Section G
Binocular-Receiver Sensor – 10XBR-Series
Operators Manual

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G.1 Introduction

The SCAN-A-LINE™ Binocular-Receiver Sensor – 10XBR-Series is a non-contact, electro-optical sensor designed specifically for the multiple detection's of strip edges in several previously difficult measurement applications. The 10XBR-Series sensor utilizes two receivers for each emitter, allowing the sensor to accurately locate edges on materials that vary in product positioning over the face of the emitter (product passline) {Figure G.1-1} for Passline Independent Width Measurement or for single-sensor Thickness Independent Width Measurement.

G.1.a 10XBR-Series Overview

The 10XBR-Series sensor consists of an emitter with 20 foot [6.1m] cable and two receivers with 15 foot [4.57m] emitter-to-receiver cables {Figure G.1-1} and a single 20 foot [6.1m] emitter-to-processing unit attaching the sensor to the processing unit. Longer cables are available upon request (XCB Option). The 10XBR-Series sensor can be configured for single- or dual-sensor operation {Figure G.1-2}. Each receiver in a dual-sensor system is configured with a long blinder to prevent the receivers on sensor A (receiver A1 and A2) from detecting the emitter light from sensor B and may be configured with receiver horn blinders [HBLD Option – Section G.5] in some ambient light intensive applications.

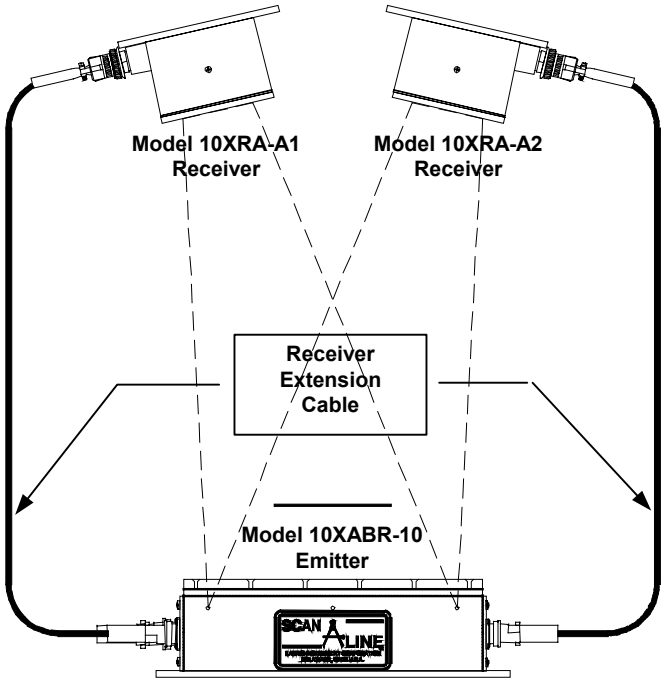

Figure G.1-1: 10XBR-Series Sensor

AlGaAs Light Emitting Diode (LED) arrays are used in the emitter as the light sources, while each receiver contains a low noise preamplifier, a silicon photocell and a cylindrical lens. In addition to the LED counters, decoders and drivers, the emitter driver board contains a tuned amplifier for the video signal generated by the receiver. The ten-inch [254mm] long Model 10XABR-10 emitter uses a set of ten LED array sections. Each section is one inch [25.4mm] in length and is composed of ten LEDs spaced 0.1 inch [2.54mm] apart. The 10XBR-Series emitter modules boards can be packaged in units of 10, 20, 30 or 40 inches [254mm, 508mm, 762mm and 1.02m] in length, though most passline independent applications utilize thirty [762mm] and forty inch [1016mm]sensor lengths.

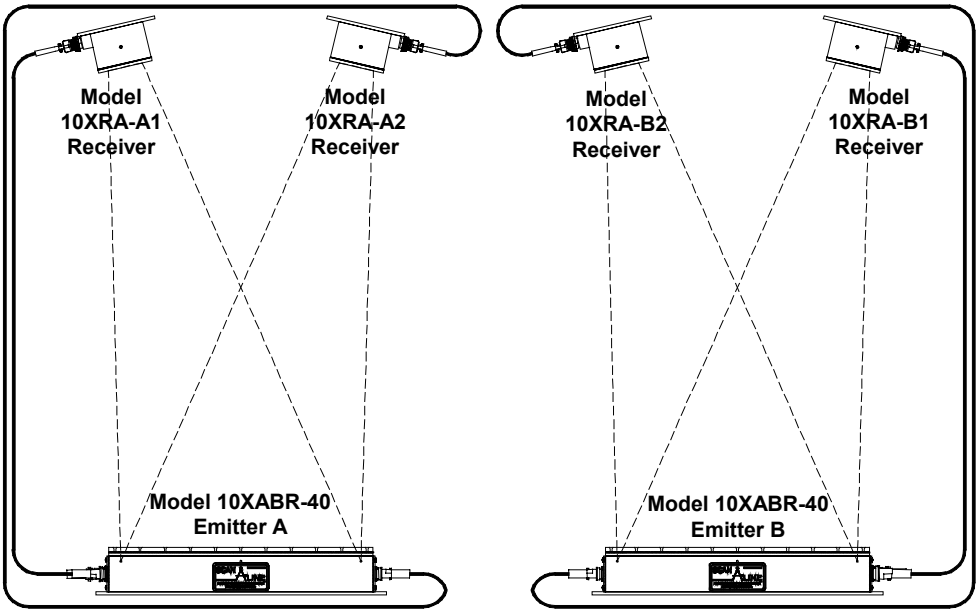

Figure G.1-1: Model 10XABR-40 Dual-Sensor System for Passline Independent Width Measurement

The 10XBR-Series sensors can be used individually for measurement of small widths with relatively little passline changes or for single-sensor thickness independent width measurement. For measurement of sizes larger than 30 inches [762mm], the 10XBR-Series sensor can be paired with another 10XBR-Series sensor in a dual-sensor configuration to cover strip sizes of almost infinite size. Wide variations between the smallest and the largest materials to be measured must be taken into account with the 10XBR-Series sensor system, as the sensor may not be able to fully view the smallest strip when installed to view the largest strip.

NOTE:

If strip widths vary more than 40 inches [1016mm] between the narrowest and widest materials, the 10XBR-Series sensor may not be appropriate for that application. Please consult with Harris Instrument Corporation Engineering for more information.

Because of the unique abilities of the 10XBR-Series sensor (passline independent or thickness independent width measurement), the sensor is set up differently from the 10XAS-Series sensors. The receivers are mounted with their photocell centerpoints located directly over the middle of the last LED on each end of the emitter, with the centerline of the receivers pointing directly at the mid-point of the emitter LED array {Figure G.1-2}. Note that operation over seventy-two inches [1829mm] emitter-to-receiver separation is available (though not recommended) and may be noted in an Engineering Variance Order (EVO) document.

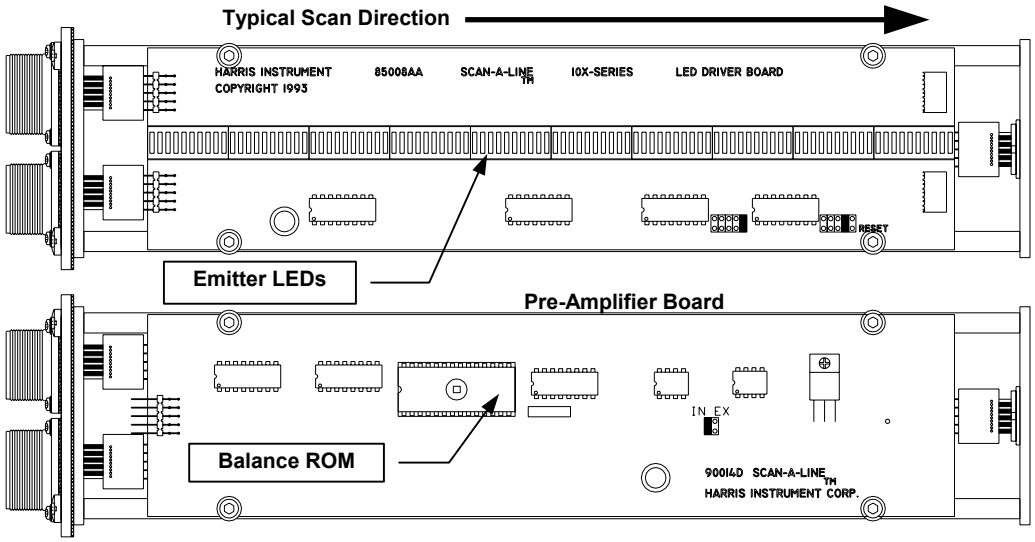

Figure G.1-3: Model 10XABR-10-CR Emitter Interior Views

Reliable measurements can be performed with the 10XBR-Series sensor even with a 90% attenuation of optical signals, providing the attenuation is uniform over the entire measurement area (i.e. smoke, steam, etc.).

G.1.b Functional Description

Each SCAN-A-LINE™ 10XBR-Series sensor (emitter, receivers and cabling) operate as a complete measurement sensor system. The emitter driver board in the emitter, containing a tuned amplifier, employs a 2mHz crystal oscillator and a series of counters, decoders and drivers that generate a signal to light the emitter LEDs one through ten. Every time ten sequential diodes are lighted, a pulse is sent to the LED array boards to advance their counters. The array boards also contain counters that are decoded and used to select LED block 10, 20, 30, etc. At the 100th counted pulse (the end of a ten inch [254mm] emitter LED array board), LED array board #1 is turned off. The last diode triggers the same sequence in the next board if more than one array board is used (a Model 10XABR-20 has two LED array boards, a Model 10XABR-30 has three LED array boards, etc.) When the last diode in the last board is turned off, a reset pulse is sent back to the emitter driver to generate the SYNC pulse, reset all counters and begin the LED lighting sequence again. The scanning direction is initiated from the two-connector end of the emitter and finishes on the opposite end of the emitter {Figure G.1-3}.

The receivers are positioned to “see ” each diode in the emitter array as it is lit. A cylindrical lens in the receivers gather light from each of the emitter LEDs and focuses it onto one or more silicon cell(s) {Figure G.1-4}. The emitter LED light focused by the receiver lens onto the photocells generates an electrical current. Because the light from the emitter LEDs in the array is pulsed at a 20kHz rate, the current generated in the receiver is modulated at the same frequency. The receiver preamplifier is tuned to this frequency (20kHz) to help reject signals generated by other sources of light.

Because the light is not actually imaged onto the photocell, placement of the receivers in standard 10XAS-Series systems is typically non-critical. But in passline independent or thickness independent width measurement systems with the 10XBR-Series sensor, the positioning of the receivers is very important. Since the light from each of the emitter diodes is emitted in the form of an expanding cone rather than a beam, it is possible to detect the attenuation of a particular diode by an object long before it completely blocks the light. It is important to note that the edge position is a statistical analysis of the receiver LED detection signal. The amplified signals from the receivers are sampled in the emitter at the peak of each LED pulse. The resulting signals are sent through a low-pass filter into a peak detector and comparator circuit. Whenever the filtered sampled video signal drops to a level equal to one-half the peak level, the comparator switches from a 12VDC to a 0 VDC signal. This output is buffered and sent from the emitter as the output VIDEO signal. By using sample-and-average techniques, the position of the object with respect to the array can be determined to a resolution 10 or 20 times finer than the spacing between the diodes in the array. The resolution of the system is related to and limited by the diode-to-diode uniformity and the signal-to-noise ratios of the receiver photocell amplifiers.

When the video signal is received in the processing unit [typically a Model MPPU – Section Z or Model DCPU – Section K], it is translated to measurement information and can be converted into an analog signal for processing and/or routing to the customer equipment. The 10XBR-Series sensor will typically detect four edges, two edges for each receiver in a single-sensor system and two edges for each sensor in a dual-sensor system. This information can then be processed by the Multi-Purpose Processing Unit – Model MPPU [Section Z] or Digital Control Processing Unit – Model DCPU [Section K] to determine the size of the material, with product passline variations of up to one foot [305mm].

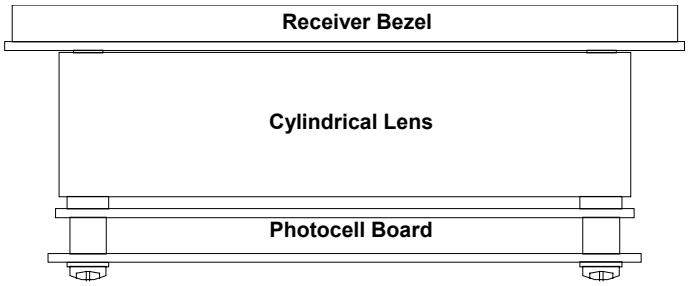

Figure G.1-4: Model 10XRA Receiver Interior View

The SCAN-A-LINE™ Model 10XRA receivers on the 10XBR-Series sensor allow two, uniform wide-angle views of the emitter. When using a pair of 10XBR-Series sensors with a large measurement system, it is important to insure that the light from one emitter is not seen by the other sensors receivers. This is most easily accomplished by using a small sheet metal "blinder" to block light coming from the opposite emitter {Figure G.1-5}[Section G.4.e]. Several types of blinders are available for the Model 10XRA receiver; please contact Harris Instrument Corporation for more information.

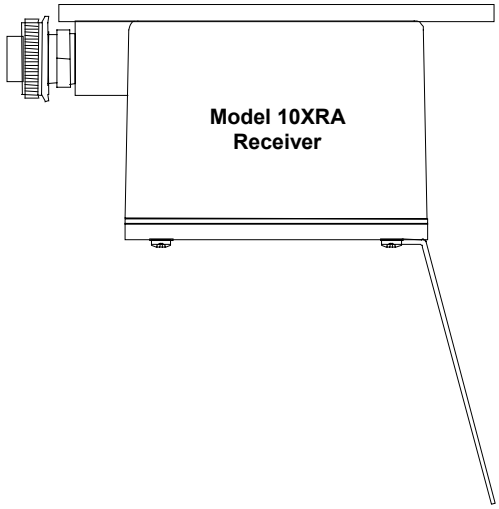

Figure G.1-5: Model 10XRA with Long Blinder

G.1.c Sensor Balancing

All SCAN-A-LINE™ 10XBR-Series sensors are computer balanced for optimum performance of the emitter LED's. Because of the slight differences in intensities of the AlGaAs light emitting diodes in the emitter, the complete sensors are individually tested for the light intensity that reaches both receivers photocell arrays. To achieve optimum accuracy and the fastest, most accurate photocell response, a computer "evens" out the individual LED outputs and stores the results in the on-board Erasable Programmable Read-Only Memory (ROM) chip {Figure G.1-3}.

Balancing of the sensor must be performed at the factory by Harris Instrument Corporation trained personnel (the Harris Instrument Corporation Service Department can also balance sensors in the field on service calls when necessary). Balancing of the sensor requires the information on the separation between the emitter and the receivers, as well as the position of the receivers over the emitter. Unless specified when ordered, ALL 10XBR-Series sensors are balanced at the recommended emitter-to-receiver separation and with the receivers centered over the end LEDs of the emitter and pointed at the middle emitter LED.

NOTE:

Any time the receiver(s) and/or emitter(s) physical positioning changes, the sensor MUST BE REBALANCED. Contact Harris Instrument Corporation Service for information on balancing the sensor(s).

Sensor Size	Default Balance Separations
10XBR-10	*20" [504mm]*
10XBR-20	*40" [1016mm]*
10XBR-30	*60" [1524mm]*
10XBR-40	*72" [1829mm]*

Table G.1-1: Balance Separation

G.1.d Receiver Mounting Fixtures

All 10XBR-Series sensors produced after 01 June 1997 may include a receiver mounting bracket with each receiver to assist in the installation of the sensor system. Please refer to the Installation Section of the manual [Section G.5] for more information. If your system was not provided with receiver mounting fixtures, please contact Harris Instrument Corporation Service for information on obtaining such fixtures.

G.2 Operational Considerations

The 10XBR-Series sensor is highly resistant to most of the industrial environments that can cause problems with most non-contact measurement equipment. The operating temperature for the 10XBR-Series is 32°F to 122°F [0°C to 50°C]. Operations outside this range are possible with special provisions made to protect the equipment, such as heat shields and water jackets.

A reasonably uniform buildup of dust, dirt or oil will not affect the operation or accuracy of a SCAN-A-LINE™ sensor. An even build-up of dust, dirt and oil can attenuate the sensor signal by over 90% before any loss of accuracy occurs. To avoid erratic readings or maintenance difficulty, care should be taken to install the emitter and receiver where the danger of such contamination is minimized. An air wipe installed over the emitter viewing window can be helpful where contamination cannot be avoided. Since sensing an edge position is a factor of time and not of signal amplitude with SCAN-A-LINE™ sensors, vibration is of little or no consequence. In very high vibration applications, simple vibration dampening will solve most problems encountered.

Because the 10XBR-Series sensor is producing and looking for light modulated at approximately 20kHz, it is unlikely that most ambient light sources will be a problem. It is best to avoid placing a direct light source in the receiver view path. A bright light source can overload the receiver photocell and prevent it from detecting the emitter light. When conditions require them, special filters can be provided to reduce the problem. Special filters are also required when measuring incandescent, hot worked metals to remove the infrared spectrum energy.

Even though the 10XBR-Series sensor is tolerant of most ambient light situations, high-intensity strobe lights can also cause receiver cell overload, producing false detection's. Because of the high frequency pulsing of strobe lights, the receiver can interpret the strobe pulses as an extra edge or trigger a fault detection. Care should be taken when installing the 10XBR-Series sensor to locate the sensor as far as possible from any strobe light(s). If operational constraints require that the SCAN-A-LINE™ sensor be mounted in close proximity to a strobe light, horn blinders [HBLD Option — Section G.5 if applicable {Figure G.2-1}] are available for all Model 10XRA and 10XRA-UT receivers.

In applications where the sensor may be vulnerable to strip collisions, the receiver and emitter are available in *ULTRA-TOUGH*™ enclosures (UT Option). *ULTRA-TOUGH*™ enclosures are designed to withstand most industrial conditions. For environments that contain caustic or corrosive materials, the Chemical Resistant Option (CR Option) provides fluid and corrosive resistant enhancements to both the standard and *ULTRA-TOUGH*™ enclosures.

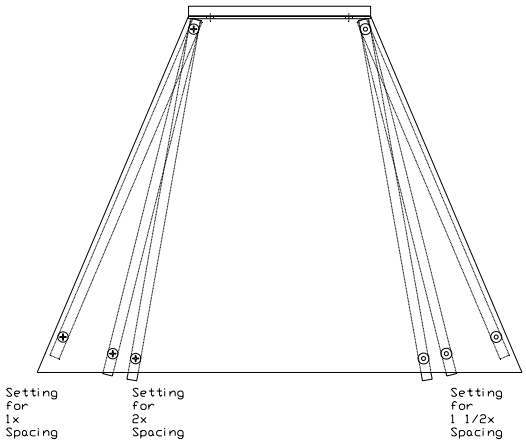

Figure G.2-1: Horn Blinder

G.3 Specifications for 10XBR-Series

Power for the 10XBR-Series sensor MUST be supplied by a SCAN-A-LINE™ processing unit, with one or two sensors per processing unit, for dimensional measurement and strip position monitoring applications. Currently, the only processing units compatible with the 10XBR-Series sensor is the Multi-Purpose Processing Unit — Model MPPU [Section Z] and the Digital Control Processing Unit – Model DCPU [Section K], though a General Processing Unit — Model GPU [Section R if applicable] could be utilized to supply power to the sensors and route the sensor signals to the Model MPPU (or Model DCPU) if distances between the Model 10XABR sensor and the processing unit warrant. The tolerance for power on the 10XBR-Series sensor is very good, but the voltage MUST BE STABLE for proper operation.

A good system earth ground can be helpful in reducing the possibility of interference from other electrical equipment. Care should be taken to insure that the SCAN-A-LINE™ earth ground is separate from the grounds used by other systems. This is most important when high current (i.e., welding equipment) and high voltage is involved.

G.3.a Power Requirements

Power Supply (rated at 50°C):

+12VDC ±0.25VDC @ 250mA
-12VDC ±0.25VDC @ 50mA

G.3.b Signal Output

The output signal from the 10XBR-Series sensor is a 12VDC CMOS signal. The number of edges encountered by the sensor during a scan can be determined by observing the output signal from the emitter. Typically, a single-sensor 10XBR-Series sensor system will encounter four edges (two per receiver) and a dual-sensor system will also encounter four edges (two per sensor). Signal output is the same whether using the sensor for strip position monitoring (such as centerline position) or dimensional measurement.

G.3.c Functionality Specifications

The following specifications for the 10XBR-Series sensors are based upon a dual-sensor Model 10XABR-40 sensor system with standard LEDs detecting opaque material 0.0625 inch [1.6mm] thick at an emitter-to-receiver separation of seventy-two inches [1829mm] and a product passline of two inches [51mm] minimum to fourteen inches [356mm] maximum. Operating conditions are optimal (no ambient light interference, 25°C operating temperature, proper sensor alignment, etc.) for the sensor and processing unit. All specifications are obtained by operating with a Multi-Purpose Processing Unit — Model MPPU [Section Z] or Digital Control Processing Unit – Model DCPU [Section K]. Actual sensor performance may vary depending upon application conditions (IR LEDs, detecting clear, translucent or loosely woven materials, improper alignment, extended separation and/or passline spacing, etc.).

Specification	Value
Linearity	*±0.032 inches [±0.813mm] standard at 2 sigma*
Repeatability	*±0.005 inches [±0.127mm]*
Stability	*Better than ±0.005 inches [±0.127mm]*
Reproducibility	*±0.010 inches [±0.254mm]*
Accuracy	*±0.005 inches [±0.127mm]*

Table G.3-1: Sensor Specifications

G.3.d Physical Characteristics

The 10XBR-Series emitter measures 3.91 inches [99mm] tall by 3 inches [76mm] wide in lengths from 14.2 inches [361mm] (Model 10XABR-10) to 44.2 inches [1123mm] (Model 10XABR-40) and integrates a mounting plate into the base of the emitter. It is constructed of extruded aluminum tube for the housing with an extruded aluminum base plate and bezel mounting plate with a Lexan® bezel as the emitter window (see Drawing # 1295004 Rev. B in Section G.8). The emitter-to-processing unit cable is attached with a 7-pin MS-style circular connector. The two receivers attach, one on each end of the emitter, via 6-pin MS-style circular connectors.

The receivers (Model 10XRA) measure 6.6 inches [168mm] long by 3 inches [76mm] wide by 3.6 inches [91mm] tall. It is constructed of a cast aluminum housing with extruded aluminum mounting plate and bezel containing the borosilicate glass viewing window (see Drawing # 1295015 Rev. C in Section G.8). The 10XBR-Series receivers have a 6-pin MS-style male circular connector for attachment of the emitter-to-receiver cable.

The 10XBR-Series emitter and receiver are also available in the *ULTRA-TOUGH*™ enclosure for extreme operating conditions (such as high collision and/or fluid intensive environments). The *ULTRA-TOUGH*™ emitter measures 4.5 inches [114mm] tall by 4 inches [102mm] wide in overall lengths from 16 inches [406mm] (Model 10XBR-10-UT) up to 46 inches [1168mm] (Model 10XBR-40-UT). The emitter is constructed of cast aluminum housings over 0.625 inches [15.9mm] thick with an extruded aluminum bezel 0.75 inches [19.1mm] thick and a borosilicate glass emitter window approximately 0.375 inches [9.5mm] thick (see Drawing # 1295007 Rev. A in Section G.8). The borosilicate glass is sealed into the bezel with RTV silicon sealant on the standard *ULTRA-TOUGH*™

emitter and with epoxy resin on the CR Option version. The *ULTRA-TOUGH*™ receiver measures 8 inches [203mm] long by 4 inches [102mm] wide by 4.6 inches [117mm] tall (see Drawing # 1295011 Rev. B in Section G.8). They are also constructed of cast aluminum housings with extruded aluminum bezels and borosilicate glass viewing windows similar to the *ULTRA-TOUGH*™ emitters. Included with the 10XBR-Series *ULTRA-TOUGH*™ sensors is a 20 foot [6.1m] watertight emitter cable and two 13 foot [3.96m] watertight receiver cables. All cable connections for the *ULTRA-TOUGH*™ are identical to the standard 10XBR-Series sensor except the *ULTRA-TOUGH*™ sensors use watertight connectors and cables. All gasketing are Gortex® seals or FR152 closed-cell Neoprene on the *ULTRA-TOUGH*™ sensor.

G.3.e Options Available for the 10XBR-Series

The 10XBR-Series sensor is available in several optional configurations to meet a variety of application requirements. The emitter and the receivers may be housed in the standard aluminum housings or in the *ULTRA-TOUGH*™ enclosures. The connections between the emitter and receiver may be made by either semi-rigid liquid-tight cable or by flexible electrical cable. The various configurations are specified as follows:

Model Number & Suffix	Description
10XABR	*Designates the standard sensor, the emitter and two receivers connected by electrical cable. The emitter and receiver are housed in the standard aluminum enclosures with a Lexan® bezel, neoprene gaskets and self-sealing screws on the endcaps. Improves overall fluid resistance & allows for easy, in-the-field bezel replacements.*
10XRA	*Deginates that the unit is a 10X-Series Auto-Load receiver.*
HBLD	*Indicates that the unit is configured with horn blinders [HBLD Option – Section G.5]. These blinders are used with systems that will be installed on lines that may have interference from strobe or other light sources.*
E	*Designates that the unit is a Model 10XABR emitter. Example: 10XABR-10-E*
POL	*Indicates the sensor is protected with polane painted surfaces (POL Option) and stainless steel screws to resist corrosion (included at no extra charge with the UT Option and A-CR Option).*
10XBR-UT	*Indicates the emitter and receiver are housed in the ULTRA-TOUGH™ enclosures instead of the standard housings (UT Options) The enclosures have cast aluminum walls at least 0.625" [15.9mm] thick with 0.375" [9.5mm] thick borosilicate viewing windows sealed with RTV108 silicon adhesive. All circular connectors are fluid-sealed and all hardware is stainless steel. Neoprene gaskets seal the 0.75" [19.1mm] bezel to the enclosure base and corrosive-resistant polane paint is applied to all exterior surfaces.* *Example: 10XABR-40-UT* *The Chemical Resistant Option for the ULTRA-TOUGH™ enclosures replaces the neoprene gasket with Teflon Joint Sealant and the RTV108 adhesive with corrosive-resistant epoxy resin. Example: 10XABR-20-UT-CR*
-A1 (or -B1)	*Indicates that the unit is a Model 10XRA receiver and the receiver is receiver number one in a single-sensor system. Receiver number one plugs into the 6-pin connector on the end of the emitter with the 7-pin processing unit connector. In a dual-sensor system, the second sensor's receiver one is designated "-B1".*
-A2 (or -B2)	*Indicates that the unit is a Model 10XRA receiver and the receiver is receiver number two in a single-sensor system. Receiver number two plugs into the 6-pin connector on the end of the emitter without the 7-pin processing unit connector. In a dual-sensor system, the second sensor's receiver two is designated "-B2".*
XCB	*Indicates that the cables supplied with the system are longer than the standard cables (15' [4.6m] to 20' [6.1m] up to 50' [15.2m]).*

Table G.3-2: Options available for 10XBR-Series sensors

G.4 Installation

The 10XBR-Series sensor is designed for operation only with the Model MPPU, though a Model GPU could be utilized to power the sensor and route the signals to the Model DCPU or Model MPPU. Each application may have slightly different installation requirements. The main measurement application for the 10XBR-Series sensor is Passline Independent Width Measurement, though it is also adaptable Thickness Independent Width Measurement with a single sensor.

Lateral Strip Deviation

When installing the 10XBR-Series sensor, some commonsense procedures to protect the sensor(s) from any line collision should be taken. Damage to sensors from line collisions is the primary cause of SCAN-A-LINE™ sensor failures. Install the sensor(s) in a position on the line where it is protected as much as possible from strip collisions. Many times, a simple deflection bar mounted above the sensor components will prevent such collisions. Once properly installed and protected, the 10XBR-Series sensor will provide a lifetime of reliable operation.

Strip Direction

NOTE:

If any welding is to be performed near the 10XBR-Series sensor, COVER THE VIEWING WINDOW with a protective material (i.e., metal plate, wood sheet, etc.) to prevent the welding flash from coming in contact with the glass in the window. Such welding flash is hot enough to melt the glass causing pitting of the window that may cause incorrect readings.

G.4.a Basic Installation Guidelines

Emitter-to-receiver separation for the 10XBR-Series sensor is generally one times the emitter length minimum up to seventy-two inches [1829mm] {Table G.4-1}. This offers a well-balanced receiver viewing sensitivity. The optimum emitter-to-receiver separation depends upon the length of the emitter and several other factors (such as strip minimum and maximum widths and/or overall passline variation). Emitter-to-receiver separations closer than one times the emitter length will limit the inspection range of the sensor (as well as the maximum passline variation) and may cause a loss of sensor sensitivity at the outside edges.

Although ambient light sources are largely rejected by the 20kHz tuning of the video signal processing circuits and the IR filtering in the silicon cells, some interference may be experienced. Strobe lights or any pulsed IR light source can pose special problems for the 10XBR-Series sensor. Shielding the receiver from interfering light sources to reduce such ambient light interference may improve overall system performance (such as horn blinders).

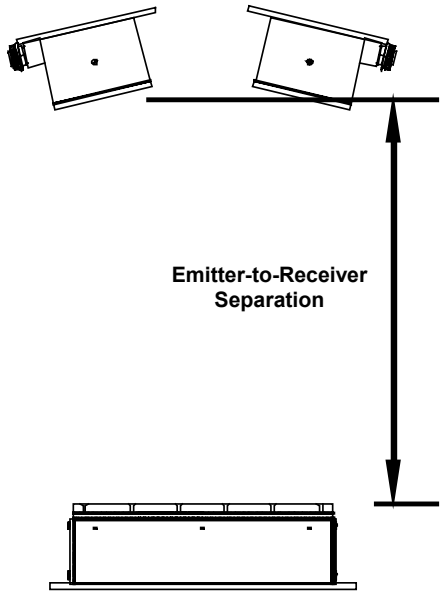

Figure G.4-1: Emitter-to-Receiver Separation

Sensor Model Name	Minimum Separation	Recommended Separation	Maximum Separation *
10XBR-10	*15" [381mm]*	*20" [508mm]*	*72" [1829mm]*
10XBR-20	*30" [762mm]*	*40" [1016mm]*	*72" [1829mm]*
10XBR-30	*45" [1143mm]*	*60" [1524mm]*	*72" [1829mm]*
10XBR-40	*60" [1524mm]*	*72" [1829mm]*	*72" [1829mm]*
** Note that extended emitter-to-receiver separations are optionally available. Contact Harris Instrument Corporation Engineering for more information.*			

Table G.4-1: Nominal Binocular-Receiver Sensor – 10XBR-Series Emitter-to-Receiver Separations

NOTE:

Unless specified by the customer (or dealer representative) at time of purchase, ALL 10XBR-Series sensors are computer balanced for emitter-to-receiver separations at recommended separation for that size of sensor (Table G.4-1).

Lateral Strip Deviation

The dynamic measurement range for the 10XBR-Series sensor varies depending upon the length of the emitter and overall product passline variation. However, operational considerations such as lateral strip deviation will also affect that range. The 10XBR-Series sensor should be placed on the line where the strip lateral position deviation {Figure G.4-2} is relatively stable to prevent loss of range caused by such deviation (or ensure that the sensor system has the overall range to compensate for large lateral deviations). Typically, the detection width range is less than the length designation of the sensor when a tolerance for side-to-side deviation and product passline variation is taken into account (i.e. a Model 10XABR-10 sensor will have an effective measurement range of 8.34 inches [212mm] at a 2 inch [51mm] passline and a 7.5 inch [191mm] range a at 14 inch

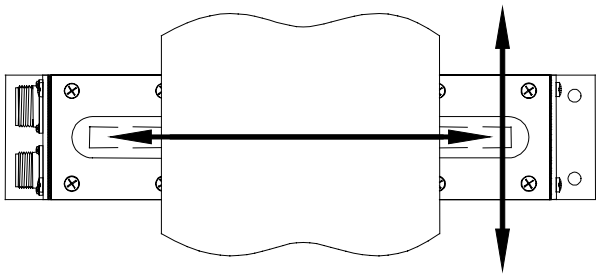

Figure G.4-2: Strip Lateral Deviation Example

[356mm] passline, both sizes account for a maximum ±0.5 inch [12.7mm] lateral strip deviation).

NOTE:

Larger emitter-to-receiver separations and product passline variations may be available with special configurations for the 10XBR-Series sensor. Please contact Harris Instrument Corporation for more information on extended separations and larger or smaller passline variations.

Product Passline

Lower-end product passline spacing {Figure G.4-3} for the 10XBR-Series sensor is generally one inch [25.4mm] to six inches [152mm] maximum and upper-end product passline spacing of thirteen inches [332mm] to nineteen inches [483mm] maximum, with optimal lower-end passlines of two inches [50.8mm] to four inches [102mm] with a upper-end passline variations of up to fourteen inches [356mm] to sixteen inches [406mm] typical. Typically, the overall passline variation should be twelve to fourteen inches [305mm to 356mm]. As the product passline increases the active measurement range of the sensor decreases, so be sure that the sensor system has the overall measurement range for the application. For complete verification of sensor measurement range at varying product passlines, contact Harris Instrument Corporation Sales for more information.

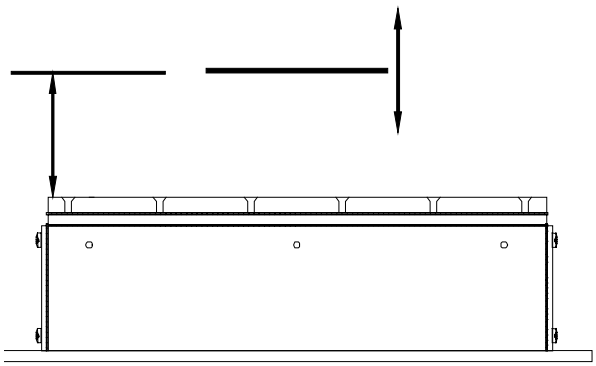

Figure G.4-3: Nominal Passline Specification

G.4.b Receiver Positioning

The 10XBR-Series has two receivers that are mounted directly above the end LEDs of the emitter. The centerpoint of the receiver photocell array (marked with a screw or other indicator) should be perpendicular with the emitter. The faces of the receivers should initially be parallel to the emitter. Both receivers are tilted towards the middle LED of their emitter, so the centerline of the receiver photocells point is aligned with the middle LED of the emitter with a tolerance of ±1°. This provides optimal emitter coverage at all emitter-to-receiver separations. The receiver viewing windows have a more narrow angle and will require mounting adjustment. A greater emitter-to-receiver separation increases the requirement for proper alignment adjustment.

The amount of receiver tilt is dependent upon the emitter-to-receiver separation and the size of the emitter. The following table {Table G.4-2} describes the tilt of the receivers at the various emitter-to-receiver separations listed in Table G.4-1.

Sensor Size	Emitter-to-Receiver Separations					
	10"	20"	30"	40"	60"	72"
10XABR-10	*22°*	*12°*	*11°*	*10°*	*7°*	*4°*
10XABR-20	*N/A*	*24°*	*16°*	*13°*	*9°*	*8°*
10XABR-30	*N/A*	*N/A*	*25°*	*21°*	*14°*	*11°*
10XABR-40	*N/A*	*N/A*	*N/A*	*25°*	*18°*	*15°*

Table G.4-2: Receiver Tilt Angles for Model 10XRA Receivers for 10XBR-Series Sensors (Dimension ❶ in Figure G.4-4)

G.4.c Receiver Mounting Fixtures

The Adjustable Receiver Mounting Brackets – MBR Option [Section YY] included with both receivers in a 10XBR-Series sensor assist in the installation process of the sensor. Angles marked on the receiver fixture side bars can be set before the receivers are mounted above the emitter, making installation much easier and faster.

G.4.d Receiver Positioning Procedure

The following procedure will assist in the installation of the receivers over the emitter end LEDs for the 10XBR-Series sensor.

1) Determine the mid-point of the emitter end LEDs. If not already marked from the factory, mark this point on the emitter housing side approximately 1.15 inches [29mm] from the middle-top of the emitter face.
2) Fixture the emitter(s) on the line in the position required for complete detection of the strip (maximum & minimum).
   a) For a single-sensor installation, find the centerline of the strip and position the mid-
   point of the LED array directly aligned with the centerline of the strip [Section G.4.c].
   c) For a dual-sensor installation, find the centerline of the strip and position the

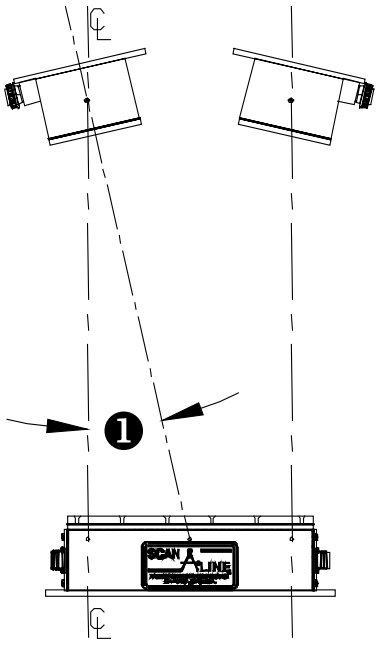

Figure G.4-4: Receiver Tilt Angles

mid-point of the emitter-to-emitter separation directly aligned with the centerline of the strip [Section G.4.d].

3) If not already attached to the mounting fixtures, attach the receivers to the mounting brackets with the supplied hardware.

NOTE:

In high vibration environments, it is suggested that ALL bolt threads on the receiver mounting fixtures be treated with a thread locking fluid for extra security.

4) Adjust the receiver tilt angle on the mounting fixtures for your required emitter-to-receiver separation {Figure G.4-4 & Table G.4-1} and tighten all fixture bolts securely.

7) Repeat this procedure for the second receiver on the other end of the emitter.

8) If a dual-sensor system, repeat this procedure for the second sensor (Sensor B).

G.4.e Single-Sensor Installation

Single-sensor installation of 10XBR-Series sensors is relatively straight forward. The emitter should be placed close the strip at a lower-end minimum product passline no greater than six inches [10.2cm], with two inches [50.8mm] to four inches [102mm] lower-end product passline optimal {Dimension ❷ in Figure G.4-5}. The receivers should be mounted directly over the emitter-end LEDs.

The field-of-view for a single-sensor application is defined by the last LED on each end of the emitter as the base of a triangle to the receiver photocells as the apex of the triangle {Figure G.4-6}. With the 10XBR-Series, there are actually two triangular viewing areas, one for each receiver. Though the sensor can detect material edges anywhere within this field of view, dynamic range is affected by product passlines of over 14" [356mm].

NOTE:

Single-sensor Model 10XABR-10 and Model 10XABR-20 (or Model 10XBR-10-UT and 10XBR-20-UT) systems are not recommended by Harris Instrument Corporation because of their lack of overall operational range.

G.4.f Dual-Sensor Installation

When the strip widths exceed 30 inches [762mm], generally a dual-sensor system is needed. A dual-sensor system allows for the centerline monitoring or width measurement of strips up to an almost unlimited width. The main concern with a dual-sensor system is the variation of widths in the strip materials. For example, if the line sometimes runs 34 inch [864mm] wide strips and other times runs 72 inch [1.83m] wide strips, the sensor system must be able to operate on both strip widths. Passline variations also become even more important when running varying width materials as the greater the product passline, the smaller the active viewing area. The size of sensors and the emitter-to-emitter separation of this dual-sensor system has already been determined upon the purchase of the dual-sensor system. Please review the Sales Order for this system, or refer to the Sensor Selection Guide that you received upon inquiry about the SCAN-A-LINE™ product line.

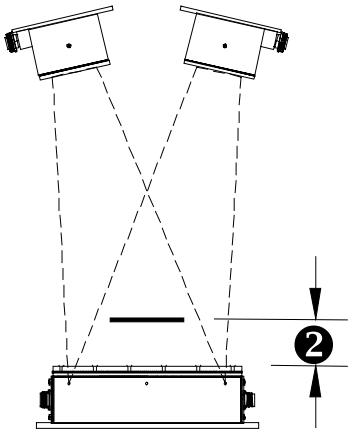

Figure G.4-5: Product Passline

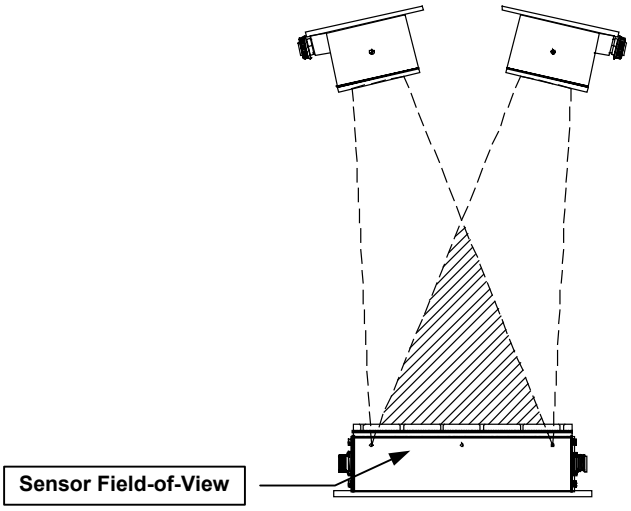

Figure G.4-6: Sensor Field of View

NOTE:

Dual-sensor Model 10XABR-10 and Model 10XABR-20 (or 10XBR-10-UT and 10XBR-20-UT) systems are not recommended by Harris Instrument Corporation because of their lack of overall operational range.

G.4.g Blinder Adjustment

In dual-sensor system installations, the physical geometry of the set-up may require the use of receiver blinders to prevent one receiver from viewing the light produced by the other emitter (emitter cross-talk). These blinders are sheet metal tabs mounted to the face of each receiver. They must be adjusted to their final positions once the system is fixtured on-line. Currently, Horn Blinders [Section G.5] are used in most applications for preventing emitter cross-talk.

The easiest way to determine whether or not a receiver is viewing the other emitter in a dual-sensor system is to connect a DC voltmeter to the appropriate "VIDEO" signal in the processing unit. The following steps outline the procedure:

NOTE:

The voltmeter will integrate the digital signal produced by the sensor and read 12VDC (11.6 to 12.4, depending on power supply voltage) when the emitter is fully UNCOVERED and will read 0VDC when the emitter is completely COVERED.

1) Locate the terminal strip connectors for the signals VIDEO A and VIDEO B in the processing unit used with the dual-sensor system. (Refer to the Operators Manual of the appropriate processing unit for the exact location of the terminal strip connectors.).
2) Connect the voltmeter to one of the VIDEO signals. To determine which sensor is being viewed, cover one of the emitters completely and check to see which VIDEO signal is at 0VDC. This sensor will be referred to as Sensor A, and the other as Sensor B, for the remainder of this adjustment procedure.
3) Uncover the emitter and check to see that the DC voltmeter reads 12VDC (11.6VDC to 12.4VDC). If the voltage is not within limits, check the alignment between the Receiver A-1 & Receiver A-2 and the Emitter A and proceed to Step 4.
4) Cover Emitter A and check whether the voltage goes to 0VDC. If any voltage is present, adjust the blinder on both receivers until a reading of 0VDC is displayed. This will ensure that no light from Emitter B affects both Sensor A receivers.
5) Now uncover Emitter A again and check that the voltage reading is 12VDC and that no light from Emitter A is being blocked by the blinder.
6) Repeat steps 3 through 5 for the other sensor (Sensor B) after the voltmeter is connected to the other VIDEO signal. This completes the blinder adjustment procedure.

G.4.h Sensor Cable Connection

With a 10XBR-Series sensor there are two receivers. Receiver A1 is typically the receiver that is aligned over the last LED of the emitter on the end with the 7-pin and 6-pin MS-style circular connectors. Receiver A2 is the receiver mounted over the end LED of the emitter with the single 6-pin MS-style circular connector. Each receiver connects to the emitter with an emitter-to-receiver cable. Also, each emitter attaches to the processing unit via the 7-pin MS-style circular connector.

Emitter-to-Receiver Cable Connection.

To connect the emitter-to-receiver cables, insert the 6-pin female end of the receiver cable into the 6-pin male receiver A1 connector and tighten securely. Insert the 6-pin female end of the emitter-to-receiver cable into the 6-pin male MS-style circular connector next to the 7-pin MS-style connector on the emitter and tighten securely. Repeat procedure for receiver A2, but be sure to attach the receiver cable to the emitter end with only one 6-pin male MS-style circular connector. If a dual-sensor system, repeat this process for the second sensor (Sensor B).

Emitter-to-Processing Unit Cable Connection.

Whether connecting a sensor for a strip position or dimensional measurement application, the sensor connects to the processing unit (Model DCPU, Model MPPU or Model GPU) in the same fashion. Insert the male 7-pin MS-style circular connector on the emitter-to-processing unit cable into the emitter 7-pin male MS-style circular bulkhead connector and tighten securely. Connect the other end of the 7-pin MS-style circular connector cable to the upper-right 7-pin MS-style circular connector on the bottom panel of the Model DCPU or Model MPPU (or Model GPU) and tighten securely. If two sensors are being used, repeat the previous procedure for the second sensor but connect the 7-pin emitter cable to the bottom-right 7-pin MS-style circular bulkhead directly below the upper-right bulkhead.

NOTE:

The sensor connected to the upper-right 7-pin MS-style circular bulkhead on the bottom panel of the Model MPPU (or Model GPU) is considered SENSOR A & VIDEO A and the lower-right 7-pin MS-style circular bulkhead is considered SENSOR B & VIDEO B.

G.5 Receiver Horn Blinder – HBLD Option

The Horn Blinder Option – HBLD Option is designed for SCAN-A-LINE™ 10X-Series Receivers {Figure G.5-1} and 10X-Series *ULTRA-TOUGH*™ Receivers {Figure G.5-2} in applications where ambient light may cause improper edge detection's. In conditions where high intensity lamps, strobe lights, or other bright light conditions may hamper the sensor edge or hole detection or measurement, the HBLD Option will assist in restricting the receivers field of view. This means that ambient light will have a smaller chance to interfere with the proper operation of the sensor.

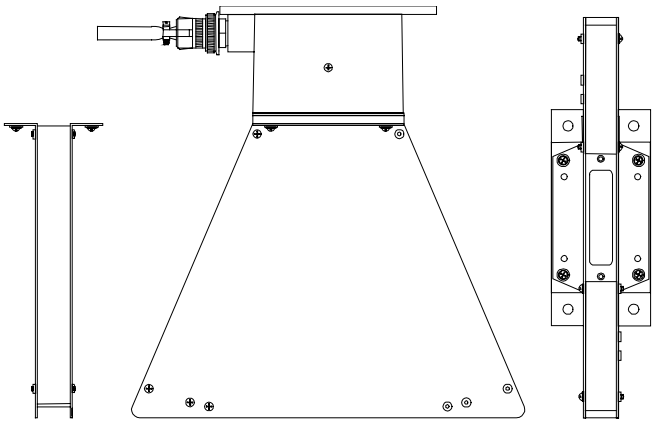

Figure G.5-1: HBLD Option Installed on Model 10XR Receiver

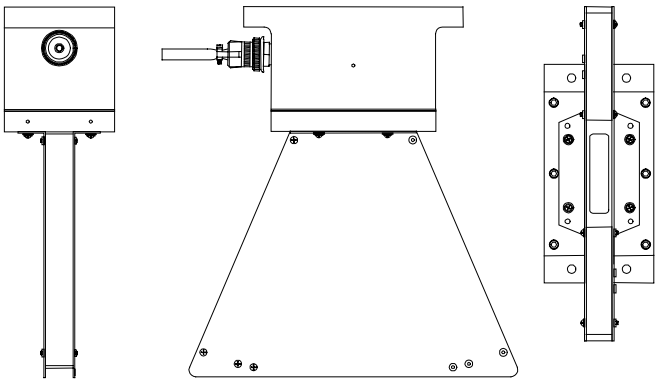

Figure G.5-2: HBLD Option Installed on Model 10XR-UT ULTRA-TOUGH™ Receiver

HBLD Option Overview

The HBLD Option is built of aluminum and is mounted directly to the bezel on the Model 10XR receiver (either a 10XRA for 10XAS-Series – Section C; 10XRHD receiver for 10XHD-Series – Section D sensor; 10XRHS for 10XHS-Series – Section F sensors) and all these sensors with the *ULTRA-TOUGH*™ option. Each receiver in a system will be supplied with a blinder when the HBLD Option is ordered (one per emitter with 10XAS-Series, 10XHD-Series and 10XHS-Series sensors, two with 10XBR-Series sensors).

Functional Description

The standard 10XR receiver (for 10XRA receiver for 10XAS-Series and 10XBR-Series sensors; 10XRHD receiver for 10XHD-Series; 10XRHS receiver for 10XHS-Series) each have an approximate 30° field of view of the emitter {Figure G.5-3}. The horn blinder restricts that field of view, permitting the receiver to view only the emitter LED light. This will assist in eliminating any intense ambient or strobe light interference.

G.5.a HBLD Option Specifications

The HBLD Option is typically supplied pre-installed on the Model 10XR or Model 10XR-UT receivers from the factory. The HBLD Option is 12.25 inches [311mm] wide by 9 inches [229mm] tall by 1.325 inches [34mm] thick. It is attached to the standard receiver with the bezel face plate mounting screws and to the bezel on *ULTRA-TOUGH*™ receivers. Units already in the field can be upgraded to use Horn Blinders, though it may require new mounting holes on the bezels of *ULTRA-TOUGH*™ receivers (see Section G.5.b).

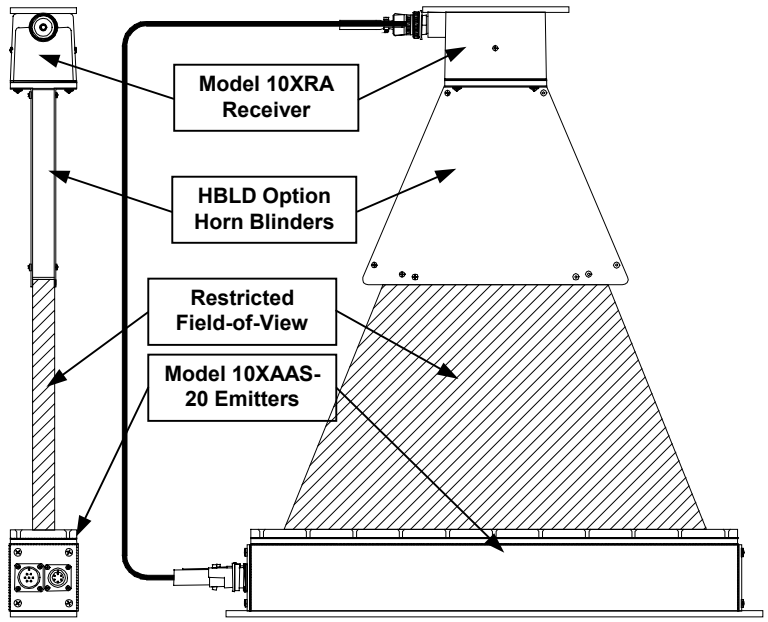

Figure G.5-3: Field of View with Model 10XAAS-20 Sensor and Horn Blinder

Separation Settings

The SCAN-A-LINE™ emitter and receiver can typically be mounted with a separation anywhere from one times the emitter length up to 72 inches [1829mm] (extended separations are available under an Engineering Variance Order only). Depending upon the emitter-to-receiver separation, the HBLD Option has mounting holes for the blinder end bars to restrict the field of view. The settings {Figure G.5-4} on the blinder are:

A) One times emitter length emitter-to-receiver separation {minimum separation} (i.e. Model 10X-10 with emitter-to-receiver separation of 15 inches [381mm]);

B) Two times emitter length emitter-to-receiver separation {suggested separation}(i.e. 10X-10 with emitter-to-receiver separation of 20 inches [508mm]);

C) Over two times emitter length emitter-to-receiver separation up to 72 inches [1829mm] {maximum separation} (i.e. 10X-10 with emitter-to-receiver separation of 70 inches [1778mm] {optional separation}).

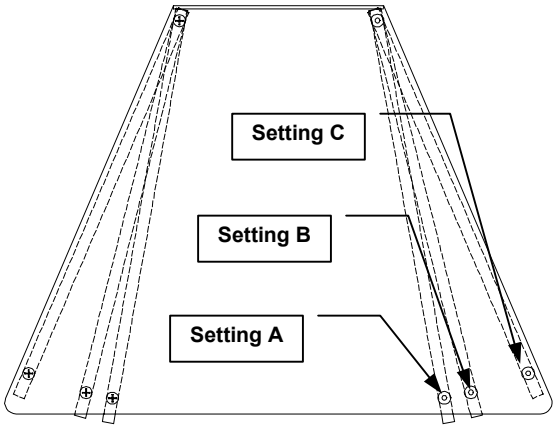

Figure G.5-4 Separation Settings for HBLD Option

Finishes

The HBLD Option is typically supplied with all surfaces black anodized and the interior of the blinder painted in flat black (to reduce reflected glare). When supplied with an *ULTRA-TOUGH*™ sensor (UT Option), the horn blinder may be painted with nitro blue polane paint at the customers request.

G.5.b Installation

Usually, the HBLD Option is supplied with the sensor when it is ordered. Sometimes though the HBLD Option must be ordered after the sensor has been installed. The following sections detail the installation of the HBLD Option on both the standard Model 10XR receiver and the Model 10XR-UT *ULTRA-TOUGH*™ receiver.

10XR-Series Receiver

The installation of 10XR-Series receivers can be performed with the receiver on-line IF your company policies allow and/or IF the receiver is easily accessible. If either of these cases exist, remove the receiver from the line BEFORE performing the following procedure. Kit should contain the assembled horn blinder and four screws, flat washers and lock washers.

1) Remove any existing blinder from the receiver, if applicable.

2) Determine the separation of the emitter-to-receiver and set the end bars for that separation (Section G.5.a & Figure G.5-5) by loosening the ‘A’ screws and removing the ‘B’ screws. Rotate the end bars until ‘B’ holes line up and insert the ‘A’ screws. Tighten all screws securely.

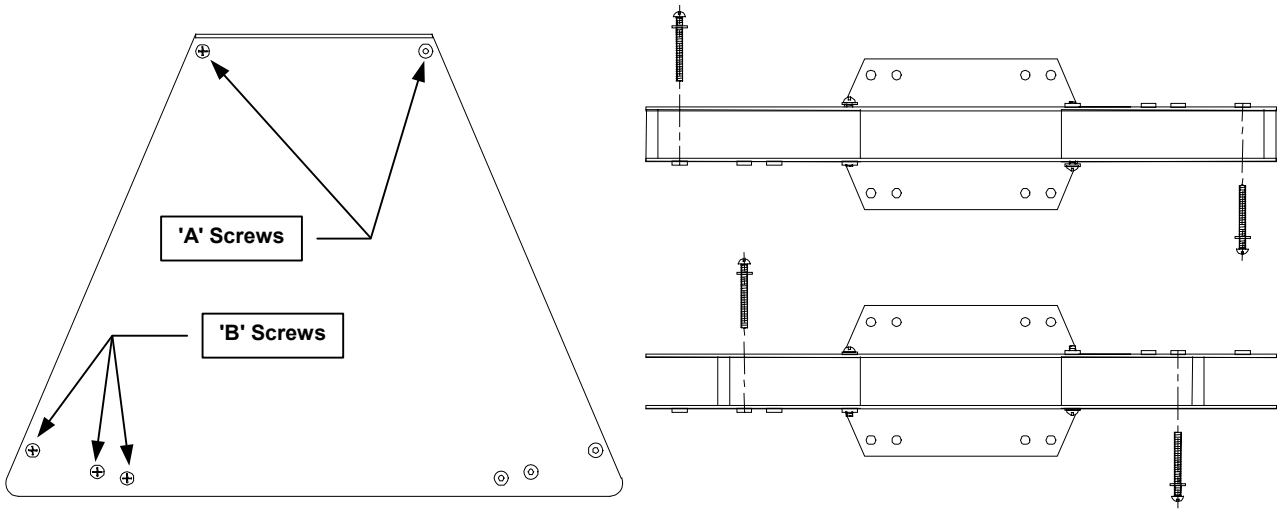

Figure G.5-5: Horn Blinder Adjustment of End Bars

3) Remove the four bezel retaining screws {Figure G.5-6}. Be sure to hold the bezel in place when the screws are removed.

4) Exchange the four bezel retaining screws with the new screws, lockwashers and flat washers supplied with the horn blinder.

5) Align the Horn Blinder with the outer holes over the bezel retaining holes {Figure G.5-7}.

6) Assembly the screws with a lock washer first and the flat washer second {Figure G.5-8}.

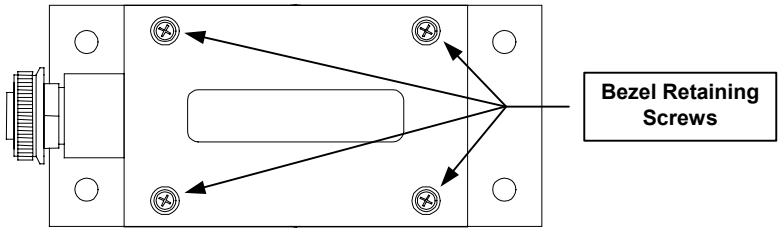

Figure G.5-6: Model 10XR Bezel Retaining Screws

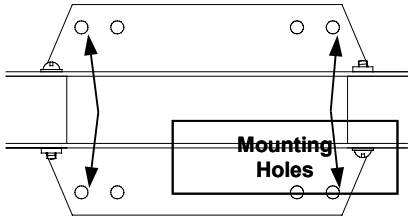

Figure G.5-7: Blinder Mounting Holes

7) Insert the four mounting screws into the bezel and finger tighten {Figure G.5-8}.

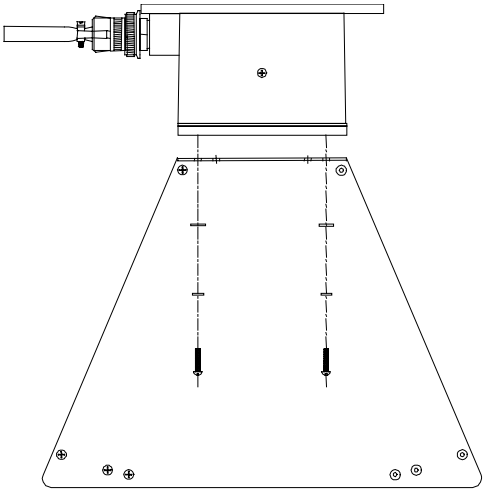

Figure G.5-8: Horn Blinder Screw Assembly on Model 10XR Receiver

8) Visually inspect that the horn blinder is aligned properly {Figure G.5-9} and tighten the mounting screws securely (be careful not to over-tighten the screws, as they are stainless steel screws threading into cast aluminum).

If necessary, use the Model AA10X Alignment Adapter (Section AA) and an oscilloscope to check the view of the emitter and the receiver output. Review the sensor manual section to verify proper operation of the sensor with the horn blinder attached.

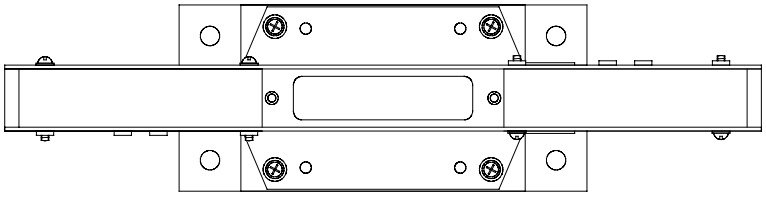

Figure G.5-9: Horn Blinder Properly Aligned on Model 10XR Receiver

10XR-Series ULTRA-TOUGH™ Receiver

The installation for 10XR-Series *ULTRA-TOUGH*™ receivers can be performed with the receiver on-line IF your company policies allow and/or IF the receiver is easily accessible. If either of these cases exist, remove the receiver from the line BEFORE performing the following procedure. Kit should contain the assembled horn blinder and four screws, flat washers and lock washers.

1) Remove any existing blinder from the receiver, if applicable.

2) Determine the separation of the emitter-to-receiver and set the end bars for that separation (Section G.5.a & Figure G.5-5) by loosening the ‘A’ screws and removing the ‘B’ screws. Rotate the end bars until ‘B’ holes line up and insert the ‘A’ screws. Tighten all screws securely.

3) Align the Horn Blinder with the inner holes over the bezel retaining holes {Figure G.5-10}.

4) Assemble the screws with a lock washer first and the flat washer second {Figure G.5-11 next page}.

5) Insert the four mounting screws into the bezel and finger tighten {Figure G.5-11}.

6) Visually inspect that the horn blinder is aligned properly {Figure G.5-12} and tighten the mounting screws securely (be careful not to over-tighten the screws, as they are stainless steel screws threading into aluminum).

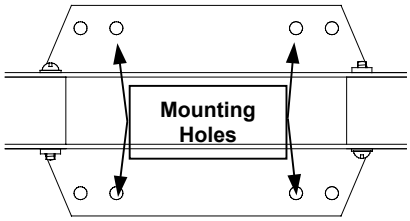

Figure G.5-10: Model 10XR-UT Blinder Mounting Holes

If necessary, use the Model AA10X Alignment Adapter (Section AA) and an oscilloscope to check the view of the emitter and the receiver output. Review the sensor manual section to verify proper operation of the sensor with the horn blinder attached.

NOTE:

Older Model 10XR-UT receiver bezels may not have the mounting holes drilled and tapped on the bezel for the Horn Blinder mounting screws. These bezels must be machined to accept the Horn Blinder.

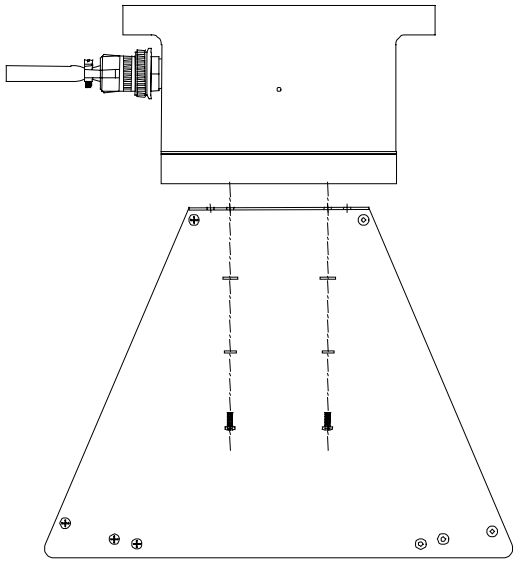

Figure G.5-11: Horn Blinder Screw Assembly on Model 10XR-UT ULTRA-TOUGH™ Receiver

G.5.c Horn Blinder Trouble Shooting

Trouble shooting the HBLD Option is relatively simple. First, verify that all screws of the unit are secure. The alignment of the receiver to the emitter is fairly critical because of the restricted field-of-view.

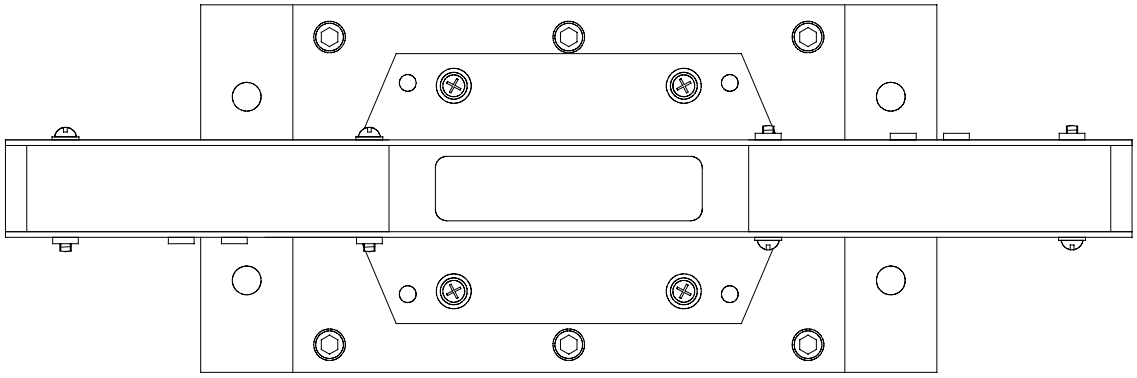

Figure G.5-12: Horn Blinder Properly Aligned on Model 10XR-UT ULTRA-TOUGH™ Receiver

G.6 General Maintenance

All SCAN-A-LINE™ sensors are highly reliable and tolerant to most industrial environments. Maintenance of the 10XBR-Series after installation is extremely limited. Since there are no moving parts in the 10XBR-Series, there is nothing to lubricate. If any form of maintenance is performed on the line near the 10XBR-Series sensor, be sure to cover the sensors view windows to protect the glass from hot or falling objects.

NOTE:

If welding is to be performed anywhere on the process line where the 10XBR-Series is installed, disconnect ALL cables from the 10XBR-Series sensor. This prevents a system overload from the current generated by the welding.

The only typical maintenance for the 10XBR-Series sensor is:

1) Check all cable connections. All connections should be snug.
2) Clean the viewing window. Even though the 10XBR-Series can operate with an almost 90% attenuation of the light source, cleaning the window will insure constant and reliable detection's.
3) Check all mounting fixtures. Tighten if necessary. In high vibration environments, mounting plates can vibrate loose, which may change the emitter-to-receiver alignment. If vibration is still causing problems, simple vibration dampening can solve most cases of vibration interference.

G.5.a Lexan Bezel Replacement

The Lexan® bezel on the Model 10XABR emitters are designed to be field replaceable. If the Lexan® bezel has been damaged (scratched or pitted), contact Harris Instrument Corporation Service for a replacement bezel and instructions for replacing the bezel.

G.5.b Cable Building & Repair

In many applications, the cables that are supplied with SCAN-A-LINE™ sensor systems need to be modified for installation; or repaired because of incidental damage. Harris Instrument Corporation can supply custom cables for special situations and we suggest that you order the cables directly from Harris Instrument Corporation. Installation of customer-built cables that are improperly wired is one of the major causes of malfunction of SCAN-A-LINE™ systems (next to strip collisions). Improperly built cables can CAUSE SERIOUS DAMAGE to the SCAN-A-LINE™ system and the installation of customer-supplied cables MAY VOID THE WARRANTY of the SCAN-A-LINE™ equipment. For further information on customer-supplied and/or built cables, please contact Harris Instrument Corporation Sales or Service.

In many cases, the customers electrical maintenance personnel will be modifying the cables for routing through conduit or direct wiring of power. Please review the processing unit Section [Sections K through Z if applicable] for more information on direct wiring of system power. The current section describes the proper procedures for building and/or repairing cables. Be aware that this section only covers the standard cables supplied with all SCAN-A-LINE™ sensors and processors. It does not necessarily pertain to cables supplied with Engineering Variance Orders (EVO's). Contact Harris Instrument Corporation Engineering for further information on cabling instructions for EVO installations.

General Cable-Building Procedures

Please review this section BEFORE attempting to build a custom cable. These specifications, if followed fully and correctly, will help ensure that the cable is built to operate properly with 10XBR-Series sensors.

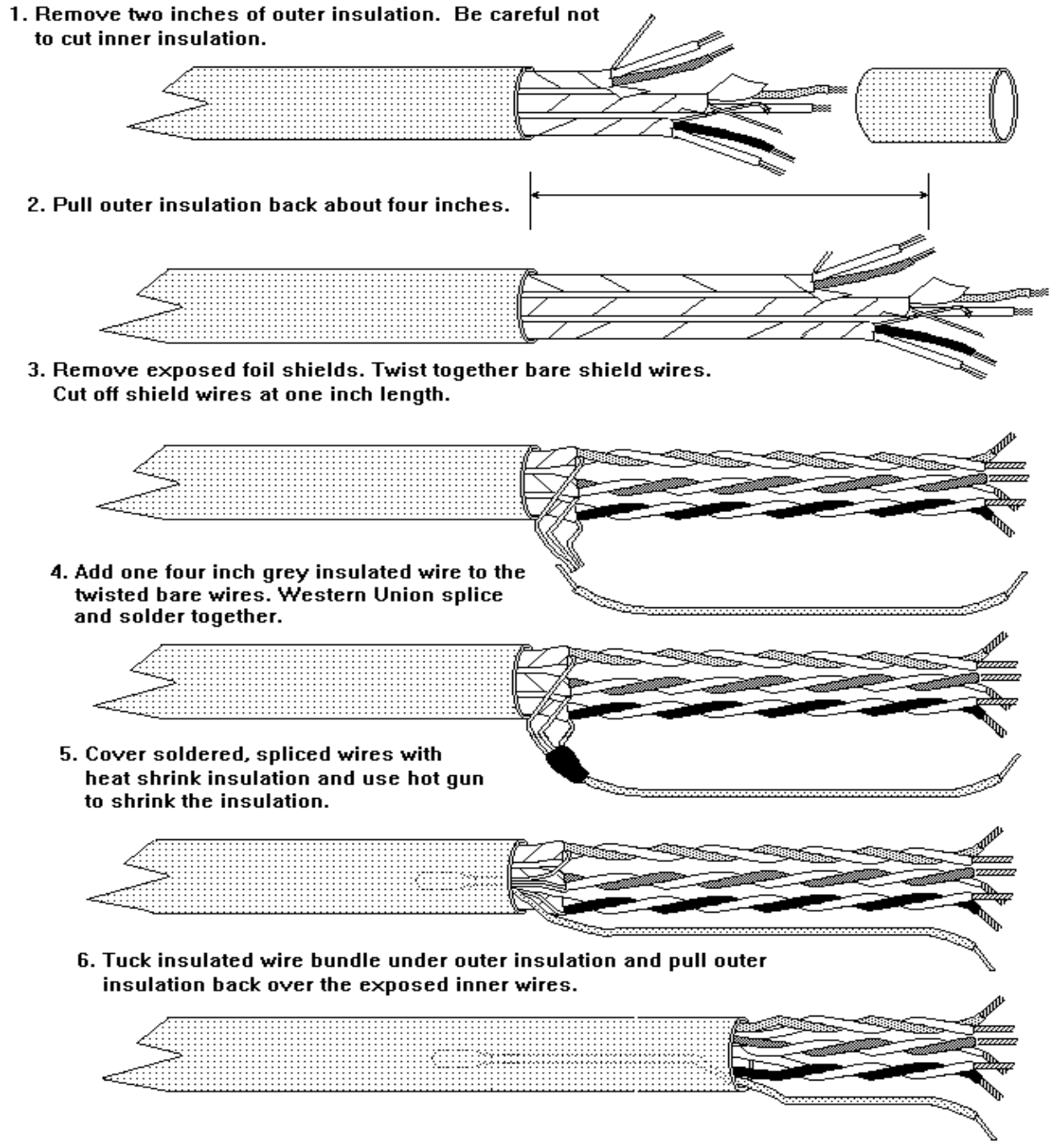

Figure G.6-1: General Cable-Building Instructions

Belden 8777 or equivalent cable is used for the receiver pigtail (section one) cable, the receiver extension (section two) cable and for the emitter-to-processing unit cable. Figure G.6-1 shows the proper procedure to prepare the Belden 8777 or equivalent cable for attachment to the circular connectors. Figure G.6-2 shows an exploded view of a 7-pin cable and it's components.

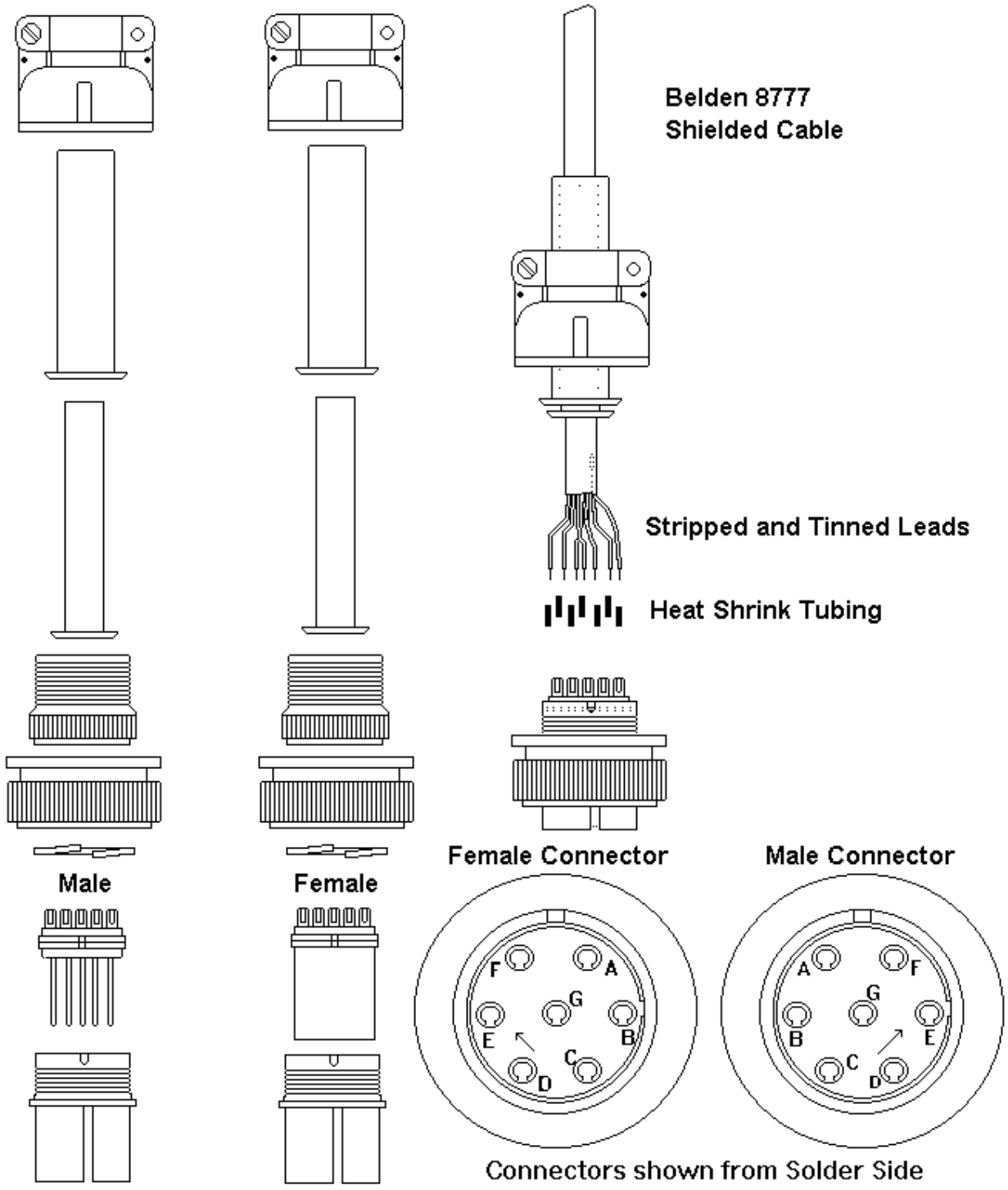

Figure G.6-2: Exploded View of Standard Enclosure 7-Pin Cable

NOTE:

ULTRA-TOUGH™ enclosures utilize watertight versions of the 6- and 7-pin cables listed below. Contact Harris Instrument Corporation for information on building watertight cables if necessary.

Emitter-to-Receiver Cable

The MS-style circular connectors on the standard receiver cable are of two different types. On the end that attaches to the receiver, the shell is a 97-3101A-14S inline connector with 97-3057-6 strain relief, 97-79-513-6 rubber boot and a 97-14S-6S female insert. The standard connector that attaches to the 6-pin bulkhead on the emitter is a 97-3106A-14S shell, 97-3059-6 strain relief, 97-79-513-6 rubber boot and a 97-14S-06P male plug insert. Drawing number 3495104 Rev A shows the pinouts of the circular Inline connectors for both ends of the receiver cable.

The *ULTRA-TOUGH*™ (UT Option) option require a sealed circular connector MS3106E14S-6P on the end of the cable that attaches to the emitter 6-pin circular bulkhead. Drawing number 3495109 Rev A shows the pinouts of the sealed receiver cable.

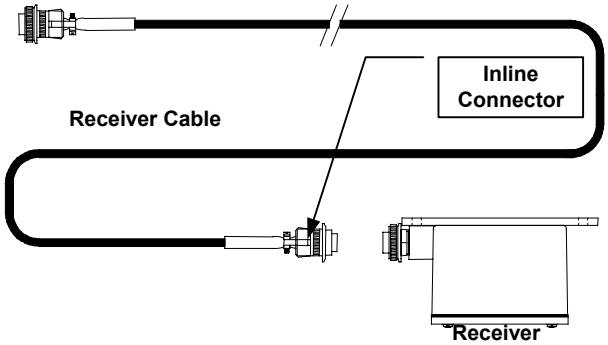

Figure G.6-3: 10X Receiver with Cabling

Emitter-to-Processing Unit Cable

The standard enclosure emitter-to-processing unit cable also has two circular connectors. On the end that attaches to the emitter is a 97-3106A-16S shell, 97-3057-8 strain relief, 97-79-513-8 rubber boot and a 97-16S-1S female insert. The end that attaches to the processing unit is a 97-3106A-16S shell, 97-3057-8 strain relief, 97-79-513-8 rubber boot and a 97-16S-1P male plug insert. Drawing number 3486060 Rev A shows the pinouts of the circular connectors for both ends of the emitter-to-processing unit cable. The *ULTRA-TOUGH*™ (UT Option) option requires a sealed circular connector MS3106E16S-1S on the end of the cable that attaches to the emitter 7-pin circular bulkhead. The inline connector is the same as the standard enclosure emitter-to-processor cable. Drawing number 3495109 Rev A shows the pinouts of the sealed emitter-to-processing unit cable.

Typical Cable Building Tutorial

Review Figure G.6-1 and G.6-2 for information on building a typical SCAN-A-LINE™ cable. The following tutorial will assist, in association with these pictures, in assuring that the cable is properly built.

1) Determine the length of the cable to be cut. Use only Belden 8777 cable or equivalent. Cut the cable to the proper length.
2) Starting on one end, cut the outer (gray) insulation, being sure not to cut the internal wire insulation, approximately two inches [51mm] from the end of the cable. Remove the cut insulation. Pull back the gray outer insulation approximately four inches [102mm].
3) Peel back the foil on the internal wire pairs and remove down to the insulation cut point.
4) Separate the shields. Separate out the three pairs of wires (green & black, white & black, red & black) and twist each pair together (twist the green & black together, etc.).
5) Cut a four inch [102mm] 24-guage wire in gray. Cut shields to approximately one inch [25mm] in length. Strip the ends of the four inch [102mm] gray wire approximately one inch [25mm]. Connect shields and the gray wire with a Western Union splice, solder and shrink wrap.
6) Tuck shrink wrapped shields back into cable bundle and push gray outer insulation back up to cover the shields.
7) Strip and tin all wire ends approximately one-half inch [13mm].
8) Check the wiring diagram for the cable being built (i.e., if receiver extension cable, check drawing #3495104 Rev A) for the wire connections, circular connector pinouts, circular connector shell type and circular connector insert type. Run the cable through the appropriate rubber boot, strain relief, and circular connector shell.
9) Verify the pinout locations on the back of the circular connector insert with the proper drawing. Run the wires through a small piece of heat shrink tubing (approximately 0.375 inch [10mm]) and solder the correct wires to their corresponding circular connector pinouts. Heat the heat shrink tubing.
10) Attach the circular connector insert to the circular connector shell with the split retaining ring. Assemble the circular connector and tighten all connections securely.

G.7 Trouble Shooting

The following procedures are designed to isolate problems that may occur in systems that are installed and have been operating properly. For installation problems, see the installation portion of this manual, or contact your SCAN-A-LINE™ representative or Harris Instrument Corporation for more information.

1) Begin with a thorough visual inspection of the system under test. Before testing for circuit malfunctions, ensure the power switch is on and that power is supplied to the system.

2) Verify that the emitter and receiver viewing windows are unbroken and free of scratches, reasonably clean and devoid of foreign material. Cracked lenses, excessive dirt and foreign material on the lens can cause the system to perform incorrect detection's.

3) Examine all cables for cuts, nicks or crimps that could cause open or short circuits. Ensure that all connectors are secure and free of foreign material.

Further trouble shooting of the sensors is only possible with the sensor connected to the processing unit (Model MPPU). All diagnostics for the sensor relies upon the diagnostic circuitry in the processing unit. See the Model MPPU Operators Manual [Section Z] for more information.

G.8 Related Drawings

The following pages contain various drawings for the components used in and with the 10XBR-Series sensor. For drawings of other sizes of sensors (20, 30 or 40), please contact Harris Instrument Corporation Engineering. All mechanical drawings are available as AutoCAD® .DWG files for a minimal charge. Please contact Harris Instrument Corporation Sales.

Drawing #	Description	Drawing Format
1295004 Rev. B Pg.1	*Dimensions, Model 10XA Sensor Emitter*	*AutoCAD LT Rel. 3*
1295004 Rev. B Pg.2	*Dimensions, Model 10XA Sensor Emitter for TSR Option or 10XABR-Series Emitter*	*AutoCAD LT Rel. 3*
1295004 Rev. B Pg.3	*Dimensions, Model 10XA Sensor Emitter for OLB Option*	*AutoCAD LT Rel. 3*
1203004 Pg. 1	*10X-Series B-Style Emitter Dimensions*	*AutoCAD LT Rel. 3*
1203004 Pg. 2	*10X-Series B-Style Emitter Dimensions With BR or TSR Connectors*	*AutoCAD LT Rel. 3*
1203004 Pg. 3	*10X-Series B-Style Emitter Dimensions With OLB Connector*	*AutoCAD LT Rel. 3*
1295007 Rev. A Pg. 1	*10X-Series Model 10BR-UT Emitter Dimensions*	
1295007 Rev. A Pg. 2	*10X-Series Model 10BR-UT Emitter Dimensions for 10XBR-Series or TSR Option*	*AutoCAD LT Rel. 3*
1295007 Rev. A Pg. 3	*10X-Series Model 10BR-UT Emitter Dimensions for OLB Option*	*AutoCAD LT Rel. 3*
1295011 Rev. B	*10XBR-Series Model 10XBR-UT Receiver Dimensions*	*AutoCAD LT Rel. 3*
1295015 Rev. C	*10XBR-Series Model 10XRA Receiver Dimensions*	*AutoCAD LT Rel. 3*
1495273 Rev. B Pg. 1	*Typical 10XBR-Series Sensor Installation Specifications for Model 10XABR Sensors*	*AutoCAD LT Rel. 3*
1495273 Rev. B Pg. 2	*Typical 10XBR-Series Sensor Installation for Model 10XBR ULTRA-TOUGH™ Sensors*	*AutoCAD LT Rel. 3*
3486060 Rev. A	*Emitter-to-Processing Unit Cable*	*AutoCAD LT Rel. 3*
3495104 Rev. A	*Emitter-to-Receiver Cable*	*AutoCAD LT Rel. 3*
3495101	*Sealed Emitter-to-Processing Unit Cable for UT Sensors*	*AutoCAD LT Rel. 3*
3495109 Rev. A	*Sealed Emitter-to-Receiver Cable for UT Receivers*	*AutoCAD LT Rel. 3*
4496184 Rev. C	*10XR-Series Horn Blinder Assembly*	*AutoCAD LT Rel. 3*
4497015 Rev. C	*HBLD Option Attachment to Model 10XR Receiver*	*AutoCAD LT Rel. 3*
4497016 Rev. D	*HBLD Option Attachment to Model 10XR ULTRA-TOUGH™ Receiver*	*AutoCAD LT Rel. 3*

Table G.8-1: Drawing Packet Information