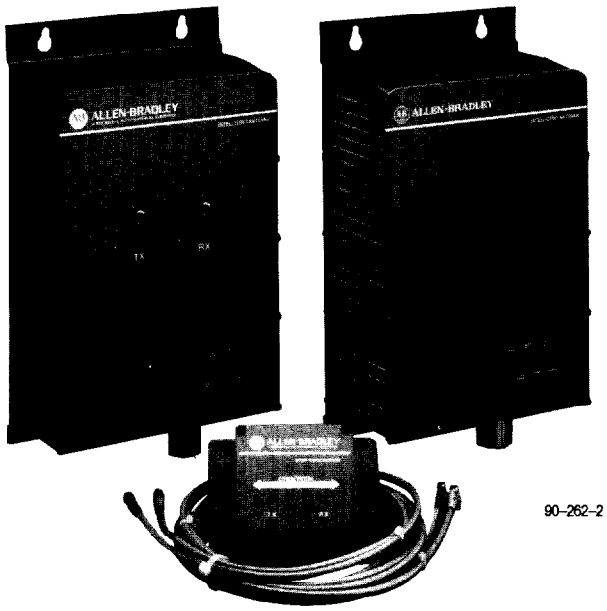
ALLEN-BRADLEY

Bulletin 2750
Intelligent Antennas

(Catalog No. 2750-AS, -ASP, -ASD, -ASPR
2750-AH, -AHP, -AHD, -AHPR)

Product Data



General. This document describes the Allen-Bradley families of Intelligent Antennas.

- Catalog No. 2750-AS Series Antennas are RS-232/422 devices which communicate using DF1 or ASCII protocol.
- Catalog No. 2750-AH Series Antennas are RS-485 devices which communicate using DH-485 protocol.

DF1 and DH-485 protocols are compatible with the Allen-Bradley Programmable Logic Controllers (PLCs), Data Highway 1 and Data Highway 2. ASCII protocol is useful for quick startups and operation checks.

General (cont'd)

Intelligent antennas are identification sensors which transfer data between radio frequency (RF) tags and a host device. The antennas are responsible for:

- Bidirectional communication with tags.
- Encoding/Decoding of this information.
- Interpretation and execution of host commands.
- Transforming data into host format for transmission.

Intelligent antennas exchange data with different types of RF tags:

- Read/Write tags with 2K or 8K of RAM memory.
- Programmable tags with 6-digit, 20-character, or 40-character EEPROM memory.

The antennas can read from or write to read/write tags and read from programmable tags during online operations.

The 2750-ASP, -ASPR, -AHP, -AHPR antennas can program the programmable tags at a stationary offline location.

Table 1 shows the tags that operate with each antenna.

Table 1

Antenna Catalog No.	Radio Frequency (RF) Tags	
	Type	Catalog No.
2750-AS, -AH, -ASD, -AHD	Read/Write	2750-TFAW2K, 2750-TFAW8K
	Read Only Operations	2750-TAU40, -TSHU40, -TFAU40
2750-ASP, -AHP, -ASPR, -AHPR	Read/Write	2750-TFAW2K, 2750-TFAW8K
	Programmable and Read Only Operations	2750-TAU40 -TSHU40, -TFAU40

Operating parameters and status checks are user programmable using antenna commands. Diagnostic LED indicators on the device also provide a visual indication of operating status.

You can install the antennas in a wide range of industrial environments. Housed in a die cast aluminum enclosure, the antennas meet NEMA Type 4 enclosure standards.

The antennas transmit data at a frequency of 915 MHz and receive data at a frequency of 1830 MHz. The 2750-AS, -AH, -ASD and -AHD antennas meet the required Federal Communications Commission (FCC) Part 15 regulations and require no site license. The 2750-ASP, -AHP, -ASPR and -AHPR antennas require an FCC Part 90 approved site license for operation.

Integrated or Remote Style

The Intelligent Antennas are available in two styles: integrated and remote.

- **Integrated Antennas (Catalog No. 2750-AS, -AH, -ASP, -AHP)**
  This style of antenna contains the circuitry, transmit and receive antennas in the main body. The integrated antennas have a 360° polarization. The face of the tag can be in any degree of rotation with respect to the antenna and still communicate.
- **Remote Antennas (Catalog No. 2750-ASD, -AHD, -ASPR , -AHPR)**
  With this style of antenna, a remote head connects to the main body using a 10 foot (3.05 meter) coaxial cable. The remote antennas have a linear polarization. The face of the tag can rotate up to ± 25° with respect to the remote antenna head and still communicate.

  The remote antennas require the following hardware:

  - Two 10 foot (3.05 m) coaxial cables (Catalog No. 2750-C1) connect the antenna body to the remote head.
  - Remote antenna head with RX and TX connectors.

  The remote antennas are particularly useful for applications where space limitations are a concern.

The remote and integrated antennas of the 2750–AS family support RS-232/422 communications. The same antennas in the 2750–AH family support RS-485 communications. The remote antennas are available with a short or long range reading capability.

Note: The RS-485 physical link is implemented using the Allen-Bradley DH-485 protocol.

Operating Antennas in a DH-485 Network

The 2750-AH Series of Antennas (Catalog No. 2750-AH, -AHP, -AHD, -AHPR) operate in a DH-485 network with the Flexible Interface Module (Catalog No. 2760-RB) and the DH-485 Protocol Cartridge (Catalog No. 2760-SFC2 Series B).

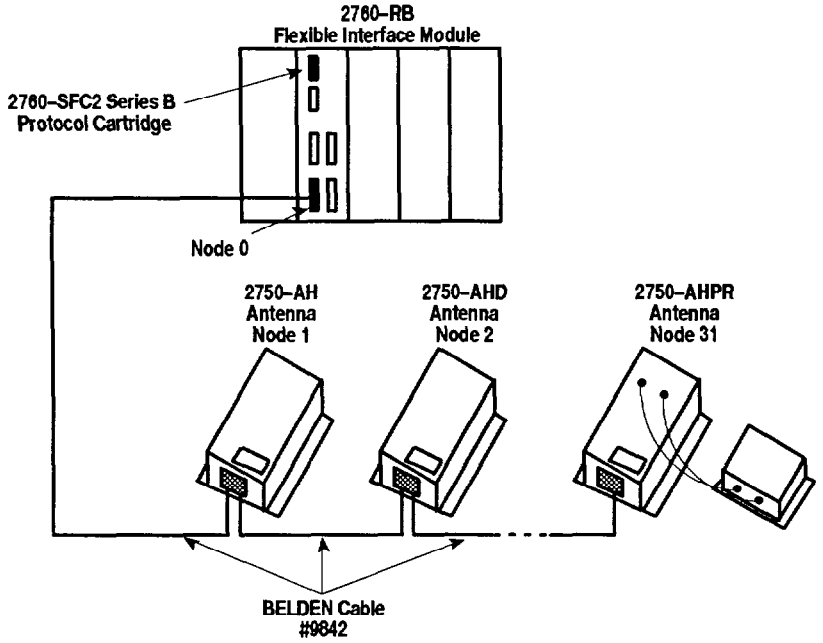
The antennas communicate over the DH-485 network to a PLC via a port of the Flexible Interface Module.

You can configure each device port of the Flexible Interface Module to operate up to 31 antennas in a single network. The antennas operate as slave devices responding to poll requests for data from the module or a PLC controller.

In addition, the antennas can operate in a network with other Allen-Bradley devices, including the SLC 500 Small Logic Controllers and the 2755-DM6/DM9 Bar Code Decoders. In a mixed network, the antennas operate as slaves with other slave or master devices.

Figure 1 shows a typical configuration with a network of 2750-AH Series of antennas. Node addresses and baud rate are set using DIP switches on the antennas.

Figure 1
Network of 2750-AH Intelligent Antennas



Refer to Publications 2760-2.10 and 2760-2.20 for more information on the Flexible Interface Module and the DH-485 Protocol Cartridge. For complete details on operating the 2750-AH Antennas in a DH-485 network, see the User's Manual (Publication 2750-ND001).

Power Supply

The Catalog No. 2750-PA power supply provides the 24 VAC operating voltage to operate an intelligent antenna. A single power supply can operate up to four antennas at a maximum distance of 200 feet (60.96 meters).

External Connections

Beneath the wiring plate on the antennas are two plug in connectors; a 5-pole and 8-pole connector. Figure 2 shows the location of these connectors.

The 8-pole connector connects:

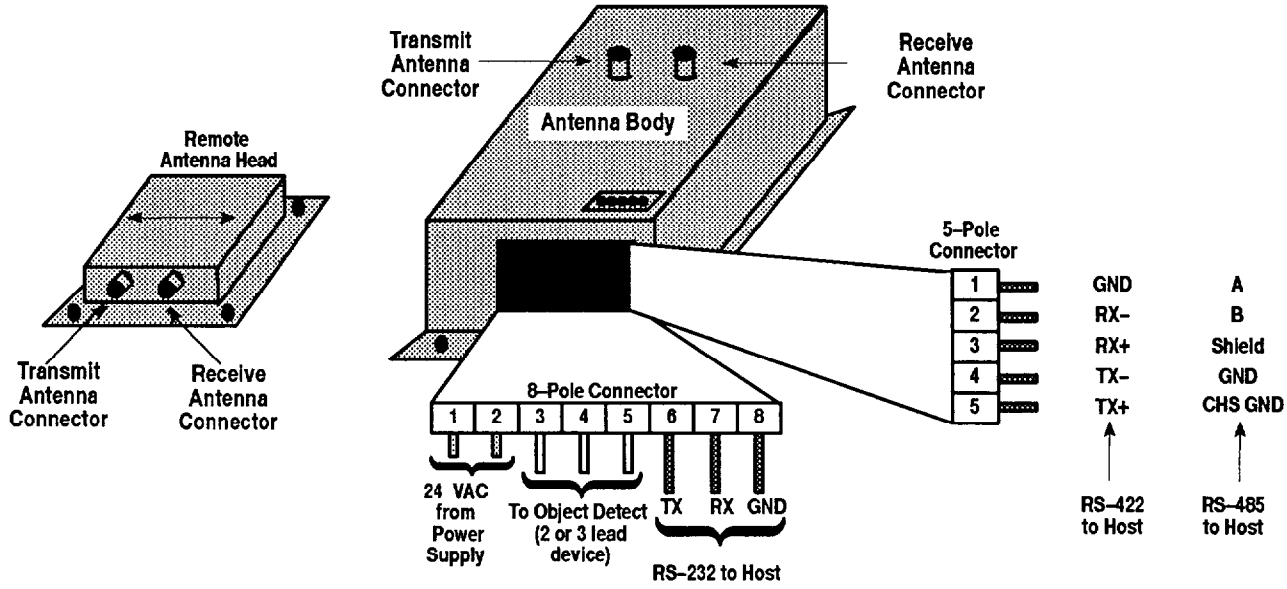
- 24 VAC Power Supply (Catalog No. 2750-PA).
- Object Detect Device (2- or 3-lead, current source or current sink).
- RS-232/422 communication line to host (Catalog No. 2750-AS Antennas only).

The 5-pole connector connects:

- RS-422 communication line to host (Catalog No. 2750-AS Antennas) or
- RS-485 communication line to host (Catalog No. 2750-AH Antennas).

Important: The 2750-AH series of antennas use DIP switches to set the node address and baud rate for each antenna on the DH-485 network.

Figure 2
External Connections



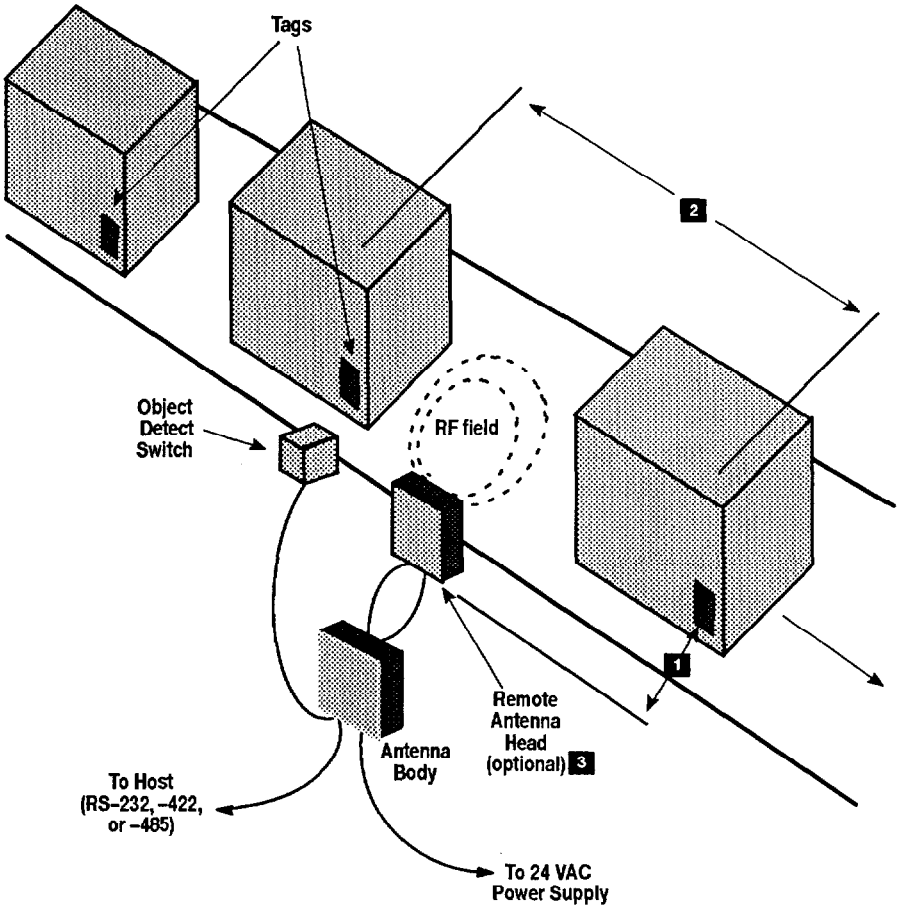
Object Detect Device

Each antenna has an input for connecting an optional object detect device. This sensing device detects objects with attached RF tags. Allen-Bradley offers a variety of object detect devices including photoswitches, limit switches and proximity sensors.

The object detect can be: 2- or 3-lead; current sink or current source; or a dry contact device. The antenna can supply power to a device from 10 VDC to 30 VDC at 50 mA.

Figure 3 shows a typical operating configuration with an object detect device.

Figure 3
Typical Operating Configuration for Antennas



1 Antenna-to-tag spacing.

2 Tag-to-tag spacing should be at least 3 times the antenna-to-tag spacing for read operations. The User Manuals for the antennas define spacing requirements for programming tags or writing to tags.

3 The remote antenna uses a linear polarization, which requires the correct orientation between the tag and the remote head. The User Manuals for the antennas provide details on antenna-to-tag orientation.

Antenna Configuration

Commands are sent from a host device to the antenna to configure and operate the antenna. These commands:

- Set the object detect's operating parameters including:
  - tag type
  - object detect mode
  - transaction timeout setting
  - RF field strength level
- Set parameters for host communication (-AS antennas only).
- Return the current operating parameters.
- Perform single or multiple tag transactions.
- Repeat tag transactions.
- Reset antenna to default communication parameters.
- Run diagnostics and return diagnostic results.

Typical Operation Sequence

Each object that is to be identified or tracked by the system has an RF tag. When the object detect device senses a tagged object, it signals the antenna to start transmitting.

When the tag enters the antenna's RF signal field, the antenna can either:

- read data from the tag
- write or program data to the tag

The type of antenna and tag determine which kind of communication will occur.

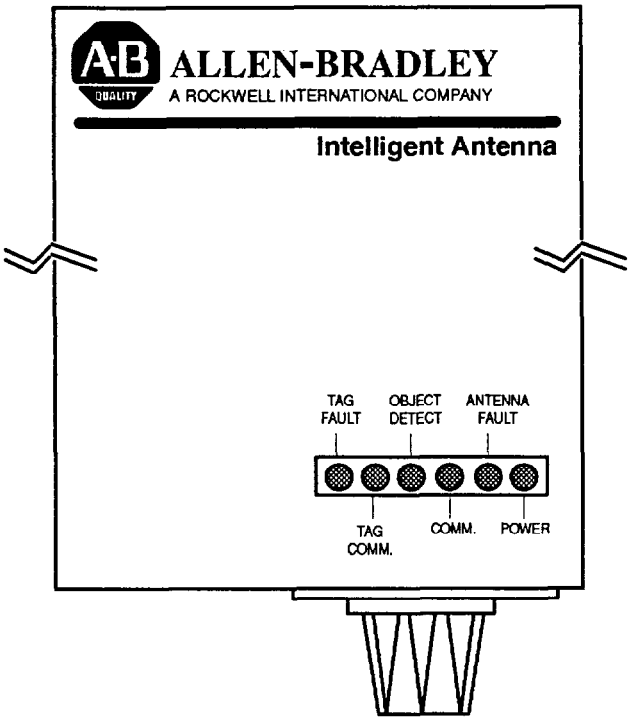
A write/program transaction sends data from the host to the antenna and then to the tag for storage in tag memory. The host can send a separate command for each transaction or a repeat command to initiate multiple transactions.

You can enable object detect mode to execute transactions only when receiving a signal from an object detect device. You can also set a timeout limit for each transaction.

Diagnostic LED Indicators

LED indicators are located on the face of the antenna. Figure 4 shows the location of the indicators.

Figure 4
LED Indicators



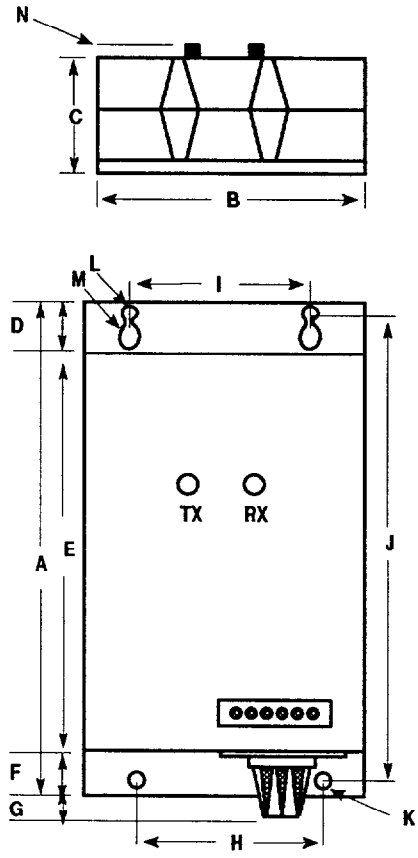
The LED indicators provide a visual indication of the following conditions.

LED Label	LED Color	Normal Status	LED Status Explanation	
			On	Off
Tag Fault	RED	Normally off.	Last read or write operation failed or timed out.	No error detected.
Tag Communications	YELLOW	Normally status is off. Changes state as tags pass.	Antenna is attempting to transmit to a tag.	No transmission in progress.
Object Detect	YELLOW	Normal status is off. Changes states when object detect switch closes physically or logically.	Object detect is active or object detect mode is disabled.	Object detect is not active.
Communications	GREEN	Normally on.	Controller communication is OK.	Controller communication is lost.
Antenna Fault	RED	Normally off.	Flashing: Intelligent Antenna fault.	Normal operations underway.
Power	GREEN	Normally on.	Power is applied.	No power applied.

Mounting Dimensions

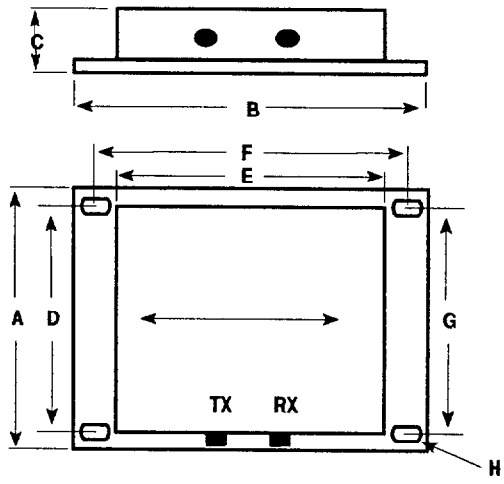
Figure 5 shows the mounting dimensions for the main body of the antenna. Figure 6 shows the mounting dimensions for the remote antenna head.

Figure 5



Dimensions in Inches (mm)	
A	13.5 (342.9)
B	7.76 (197.1)
C	4.37 (111.0)
D	1.5 (38.10)
E	11.00 (279.40)
F	1.00 (25.40)
G	0.45 (11.43)
H	5.00 (127.00)
I	5.00 (127.00)
J	12.87 (326.89)
K	0.31 Dia. (7.87)
L	0.31 Dia. (7.87)
M	0.55 Dia. (13.97)
N	0.249 Dia. (6.3)

Figure 6



Dimensions in Inches (mm)	
A	4.12 (104.65)
B	5.12 (130.04)
C	1.25 (31.75)
D	3.54 (89.91)
E	3.5 (88.90)
F	4.12 (104.65)
G	3.54 (89.91)
H	0.25 Dia. (6.35)

Specifications

Electrical	
Input power	Power Supply (Cat. No. 2750-PA) 24 VAC (+20%, -25%) @ 2 Amps
Connectors	
Integrated Units	Pressure plate type screw (8-terminals)
Remote Units	Pressure plate type screw (5- and 8-terminal) SMA type (2 connectors)
Cable Requirements	
2750-AS Antennas	Shielded cable, 50 feet (15.24 m) maximum to RS-232 host or 4,000 feet (1219. 1 m) maximum to RS-422 host
2750-AH Antennas	Shielded cable, 4,000 feet maximum to RS-485 host
Object Detect Switch:	
Supply source	10 VDC to 30 VDC, 50 mA (Bulletin 880L recommended)
Sink/Source current	8-25 milliamperes
Communications:	
2750-AS Antennas	RS-232 or RS-422 using DF1 or ASCII protocol
2750-AH Antennas	RS-485 using DH-485 protocol
Mechanical:	
Enclosure	
Rating	NEMA Type 4
Material	Die cast aluminum
Body Dimensions	
Length	11.00" (279.40 mm) body 13.50" (342.90 mm) with mounting tabs
Width	7.76" (197.1 mm)
Height	4.37" (111.0 mm)
Weight	14.00 lbs (6.35 kg)
Head Dimensions	
Length	5.12" (130.0 mm) with mounting tabs
Width	4.12" (104.6 mm)
Height	1.25" (31.75 mm)
Weight	0.75 lbs. (.34kg)

Specifications (cont'd)

Environmental:	
Operating temperature	32° to 140° F (0° to 60° C)
Storage temperature	-40° to 185° F (-40° to 85° C)
Relative humidity	5 to 95%, noncondensing
Shock	
Operating	30 G
Nonoperating	50 G
Vibration	
Operating	2.5 G (5 Hz to 2000 Hz)
Nonoperating	5.0 G (5 Hz to 2000 Hz)
Capabilities:	
Tag reading distance	Refer to Publication 2750-2.9 on Radio Frequency Tags
Read/Write transfer data	
2750-AS Antennas	6,144 bytes maximum
2750-AH Antennas	112 bytes maximum
Antenna configuration	Software selected and stored in EEPROM
Tag types	Read/Write, 2K or 8K character tag, Programmable EEPROM tag (6-digit, 20-digit, or 40-character tags)
Approvals:	
2750-AS,-AH,-ASD, -AHD Antennas	Meet FCC Regulations Part 15
2750-ASP,-AHP,-ASPR, -AHPR Antennas	Require an FCC Part 90 Site License for operation

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