		
<b>Key Erasure:</b>	Keyboard command, tamper detection and over-the-air command		

Specifications subject to change without notice.

### BATTERIES FOR ASTRO DIGITAL SABER RADIO

Battery Capacity/Type	Dimensions (HxWxD)	Typical Capacity	Battery Part Numbers
Medium Capacity Nickel-Cadmium	3.14" x 2.94" x 1.18"	1100 MAH	NTN4593
Ultra-High Capacity Nickel-Cadmium	3.90" x 2.94" x 1.18"	1800 MAH	NTN4595
High Capacity Nickel Metal Hydride	3.14" x 2.94" x 1.18"	1650 MAH	NTN8251

### FM BATTERIES FOR ASTRO DIGITAL SABER RADIO

FM Battery Capacity/Type	Dimensions (HxWxD)	Typical Capacity	Battery Part Numbers
High Capacity FM D, F & G	3.14" x 2.94" x 1.18"	1050 MAH	NTN4538
Ultra-High Capacity FM D, F & G	3.90" x 2.94" x 1.18"	1750 MAH	NTN4596

#### FM Approval Information (Optional & Pending)

INTRINSICALLY SAFE: Class I, II, III, Division I, Groups D, F and G with NTN4538 or NTN4596 batteries.  
NONINCENDIVE: CLASS 1, Division 2, Groups A, B, C AND D with NTN4538, NTN4596, NTN4593 and NTN4595 batteries.

### TRANSMITTER

TYPICAL PERFORMANCE SPECIFICATIONS			
	VHF	UHF	800 MHz
<b>Frequency Range/Bandsplits:</b>	136-174 MHz	403-470 MHz 450-520 MHz	806-824 MHz 851-870- MHz
<b>Channel Spacing:</b>	12.5/20/25/30 kHz	12.5/20/25 kHz	12.5/20/25 kHz
<b>Maximum Frequency Separation:</b>	Full Bandsplit	Full Bandsplit	Full Bandsplit
<b>Rated RF Output Power, Adj.†:</b>	1 to 5W	1 to 4W	1 to 3W
<b>Frequency Stability***†:</b> (-30°C to +60°C; +25°C Ref.):	±0.00025%	±0.00020%	±0.00015%
<b>Modulation Limiting†:</b> 25/30 kHz chnl: 20 kHz chnl: 12.5 kHz chnl:	±5.0 kHz ±4.0 kHz ±2.5 kHz	±5.0 kHz ±4.0 kHz ±2.5 kHz	±5.0 kHz ±4.0 kHz (NPSPAC) ±2.5 kHz
<b>FM Hum &amp; Noise††:</b> 25/30 kHz 12.5 kHz	-48 dB -42 dB	-48 dB -42 dB	-45 dB -39 dB
<b>Emissions***†:</b> (Conducted & Radiated):	-70 dBC	-70 dBC	-70 dBC
<b>Audio Response†</b> (6dB/Octave Pre-emphasis from 300 to 3000 Hz):	+1, -3 dB (EIA)	+1, -3 dB (EIA)	+1, -3 dB (EIA)
<b>Audio Distortion per EIA††:</b>	<2%	<2%	<2%

### RECEIVER

TYPICAL PERFORMANCE SPECIFICATIONS			
	VHF	UHF	800 MHz
<b>Frequency Range/Bandsplits:</b>	136-174 MHz	403-470 MHz 450-520 MHz	851-870 MHz
<b>Channel Spacing:</b>	12.5/20/25/30 kHz	12.5/20/25 kHz	12.5/20/25 kHz
<b>Maximum Frequency Separation:</b>	Full Bandsplit	Full Bandsplit	Full Bandsplit
<b>Analog Sensitivity* 20 dB Quieting (25/30 kHz chnl)†:</b>	0.35µV	0.35µV	0.35µV
<b>12 dB SINAD per EIA (25/30 kHz chnl)†:</b>	0.25µV	0.25µV	0.25µV
<b>Digital Sensitivity†††:</b> 1% BER (12.5 kHz chnl)*: 10% BER (12.5 kHz chnl)**:	0.40µV 0.25µV	0.40µV 0.25µV	0.40µV 0.25µV
<b>Selectivity††† (25/30 kHz chnl)†:</b> per EIA (12.5 kHz chnl):	-78 dB -67 dB	-78 dB -68 dB	-75 dB -63 dB
<b>Intermodulation***††† (25/30 kHz chnl):</b>	-78 dB	-77 dB	-74 dB
<b>Spurious Response†:</b>	-75 dBC	-75 dBC	-75 dBC
<b>Frequency Stability†:</b> (-30°C to +60°C; +25°C Ref.):	±0.00025%	±0.00020%	±0.00015%
<b>Audio Distortion per EIA††:</b>	<2%	<2%	<2%
<b>Audio Output per EIA (@≤3% Electrical Distortion)***†:</b>	500 mW	500 mW	500 mW

\*Recovered digital audio quality @ 1% Bit Error Rate exceeds audio quality @ 20 dB Quieting.  
\*\*Recovered digital audio quality @ 10% Bit Error Rate is approximately equal to audio quality @ 12 dB SINAD.  
\*\*\*Measured in digital mode per TIA/EIA TSB 102, CAAB  
†Measured in the analog mode per TIA/EIA 603.



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