



ARS-700

Installation Manual
Rev. 1.5

**SHOT
OVER**

Rev Number	Description	Date
1.0	Original document release	MAY 2017
1.1	Miscellaneous updates	AUG 2017
1.2	Updated J2 Connector Detail	JAN 2018
1.3	Miscellaneous updates	JUL 2020
1.4	Updated branding, miscellaneous updates	JAN 2021
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Changes or modifications not expressly approved by SHOTOVER Systems could void the user's authority to operate the equipment.

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All information depicted in this manual, including hardware and software names, versions, and part numbers, is subject to change and may not be up to date.

About this Manual

This manual describes the physical, mechanical, and electrical components, as well as instructions for the installation of the SHOTOVER Systems ARS-700. Every effort has been made to make this document as complete and accurate as possible.

The following symbols for warnings, cautions, and notes are used to throughout this manual.



Warning

A warning symbol denotes an item where a potential hazard capable of producing injury to personnel or destruction of equipment exists if the approved procedure is not followed.



Caution

A caution symbol denotes an item where, if not followed, damage to equipment or degradation of mission capability can occur.



Note

The note symbol is used to identify essential information for installers / operators. While not directly related to safety or protection of equipment from damage, the note symbol identifies information to which attention should be paid during the installation and/or operation of the equipment.

Product Guarantee & Warranty Information

For details about the SHOTOVER Systems warranty, please see the Terms and Conditions page available at shotover.com/agreement



This document contains information that was current as of the printing of this manual. To obtain always up-to-date installation drawings, ICDs, and much more, visit: shotover.com/specifications

Section 1: Background

1.0 Description

ARS-700 is the next-generation mission platform developed by SHOTOVER Systems. At the core of the ARS-700 platform is the ATOM mission computer. ATOM provides the hardware optimized to run SHOTOVER Systems's Augmented Reality Mapping software (ARS) and to provide high quality, digital video recording. The ARS-700 can interface with a wide variety of external mission equipment, data feeds, and video sources providing an incredibly powerful, yet compact mission solution.

1.1 Components

ATOM Mission Computer

The ARS-700 platform is based on the ATOM mission computer. ATOM is a compact, solid-state mission computer designed to run the next generation of SHOTOVER Systems's Augmented Reality Mapping Software (ARS). ATOM's design delivers maximum performance in a flexible, lightweight design.



Installation Components & Connectors

Each ARS-700 will ship with the connectors necessary for proper installation. This includes connectors for Ethernet, power, and serial connections. Installers may purchase an installation wiring kit to ensure recommended connectors are present at the time of installation.



ION Digital Video Recorder (Optional)

Some operators may elect to purchase SHOTOVER Systems's ION digital video recorder for even more flexibility and utility. ION provides a dedicated hardware solution that can record geospatial video directly to hot-swappable SD or USB media, display recorded video on a built-in screen, and allow review and playback while recording.



1.2 Technical Characteristics & Specifications

Specification	Characteristic
Product Designation/Description	SHOTOVER Systems ARS-700 with ATOM Mission Computer
Physical Dimensions	Height at bezel: 1.875 in [47.63 mm] Width at bezel: 5.75 in [146.05 mm] Length (Enclosure depth): 7.0 in [177.8 mm] Overall depth: Front panel to rear of enclosure, excluding connectors: 8.32 in [211.33 mm]
Weight	2.875 lbs ± .05 lbs [1.30 kg ± .02 kg]
Power LED	NVIS compliant
Environmental Qualifications	DO-160 Qualified
Operating Temperature Range	-20°C to +55°C
Maximum Operating Altitude	+45,000 feet [+13,716m]
Power: Input Voltage	28VDC
Input Current	2.3A on 28VDC (normal operating range: 18 - 30VDC)
Power consumption	Average power draw is 45W (1.6A ON 28VDC). Maximum power draw is 65W (2.3A ON 28VDC).
Circuit Breaker Requirement	Minimum 7.5 amp rated
Connection Types, Protocols, and Standards	LEMO (1x) J1 – Power LEMO (1x) J2 – Ethernet LEMO (1x) J4 – Serial COM port BNC J6, J7 – HD-SDI 1 & HD-SDI 2 (video in) BNC J8, J9 – HD-SDI 1 & HD-SDI 2 (video out) SMA Female, J5 (2x) – 802.11ac Wi-Fi antenna* DisplayPort (locking), J3 – video out
Video-in Support	HD-SDI in channel 1 HD-SDI in channel 2
Video-out Support	HD-SDI out (2x) (HD-SDI out channels are duplicate output) DisplayPort
Video-out Supported Resolutions	720p (50 fps) 720p (60 fps) 1080p (25 fps) 1080p (30 fps) 1080i (50 fps) 1080i (60 fps) 1080p (60 fps)

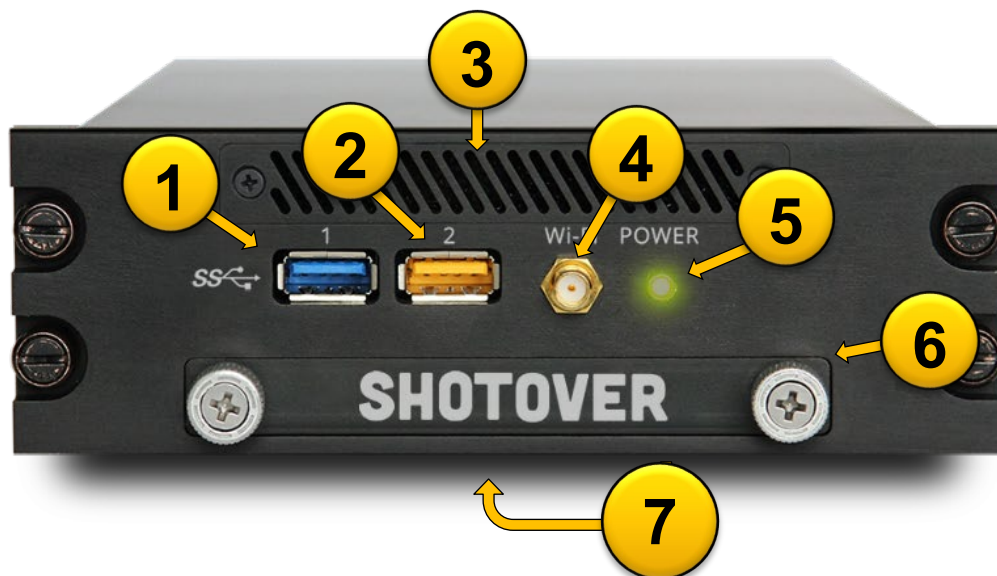
(Continued on the Next Page)

Metadata Standard	KLVS MISB/STANAG 4609 compliant
Video Codecs	H.264 (MPEG-4 AVC) H.262 (MPEG-2)

* 802.11ac Wi-Fi available for approved installations only.

1.3 ATOM Front Panel Design Features

The front connections and features of the ATOM are described below.



- 1) USB 3.0
- 2) USB 3.0 (charging capable)
- 3) Ventilation with user-serviceable air filter
- 4) Female SMA connector: Wi-Fi
- 5) Power LED
- 6) Removable drive bay (for data drive)
- 7) CMOS Battery access tray (located on the bottom of the enclosure) *

1.4 ATOM Rear Panel Design Features

The rear connections and features of the ATOM are described below.



- 1) J1 Power
- 2) J2 Ethernet
- 3) J3 Dual Mode DisplayPort (DP++)
- 4) J4 Serial Communications (USB, PS/2, RS232, RS422, Audio)
- 5) J5 Female SMA connector: Wi-Fi
- 6) J6 HD SDI 1 VIDEO IN BNC
- 7) J7 HD SDI 2 VIDEO IN BNC
- 8) J8 HD SDI 1 VIDEO OUT BNC (gold)
- 9) J9 HD SDI 2 VIDEO OUT BNC (gold)

Section 2: Installation Guidelines

2.0 Description

This section contains information and instructions for the unpacking and correct installation of the SHOTOVER Systems ARS-700 hardware.

2.1 Equipment Packaging

Prior to installation, carefully inspect all supplied hardware. Note any damage that may have occurred in transit and contact the parcel carrier if necessary to file a claim. If possible, retain the original packaging to ease in the claim or return process.

Check that all items listed below are present prior to proceeding with the installation. Report any missing items to your supplier.

- (1) ATOM Mission Computer
- (1) ARS-700 Connector Kit
- Product manuals and guides

2.2 ARS-700 Connector Kit

Each ARS-700 includes an ARS-700 Connector Kit. This kit contains all recommended connectors and accessories needed for installation. Additional connectors are available for purchase from SHOTOVER Systems or direct from the manufacturers themselves.

The connector kit includes the following:

SHOTOVER Part Number	Manufacturer Part Number	Description	Qty
KIT-FGN.1M.308.XLCM	FGN.1M.308.XLCM	J1 plug for Power - LEMO w/ pins	1
	Amphenol M85049/38-9N	Strain Relief Backshell Size 9	1
KIT-FGU.1M.308.XLCM	FGU.1M.308.XLCM	J2 plug for Ethernet - LEMO w/ pins	1
	Amphenol M85049/38-9N	Strain Relief Backshell Size 9	1
KIT-FGN.3M.330.XLCM	FGN.3M.330.XLCM	J4 plug for Serial - LEMO w/ pins	1
	Amphenol M85049/38-13N	Strain Relief Backshell Size 13	1
CONN-PICWIRE-190712	PICWire P/N 190712	75Ω BNC plug for PICWire V73263	4
CONN-AMPHENOL-112123	Amphenol 112123	75Ω BNC plug for RG59	4
CONN-AMPHENOL-112133	Amphenol 112133	75Ω BNC plug for RG179	4
CONN-FER-S	74271142S*	Small Snap on Ferrite	4
CONN-FER-L	74271112S	Large Snap on Ferrite	4
CONN-FER-K	74271	Ferrite Key	1
CONN-LED-NVIS	6890-0344	LED NVIS Dimmer Sticker	1
CONN-WIFI-ANTENNA	W1010	SMA Wi-Fi Antenna	1
CONN-DP	DP-Bracket 1-0	DisplayPort Support Bracket	1

2.3 Required Tools

You will need the correct crimping tool for the connectors selected. A few examples are listed below and are available from SHOTOVER Systems or from their respective manufacturers.

BNC Connectors:

Application	Connector:	Crimp Die:
75ohm BNC plug for PIC Wire V73263	PIC Wire P/N 190712	M22520/5-41
75ohm BNC plug for RG59	Amphenol P/N 112123	.255/.213/.068
75ohm BNC plug for RG179	Amphenol P/N 112133	.178/.128/.068

All LEMO Connectors:

Crimp Tool	Pin Positioner	Pin Extractor
DPC.91.701.V	DCE.91.070.5MVC	DCF.93.070.4LT

2.4 Installation Location Considerations

The ATOM is intended for DZUS mount (or similar) installations. If you are unsure of the installation location, please contact SHOTOVER Systems. If possible, ARS-700 mission equipment, displays, and the camera gimbal should be installed on a mission bus separate from avionics and/or master power.

If installing the optional ION Digital Video Recorder with the ATOM, it is permissible to place both components up to 100 feet (30.5 meters) apart without any noticeable latency in communications.



To ensure adequate airflow to the unit, SHOTOVER Systems recommends a minimum of 4 inches / 100mm between the back of the ATOM and any adjacent surface.

2.4.1 Voltage Requirements

ATOM operates on 28-volt DC power and consumes a maximum of 80 watts (2.86 amps on 28VDC). However, the hardware will remain operable with voltages ranging from 20-30VDC. **SHOTOVER Systems recommends using 28VDC with a minimum 7.5-amp circuit breaker.**

2.4.2 Ground Considerations

ATOM is case-grounded through the DZUS mount. Exposed aluminum is chromated. Do not chemically coat or cover with any non-conductive material. All ground pins except 28V return are ground continuous to case.



Failure to properly ground the units may result in damage to the hardware or other installed electrical components.

2.4.3 Service Loop

Install all cables with at least an 8 inch [203 mm] service loop to allow for easy removal for servicing.

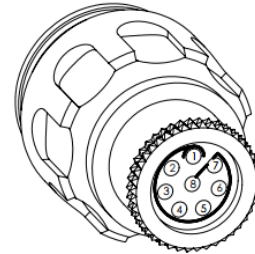
Section 3: Cabling & Connectors

3.0 Description

The cabling descriptions included in this section are highly recommended. Any variation will be at the sole responsibility of the installer. Detailed installation diagrams are provided in this manual and are available at SHOTOVER.com/specifications

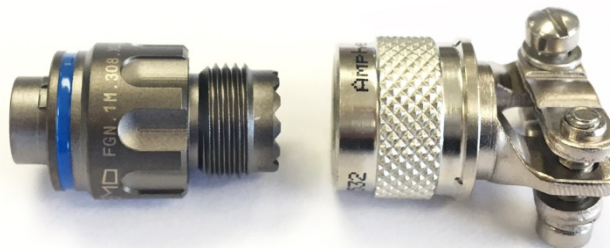


When populating LEMO connectors, please follow the pattern on the rear of the male LEMO. On most connectors, the number 1 pin will be identified by a semi-circular (⌒) shape around the pin as shown to the right.



3.1 J1 Power

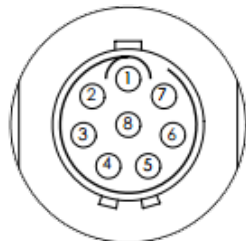
Install the J1 Power connector using the parts supplied in the connector kit, SHOTOVER Systems p/n KIT-FGN.1M.308.XLCM. The Amphenol strain relief connector backshell should be installed on the corresponding cable **before** installing the LEMO connector. The connection to 28VDC input and 28VDC GND are highly recommended to be a twisted pair. Use of 22 AWG wire size is also recommended.



(LEMO FGN.1M.308.XLCM)

(Amphenol M85049/38-9N)

3.1.1 Power Pinout



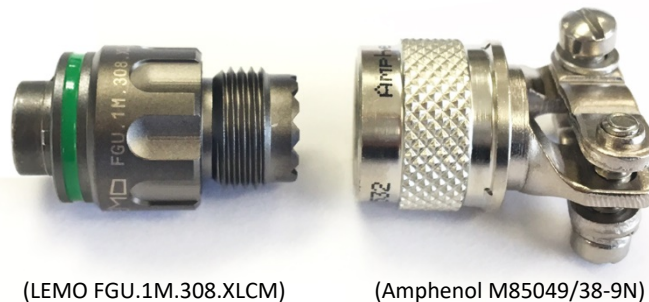
Pin	Function
1	28V
2	GND
3	NC
4	NC
5	NC
6	NC
7	NC
8	NC

3.1.2 Power Connector Backshell

SHOTOVER Systems recommends using the supplied Amphenol strain relief connector backshell **for all installations**. Always install this connector before the LEMO connector.

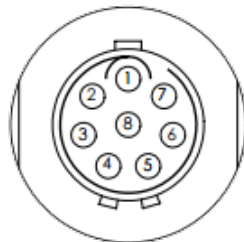
3.2 J2 Ethernet

Camera gimbal position data connectivity requires either J2 Ethernet connection or J4 Serial COM connection. Please contact your gimbal manufacturer if you are unsure which is the preferred method for your setup. Install the J2 Ethernet connector using the parts supplied in the connector kit, SHOTOVER Systems p/n KIT-FGU.1M.308.XLCM. SHOTOVER Systems recommends using either Pic Wire & Cable PIC E50824 or EMTEQ D100-0824-006 4-pair Ethernet cable. Either can be purchased from SHOTOVER Systems or directly from their respective manufacturers at <http://www.picwire.com> or <http://www.emteq.com>



3.2.1 Ethernet Pinout

Ethernet twisted pair is indicated by color block shown below.



Pin	Function	Wire color
1	TX-/BiD1-	Orange
2	TX+/BiD1+	Orange/White
3	RX-/BiD2-	Green
4	RX+/BiD2+	Green/White
5	BiD4-	Brown
6	BiD4+	Brown/White
7	BiD3+	Blue
8	BiD3-	Blue/White

3.2.2 Ethernet Backshell

SHOTOVER Systems recommends using the supplied Amphenol backshell strain relief connector **for all installations**. Always install this connector before the LEMO connector.

3.3 J3 DisplayPort (DP++)

ATOM has provisions for dual-mode DisplayPort video output. The J3 port provides display output capability and is useful to act as a primary or secondary display, and/or for on-ground maintenance activities. Any consumer-grade dual-mode DisplayPort cable will be compatible with the output. DisplayPort performance cannot be guaranteed at cable lengths greater than 25 feet (7.62 meters) without the use of an extender.

3.4 J4 COM

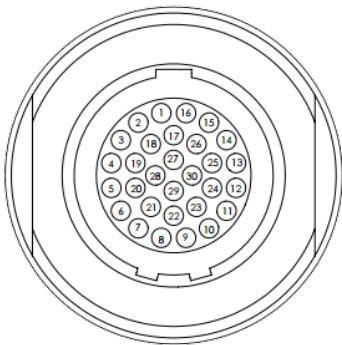
Install the J4 COM connector using the parts supplied in the connector kit, SHOTOVER Systems p/n KIT-FGN.3M.330.XLCM



(LEMO FGN.3M.330.XLCM)

(Amphenol M85049/38-13N)

3.4.1 COM Pinout



Pin	Function
1	AUDIO OUT (L)
2	USB D-
3	USB D+
4	USB 5V
5	PS/2 5V
6	PS/2 CLK MOUSE
7	PS/2 DATA KEYB
8	PS/2 CLK KEYB
9	RS232A TX
10	RS232A RX
11	RS232C RX
12	RS232B TX
13	RS422 TX+ *
14	RS422 RX- *
15	RS422 RX+ *

Pin	Function
16	AUDIO IN (L)
17	AUDIO IN (R)
18	AUDIO OUT (R)
19	GND (USB)
20	PS/2 DATA MOUSE
21	GND (PS/2)
22	GND (232A)
23	RS232C TX
24	RS232B RX
25	RS422 TX- *
26	GND (RS422)
27	GND (AUDIO)
28	GND (AUDIO)
29	GND (RS232C)
30	GND (RS232B)

* Twisted pair required.

Pair RS422 TX+ with TX-, and RS422 RX+ with RX-

3.4.2 COM Backshell

SHOTOVER Systems recommends using the supplied Amphenol backshell strain relief connector for all installations. Always install this connector before the LEMO connector.

3.4.3 USB

For USB applications using J4, SHOTOVER Systems recommends the following:

Option A: Carlisle 28433/02171LX-4. This cable can be purchased directly from Carlisle:
<http://www.carlisleit.com>

Option B: EMTEQ U090-0422-100: This cable can be purchased directly from Emteq:
<http://www.emteq.com>



USB performance cannot be guaranteed at cable lengths greater than 10ft (3.04m) without the use of an active extender. Contact SHOTOVER Systems for additional information.

3.4.4 PS/2

Installers can connect peripherals that use the PS/2 communications protocol to the ATOM. This provides the recommended interface to the ATOM and accepts a wide variety of aviation-specific and consumer-grade keyboards. Keyboards sold by SHOTOVER Systems use this protocol. Multiple keyboards/mice are not possible with PS/2, use USB instead.

3.4.5 Audio

To connect an unbalanced audio signal, ensure that the ground signal from the audio source is shorted to ground at the source. This ground of the audio signal should then be connected to pins 27 and 28.



ATOM can be configured to record stereo audio as two separate channels; ICS as channel 1 and aircraft radios as channel 2, for example. To do this, separate audio-in via J4 pin 16 and J4 pin 17.

3.4.5.1 Connecting Balanced Outputs to Unbalanced Inputs

Establishing proper inter-connections between balanced and unbalanced equipment is imperative for the performance of the system and may also prevent damage to the equipment. There are three types of balanced outputs: '**impedance balanced**', '**transformer balanced**', and '**active balanced**'. Each type of balanced output requires different considerations when connecting to an unbalanced load. Assume that 2-conductor (unbalanced) wire is being used since 3-conductor wire will offer no advantages when driving unbalanced loads.

Devices with impedance-balanced outputs actively drive the hot output only. The cold output is tied to ground via a resistor that matches (or balances) the output impedance of the hot signal conductor. In other words, there is no audio signal on the cold conductor, but, in a full balanced system, common-mode rejection will be maintained since the impedance is balanced between the two conductors.

Impedance-balanced outputs can connect to unbalanced loads with the cold output 'floated' (unconnected) or connected to ground. There will be no performance or other differences between a floated or grounded cold conductor (pin-3) with impedance-balanced outputs. Using an XLR connector, this corresponds to pin-3 floating or tied to pin-1. The hot signal conductor will be connected to pin-2, as usual, and it will carry the audio information. The shield conductor will be connected, as usual, to pin-1.

Devices with **transformer-balanced** outputs actively drive the primary winding of the output transformer. The secondary winding of the output transformer delivers a symmetrical signal to the hot and cold signal conductors. Transformer-balanced outputs must have the cold output tied to the shield conductor when connecting to an unbalanced load. Using an XLR connector, this corresponds to tying pin-3 to pin-1. The hot signal conductor will be connected to pin-2, as usual, and it will carry the audio information. The shield conductor will be connected, as usual, to pin-1.

Devices with **active-balanced** outputs actively drive both the hot output and the cold output. The signal on the cold output is an inverted (polarity-reversed) version of the signal on the hot output. This creates symmetrical signals between the hot and cold outputs. This is the topology of all Benchmark equipment.

When connecting an active-balanced output to an unbalanced load, it is necessary to leave the cold output (pin-3) floating. Using an XLR connector, pin-3 should not be connected to anything. If a cable is used with pin-3 tied to pin-1 (shield), the output amplifier could be damaged. This type of connection establishes a low/no impedance path to ground. This means the amplifier will drain current, unimpeded, into ground, which is stressful to the output amplifier.

If you have questions regarding the best audio setup for your installation, please contact SHOTOVER Systems.

3.4.6 Serial Com – RS232, RS422

J4 contains connection provisions for RS232 and RS422 serial communications. Twisted pairs should be used for RS422TS+ / RS422 TX- and RS422 RX+ / RS422 RX-. Camera gimbal geospatial (positional) data connectivity requires either J2 Ethernet connection or J4 Serial COM connection. Please contact your gimbal manufacturer if you are unsure which is the preferred method for your setup.



The maximum speed for cable runs of less than 25 feet [7.62m] is 256 kbit/s for RS232 and 8 Mbit/s for RS422.

3.5 J5 Wi-Fi

The J5 Wi-Fi antenna uses a standard, female SMA connector. Wi-Fi connectivity is available for approved installations only.

3.6 J6, J7 HD-SDI Video In

ATOM has two HD-SDI IN connections. When used with gyro-stabilized gimbals, HD-SDI video 1 (J6) is typically used for Video In Command (VIC) and HD-SDI video 2 (J7) is typically used for a hoist camera, etc. All BNC connectors use the center pin for the signal and the shell as the ground.

In almost all applications, SHOTOVER Systems recommends use of PIC Wire PIC V73263 lightweight 75Ω HD-SDI COAX Cable, P/N 190712, available from SHOTOVER Systems or <http://www.picwire.com>

If an installation requires alternative cabling, please use the following:

Alternative A: RG59 can be used in place of PIC Wire PIC V73263. The proper connector is SHOTOVER Systems p/n CONN-AMPHENOL-112123 (manufacturer p/n Amphenol Connex 112123). These are available from SHOTOVER Systems or <http://www.digikey.com>

Alternative B: If RG179 is required by other equipment (ex. MX-10 gimbal), then for EMI purposes, DOUBLE high performance 360-degree EMC individual braid shielding must be done to RG179 cable from end to end. The proper connector is SHOTOVER Systems p/n CONN-AMPHENOL-112133 (manufacturer p/n Amphenol Connex 112133), available from SHOTOVER Systems or <http://www.digikey.com>



Routing SDI cables near avionics including the transponder, antennas, receivers, etc., may result in noise in the SDI line which will cause various issues on recording, downlink, and displays exhibited by dropouts, alarms, or freezes.

3.7 J8, J9 HD-SDI Video Out

J8 and J9 provide video output. This is useful for broadcast or downlink output or displaying video on a second display. All BNC connectors use the center pin for the signal and the shell as the ground.

In almost all applications, SHOTOVER Systems recommends use of PIC Wire PIC V73263 lightweight 75Ω HD-SDI COAX Cable, P/N 190712, available from SHOTOVER Systems or <http://www.picwire.com>

If an installation requires alternative cabling, please use the following:

Alternative A: RG59 can be used in place of PIC Wire PIC V73263. The proper connector is SHOTOVER Systems p/n CONN-AMPHENOL-112123 (manufacturer p/n Amphenol Connex 112123). These are available from SHOTOVER Systems or <http://www.digikey.com>

Alternative B: If RG179 is required by other equipment (ex. MX-10 gimbal), then for EMI purposes, DOUBLE high performance 360 degree EMC individual braid shielding must be done to RG179 cable from end to end. The proper connector is SHOTOVER Systems p/n CONN-AMPHENOL-112133 (manufacturer p/n Amphenol Connex 112133), available from SHOTOVER Systems or <http://www.digikey.com>



Routing SDI cables near avionics including the transponder, antennas, receivers, etc., may result in noise in the SDI line which will cause various issues on recording, downlink, and displays exhibited by dropouts, alarms, or freezes.

3.8 All Other Cables

Other cables can be selected at the installer's discretion to meet the needs of the installation. All cables **MUST BE SHIELDED**. This includes power cables.

Section 4: Aircraft Post-Installation Testing Procedures

4.0 Description

The following tests should be performed post-installation to confirm the correct operation of the ATOM video recorder in airborne applications. Additionally, these tests will identify any interference that the ATOM installation may cause with existing aircraft systems. If the installed system passes all applicable EMI tests, then no further action is required. If interference is observed, then the interference must be assessed against the appropriate standards of airworthiness for the system in question.

4.1 Methodology

Most EMI tests can be conducted on the ground unless otherwise noted. Testing recommendations for various aircraft system tests are provided below. During all tests, it is recommended that users switch the ATOM unit on and off as often as required to evaluate potential EMI in all phases of ATOM operation.

ADF	If possible, set the ADF to a nearby navigation station and monitor for interference.
Autopilot	If the aircraft is equipped with an autopilot or a stability augmentation system, test fly the aircraft and verify that operation of the ATOM does not have adverse effects on these systems.
GPS	The GPS should be operational and navigating with at least the minimum compliment of satellites. Observe the GPS for any degradation in satellite status, loss of RAIM, or warning messages/flags.
Transponder / ADS-B	The transponder and encoder should be monitored with ramp test equipment. Set the output of the transponder test set to 3db above the output necessary to achieve 90% reply. Confirm no erroneous ADS-B messages and connectivity if using Bluetooth/Wi-Fi equipped ADS-B transponder.
VHF Comm Radio	The VHF comm radio should have the squelch open. Listen for any noise or detected audio signals on the VHF comm radio(s).
Navigation Radios	Operation of the Navigation radios (VOR/LOC/GS/DME receiver(s)) should be tested using known operational facilities. Listen for any noise or detected audio signals on the VOR/LOC/GS receiver audio; look for any moment of flags or needles on the VOR/LOC/GS navigation display(s).

4.2 Power-on Checks

Prior to performing any other tests, the user should confirm the basic operation of the ATOM unit. This can be conducted using ground power or in-air using aircraft power.

- 1) Power the ATOM on with a display(s) connected and confirm the boot sequence.
- 2) Power the camera on and confirm video output to the ATOM.
- 3) Operate the keyboard and/or mouse (if installed) to ensure functionality
- 4) Record to the unit's USB removable media front panel slots
- 5) Confirm functionality with camera gimbal geospatial data during a test flight.

If unable to successfully complete any of these steps, begin by rechecking wiring, connections, and if necessary, contact SHOTOVER Systems Support for further troubleshooting.

4.3 EMI Test

List the powerplant, fuel, and other electric instruments not already in the chart provided and note any anomalies that occur due to operation of the ATOM. Assess the results.

Aircraft communications & navigation equipment tests		Pass/Fail
Comm 1&2		
Transponder / ADS-B (XPDR Standby & Mode-C)		
ADF 1 & 2		
Glideslope 1&2		
VOR/LOC 1&2		
DME 1&2		
Compass		
Directional Gyro		
GPS		
Digital Clock		
Autopilot tests		Pass/Fail
Autopilot Functionality		
Coupled Approach		
Stability Augmentation Systems		

(Table continued next page)

Aircraft engine systems tests		Pass/Fail
Fuel Pressure		
Oil Temperature		
Amps		
Bus Voltage		
Fuel %		
Ng		
TOT		
Torque %		
Annunciators		
Oil Pressure		
Other systems tests (as identified by the installer/operator)		Pass/Fail

4.4 EMI Mitigation

Each ARS-700 Connector Kit contains several Würth Elektronik snap on hinged ferrite core filters. If you suspect interference caused by the ARS-700/ATOM installation, install these ferrite filters on all cables leading to the ATOM. Ensure that the ferrite core filters are located as close to the ATOM as practical.

Section 5: Technical Supplement

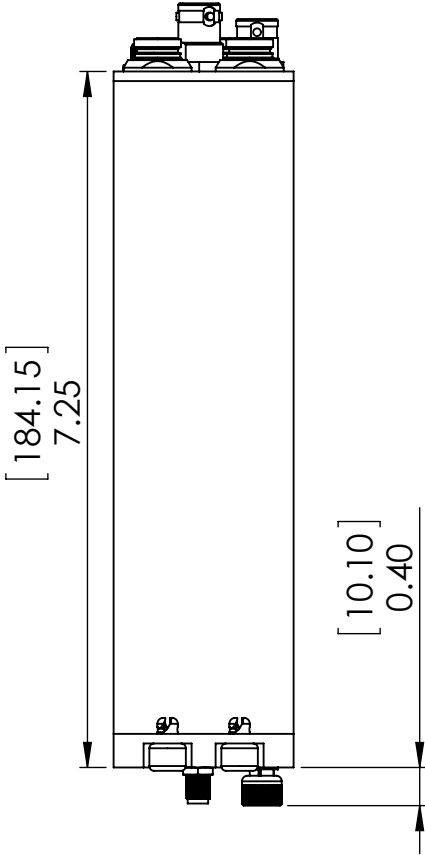
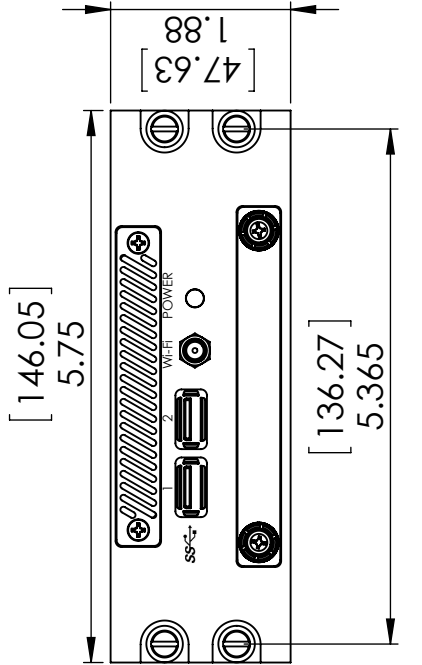
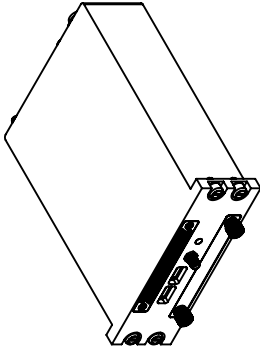
5.0 Installation Diagrams

The following pages contain the installation diagrams and specific notes for the ATOM.

SYSTEM WEIGHT: 2.875 lbs [1.3 kg]
±.05 lbs [0.02 kg]

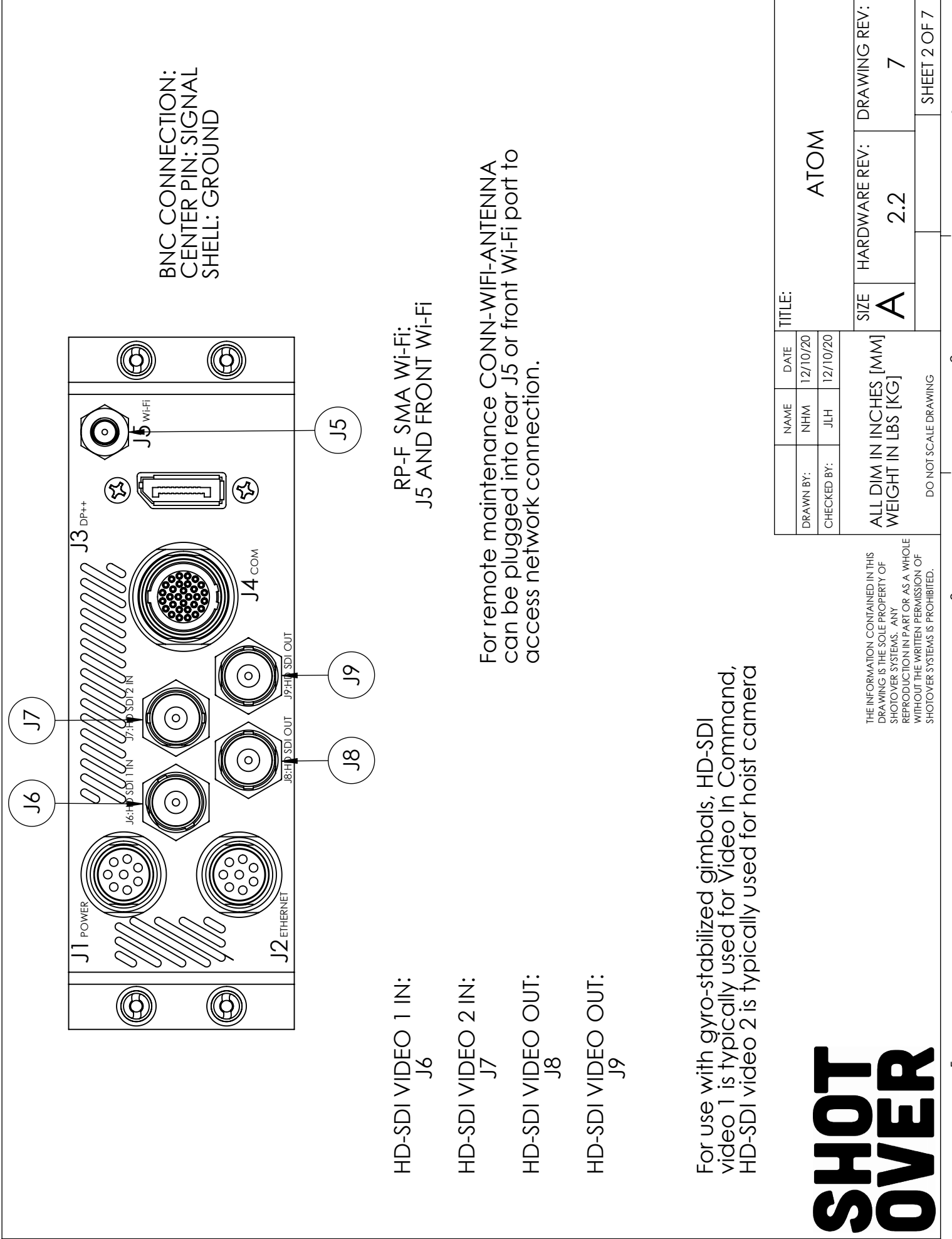
INSTALLATION NOTES:

1. ATOM IS CASE GROUNDED THROUGH DZUS MOUNT. IF THE DZUS MOUNT IS NOT DIRECTLY GROUNDED TO THE CHASSIS, USE A MINIMUM OF 16-GAUGE WIRE TO GROUND THE DZUS MOUNT PRIOR TO ATOM OPERATION.
2. EXPOSED ALUMINUM IS CHROMATED. DO NOT CHEMICALLY COAT OR COVER WITH NON-CONDUCTIVE MATERIAL.
3. ALL GROUND PINS ARE GROUND CONTINUOUS TO CASE.
4. 28V INPUT IS REVERSE-POLARITY PROTECTED.
5. RECOMMENDED POWER WIRE SIZE: 22AWG.
6. AVERAGE POWER DRAW IS 45 WATTS (1.6A ON 28VDC).
7. MAXIMUM POWER DRAW IS 65 WATTS (2.3A ON 28VDC).



TITLE:		ATOM	
DRAWN BY:	NAME	DATE	
CHECKED BY:	NHM	12/10/20	
	JLH	12/10/20	
ALL DIM IN INCHES [MM] WEIGHT IN LBS [KG]		SIZE	DRAWING REV:
		A	2.2
DO NOT SCALE DRAWING		SHEET 1 OF 7	

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HD-SDI VIDEO 1 IN:
J6

HD-SDI VIDEO 2 IN:
J7

HD-SDI VIDEO OUT:
J8

HD-SDI VIDEO OUT:
J9

For use with gyro-stabilized gimbals, HD-SDI video 1 is typically used for Video In Command, HD-SDI video 2 is typically used for hoist camera

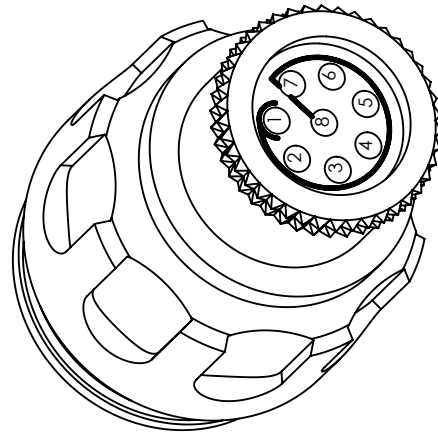
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RP-F SMA Wi-Fi:
J5 AND FRONT Wi-Fi

For remote maintenance CONN-WIFI-ANTENNA can be plugged into rear J5 or front Wi-Fi port to access network connection.

TITLE:		ATOM	
DRAWN BY:	NAME	DATE	
CHECKED BY:	NHM	12/10/20	
	JLH	12/10/20	
ALL DIM IN INCHES [MM] WEIGHT IN LBS [KG]		SIZE	HARDWARE REV:
		A	2.2
		DRAWING REV: 7	
DO NOT SCALE DRAWING		SHEET 2 OF 7	

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1:28V
2:28V GND

- 1:Bi_DA-/TX- (Orange)
- 2:Bi_DA+/TX+ (Orange/White)
- 3:Bi_DB-/RX- (Green)
- 4:Bi_DB+/RX+ (Green/White)
- 5:Bi_DD- (Brown)
- 6:Bi_DD+ (Brown/White)
- 7:Bi_DC+ (Blue)
- 8:Bi_DC- (Blue/White)

While populating LEMO connectors, please follow the pattern on the rear of the male LEMO, as seen above

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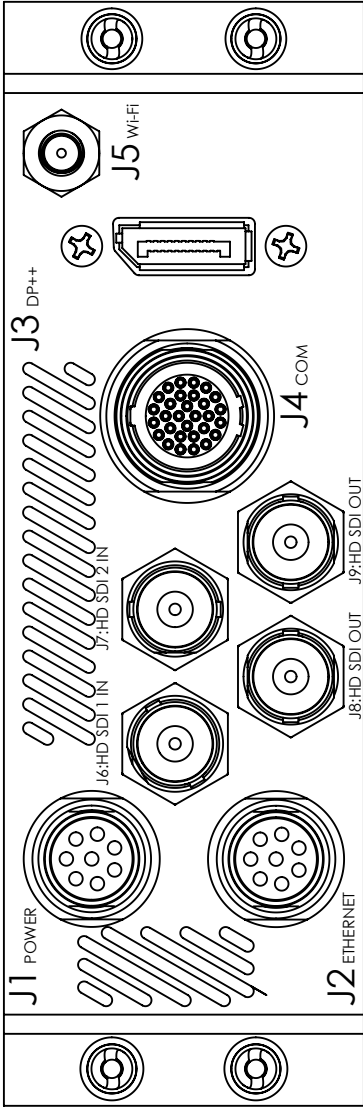
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MATING CONNECTOR PLUGS
(CABLE TERMINATION)

- J1: FGN.1M.308.XLCM (One Provided with each ATOM)
- J2: FGU.1M.308.XLCM
- J4: FGN.3M.330.XLCM

SHOTOVER has stock of all necessary connectors and tools

All ATOM Lemo Connectors Use:
Crimp tool: DPC.91.701.V
Pin Positioner: DCE.91.070.5MVC
Pin Extractor: DCF.93.070.4LT



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TITLE:		ATOM	
DRAWN BY:	NAME	DATE	
CHECKED BY:	NHM	12/10/20	
	JLH	12/10/20	
ALL DIM IN INCHES [MM] WEIGHT IN LBS [KG]		SIZE	HARDWARE REV:
		A	2.2
		DRAWING REV:	
		7	
DO NOT SCALE DRAWING		SHEET 5 OF 7	

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CABLING REQUIREMENTS

In order to ensure a properly working ATOM System, these cabling requirements are highly recommended and any variations will be at the sole responsibility of the installer. Please also install each cable with an 8 inch service loop for easy removal and replacement of unit.

Power Cable

The connection to 28V input on the Ion and 28V GND are highly recommended to be a twisted pair.

75ohm HD-SDI COAX CABLE

Option A

PicWire PIC V73263 is highly recommended. The proper connector is PicWire P/N 190712. These are available from SHOTOVER Systems or at http://www.picwire.com/pdfs/PIC_Connectors/PIC_190712.pdf.

RG59 is also highly recommended. The proper connector is Amphenol Connex 112123. These are available from SHOTOVER Systems or at <http://www.digikey.com/product-search/en/connectors-interconnects/coaxial-connectors-ff/1443098?k=112123>

Option B

If RG179 is required by other equipment (ex. MX-10 gimbal), then for EMI purposes, DOUBLE high performance 360 degree EMC individual braid shielding must be done to RG179 cable from end to end. The proper connector is Amphenol Connex 112133. These are available from SHOTOVER Systems or at http://www.digikey.com/product-search/en?wt.z_cid=ref_hearst_0211_buynow&site=us&mpart=112133&v=115

CRIMPING TOOL

You will need the correct crimping tool for the connectors selected. A few examples are listed below and are available through SHOTOVER Systems:

Connector: Crimp Die:
Picwire P/N 190712 M22520/5-41
Amphenol 112123 .255/.213/.068
Amphenol 112133 .178/.128/.068

All Lemo Connectors

Crimp tool: DPC.91.701.V Pin Positioner: DCE.91.070.5MVC Pin Extractor: DCF.93.070.4LT

USB CABLE

USB performance cannot be guaranteed at cable lengths greater than 15ft without the use of an extender. Contact SHOTOVER Systems for further details.

Option A

Carlisle 28433/02171LX-4 <http://www.carlisleit.com/product/usb-cables>. This cable can be purchased directly from Carlisle

Option B

EMTEQ U090-0422-100: http://www.emteq.com/cmsdocuments/EMTEQ_U090-0422-100.pdf & <http://www.emteq.com/entertainment.php> This cable can be purchased directly from Emteq.

ETHERNET CABLE

Picwire PIC E50824 is highly recommended. This can be purchased directly from PicWire at http://www.picwire.com/products/data_mates.php

EMTEQ D100-0824-006 is also highly recommended. This can be purchased directly at <http://www.emteq.com/ethernet-and-databus-cables.php>

DISPLAY PORT CABLE

DisplayPort performance cannot be guaranteed at cable lengths greater than 25ft without the use of an extender. Contact SHOTOVER Systems for further details.

ALL OTHER CABLES - MUST BE SHIELDED

All other cable can be selected by installer and all cables must be shielded, including power cables.



TITLE:		ATOM	
DRAWN BY:	NAME	DATE	
CHECKED BY:	NHM	12/10/20	
	JLH	12/10/20	
ALL DIM IN INCHES [MM] WEIGHT IN LBS [KG]		SIZE	HARDWARE REV:
		A	2.2
DO NOT SCALE DRAWING		DRAWING REV: 7	
		SHEET 6 OF 7	

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AVAILABLE FROM SHOTOVER SYSTEMS

CONN-ATOM
ATOM Connector Kit (Includes all below)

SHOTOVER P/N	Manufacturer P/N	Description	Quantity
KIT-FGN.1M.308.XLCM	FGN.1M.308.XLCM	J1 plug for Power - LEMO w/ pins	1
	Amphenol M85049/38-9N	Strain Relief Backshell Size 9	1
KIT-FGU.1M.308.XLCM	FGU.1M.308.XLCM	J2 plug for Ethernet - LEMO w/ pins	1
	Amphenol M85049/38-9N	Strain Relief Backshell Size 9	1
KIT-FGN.3M.330.XLCM	FGN.3M.330.XLCM	J4 plug for Serial - LEMO w/ pins	1
	Amphenol M85049/38-13N	Strain Relief Backshell Size 13	1
CONN-PICWIRE-190712	Picwire P/N 190712	75Ω BNC plug for PICWire V73263	4
CONN-AMPHENOL-112123	Amphenol 112123	75Ω BNC plug for RG59	4
CONN-AMPHENOL-112133	Amphenol 112133	75Ω BNC plug for RG179	4
CONN-FER-S	74271142S*	Small Snap on Ferrite	4
CONN-FER-L	74271112S	Large Snap on Ferrite	4
CONN-FER-K	74271	Ferrite Key	1
CONN-LED-NVIS	6890-0344	LED NVIS Dimmer Sticker	1
CONN-WIFI-ANTENNA	W1010	SMA Wi-Fi ANTENNA	1
CONN-DP	DP-Bracket 1-0	Displayport Support Bracket	1

Tools

SHOTOVER P/N	Manufacturer P/N	Description
TOOL-RG59	47-10070	Crimp tool and die for 112123 BNC (.255/.213/.068)
TOOL-RG179	47-10150	Crimp tool and die for 112133 BNC (.178/.128/.068)
TOOL-PIC	HX4 5120-01-335-8575	Hand crimp tool for PICWire BNC (No Die)
TOOL-PIC-DIE	M22520/5-41	Die set for PICWire 190712 BNC (.290/.178)
TOOL-LEMO	DPC.91.701.V*	Hand crimp tool for LEMO Crimps
TOOL-LEMO-PTNR	DCE.91.070.5MVC	Pin Positioner for Small LEMO Crimps
TOOL-LEMO-EXTR	DCF.93.070.4LT	Pin Extractor for Small LEMO Crimps

*or alternate

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DRAWN BY: NHM		NAME	DATE	TITLE:	
CHECKED BY: JLH			12/10/20	ATOM	
		12/10/20			
ALL DIM IN INCHES [MM] WEIGHT IN LBS [KG]				SIZE A	HARDWARE REV: 2.2
DO NOT SCALE DRAWING				DRAWING REV: 7	
				SHEET 7 OF 7	

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