National Center for Atmospheric Research

Electronic GPS Dropsonde System Installation

Electrical Loads Analysis Report: ELA-AVAPS-100

NSF Gulfstream V Aircraft, SN 677

Revision: A (initial release)

Date: 25 October 2005

National Center for Atmospheric Research
Research Technology Facility
3450 Mitchell Lane
Boulder, Colorado 80307

Prepared By:

Terry Hock
Engineer
National Center for Atmospheric Research

Electronic GPS Dropsonde System Rack Installation
Electrical Loads Analysis Report: ELA-AVAPS-100

Revision

Revision	Date	Description	Pages	Approved	Date
A	25 Oct 05	Initial Release	All		

NCAR Dropsonde System Electrical Loads Analysis
NSF Gulfstream V Aircraft, SN 677

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1. Introduction

NCAR is developing main cabin equipment (MCE) racks to support atmospheric research equipment installations on the National Science Foundation (NSF) GV aircraft, SN677, under STC project number ST3285DE-T through the DOT-FAA Denver ACO. Research power wiring was previously installed by Lockheed Martin Aircraft Company IAW STC ST03056AT. Research equipment will not interface with existing aircraft systems, nor will the equipment provide information to the flight crew to assist them with operation of the aircraft. Therefore, AC 25-10 (Guidance for the Installation of Miscellaneous, Non-required Electrical Equipment) will be utilized to show compliance with the applicable regulations of 14 CFR Part 25. This report will present the data for the electrical load analysis of the Dropsonde Instrumentation rack.

This report is for the electrical load analysis for the Dropsonde System atmospheric instrumentation equipment installed in an instrumentation rack in the main cabin area. Items installed in the rack are Commercial Off The Shelf (COTS) equipment. There are four items which use aircraft power; 1) PC Rack Mount Computer, 2) LCD Flat Panel Monitor, 3) Telemetry chassis and 4) 28 volt Power Supply. All equipment in the Dropsonde instrumentation rack does not interface with existing aircraft systems, nor do they provide information to the flight crew to assist them with operation of the aircraft. Therefore, the miscellaneous, non-required electrical equipment and the guidance of AC 25-10 have been utilized.

2. Description

2.1. Research System

The research electrical system is designed to provide 40KVA of 115 VAC 400HZ 3 phase power continuously from the two Integrated Drive Generators (IDGs) for research applications. Twenty KVA from each IDG is allocated for Mission power. The aircraft uses frequency converters located in the Main Power Distribution Box (MPDB) to convert the 400 HZ to 21KVA of 110 VAC 60 HZ 1 Phase as supplied by the manufacturer. Research power distribution and controls are located in the MPDB as supplied by the manufacturer. The maximum allowable continuous electrical load for each power source is 20 amps.

2.2. Research Equipment

The Dropsonde system consists of the following equipment:

- Dropsonde instrumentation rack using 115 VAC 60 Hz @14.7 amps. The unit is protected by the existing CB#3303CD11, a 20 amp breaker located in the MPDB. Table 1 lists the individual components contained in the dropsonde instrument rack. Several of the units are protected by an independent circuit breakers, see table 2.
- Dropwindsonde Launcher Assembly, manufactured by Aeromet/L3 Communications Inc., model number 01901-10101-501. The unit is powered by 28 Vdc from the Dropsonde instrumentation rack. The wiring

harness between the instrumentation rack and launch tube is protected by a DC 20 amp circuit breaker located in the Dropsonde instrument rack.

- UHF Aircraft blade antenna, Manufactured by Sensor Systems Inc., model number S65-1217. This is a passive device and does not consume power.

The Dropsonde research instrumentation rack consists of the following commercial off the shelf (COTS) equipment: listed in Table 1

Table 1 Dropsonde Equipment List

Item	*Description*	*Manufacture*	*Model*	*Input Voltage*
1	PC Computer	PCS	2USCP43	120VAC 60Hz
2	LCD Monitor	Interlogic Industries	RDF19AX-SHB	120VAC 60Hz
3	Telemetry Chassis/Cooling Fan	NCAR	AVAPS Chassis	120VAC 60Hz
4	28Vdc Power Supply	Vicor	VP-F1311991	120VAC 60Hz
5	Launch tube control Panel	NCAR	Dwg No 67705-AVAPS-1-3	28 Vdc
6	Keyboard	Cyber Research	OIX 1910B-P	NA
7	Sonde Storage box	NCAR	Dwg No. 67705-AVAPS-1-3	NA

A block diagram (Dwg. No. AVAPS-100-01) of the AC and DC power system is included at the end of the report of the Dropsonde installation.

Table 2 Circuit Breaker Data

Item	***Description***	***Circuit Breaker Rating***	***Mill-Spec Part No.***
1	Cooling Fan	2 amps	MS3320-2
3	Telemetry Chassis	1 amps	MS3320-1
4	Vicor Power Supply	5 amps	MS3320-5

2.3. Circuit Protection

The equipment rack installed is individually protected by circuit breakers or by a shared breaker installed by the manufacturer in the MPDB, the breaker shall not exceed 20 Amps. The circuit breakers are of the same type as installed by the manufacturer as original equipment.

2.4. Load Analysis

Below in table 1 is a list of all devices in the Dropsonde Instrumentation rack that is power by the aircraft 110 VAC 60Hz power system. The equipment has built in circuit breaker protection for each individual item listed in table 1. The maximum total current load under any condition is 11.7 amps.

Table 3 Power Load Summary

Tabulation of power values AC Power 120VAC @ 60 Hz for all units listed						
Item	***Description***	***AC Power Cable Type***	***Average Current (Amps)***	***Peak Current (Amps)***	***Power Not to Exceed (Watts)***	***Unit Circuit Breaker (Amps)***
1	Computer	3-wire 16 gauge	0.8	1.3	350	None
2	Monitor	3-wire 16gauge	0.4	0.4	50	None
3	Telemetry Chassis/ Cooling Fan	3-wire 16 gauge	0.5	0.7	100	2
4	Vicor Power Supply	3-wire 16 gauge	0.3	3.5	500	5
	Total		2.0 Amps	5.9 Amps	1000 Watts	7 Amps

The maximum electrical load current at 120VAC 60HZ of the Dropsonde Instrument rack is 5.9 amps. This load allows for a safety margin of 14.1 amps (or 70.5 %) from the 20 amp circuit for the MCE.

3. Conclusion

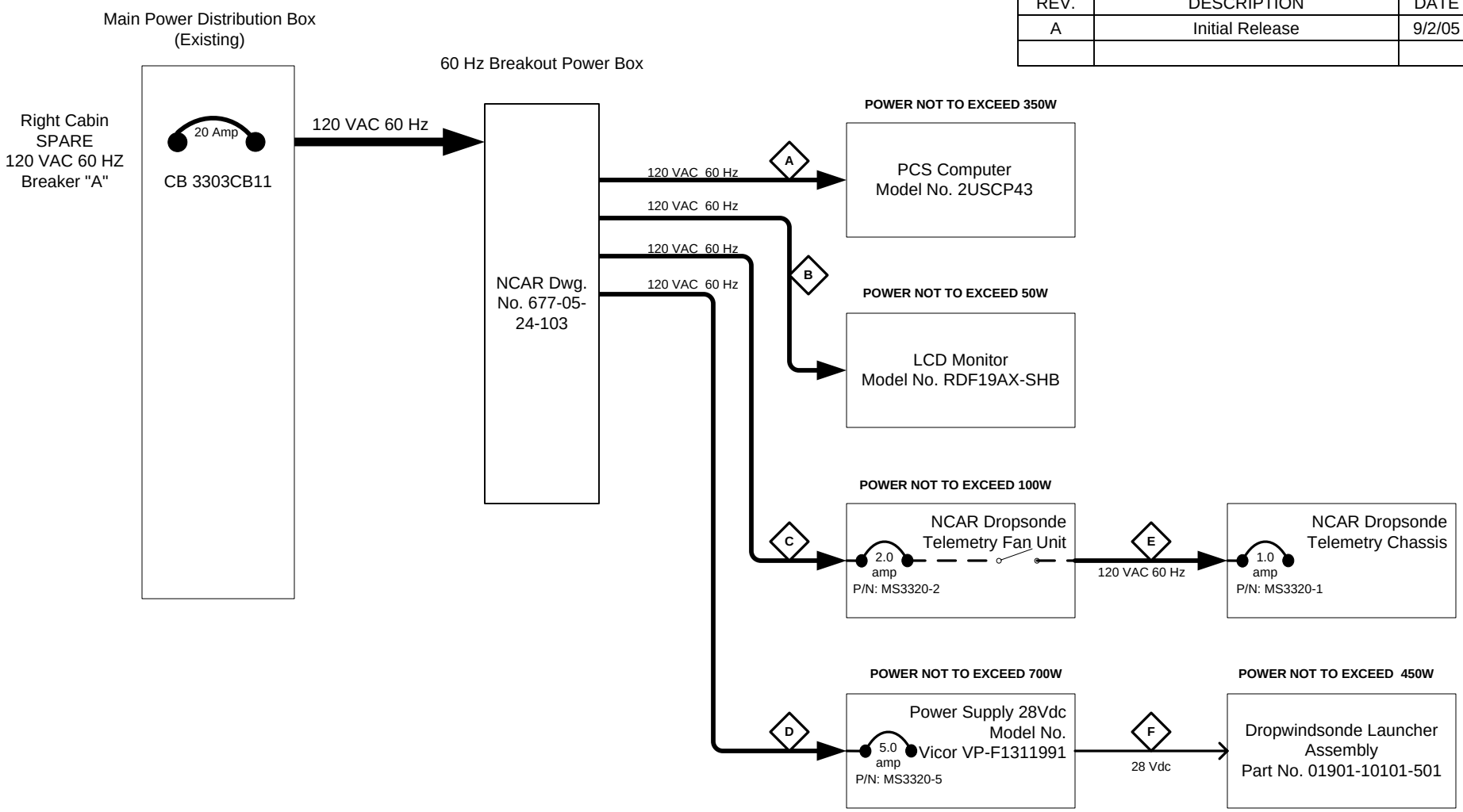
The basic research rack system as installed by NCAR is a stand alone independent system that interfaces to the Lockheed Martin Aircraft Center as part of STC number ST03056AT research electrical system. This research power distribution system incorporates automatic load shedding and a cockpit kill switch for the research power system. Independent circuit breakers protect all of the rack installed equipment and are of the type supplied as original equipment by the manufacturer. The system loads cannot exceed 20 amps per circuit.

All the circuit breakers are accessible to the flight crew at the Main Power Distribution Box.

The basic research systems do not interface with existing aircraft systems, nor do they provide information to the flight crew to assist them with operation of the aircraft. Therefore, all basic research system equipment can be considered miscellaneous, non-required electrical equipment and the guidance of AC 25-10 has been utilized.

Figure 1 Block diagram of power distribution for HIAPER Dropsonde Instrument

REV.	DESCRIPTION	DATE	BY
A	Initial Release	9/2/05	TFH



REF.	CABLE DESCRIPTION	NCAR Dwg. No.
A	AC Power 3-wire 16 gauge	677AVAPS-3-08
B	AC Power 3-wire 16 gauge	677AVAPS-3-08
C	AC Power 3-wire 16 gauge	677AVAPS-3-01
D	AC Power 3-wire 16 gauge	677AVAPS-3-03
E	AC Power 3-wire 16 gauge	677AVAPS-3-02
F	DC Power 2-wire 16 gauge, 3-wire 22 gauge	677AVAPS-3-05

ENG: T. Hock 9/2/05

National Center for Atmospheric Research
Earth Observing Lab
3450 Mitchell Lane, Boulder CO 80307

HIAPER Dropsonde
Power Distribution Block Diagram

SIZE	File Name:	DWG NO	REV
A	HAIPER ELA Diagram Rev A	677AVAPS-100-01	A

SCALE	1 : 1		SHEET	1 OF 1

Department of Transportation
FEDERAL AVIATION ADMINISTRATION
STATEMENT OF COMPLIANCE WITH THE FEDERAL AVIATION REGULATIONS

Date: 10/18/05

AIRCRAFT OR AIRCRAFT COMPONENT IDENTIFICATION

Make	Model No.	Type (Airplane, Radio, Helicopter, etc.)	Name of Applicant
GULFSTREAM	GV N677F	Airplane	NATIONAL SCIENCE FOUNDATION

LIST OF DATA

IDENTIFICATION	TITLE
Report No. 2831 Page 1	John R. Colao, Inc. Flammability Test Report

Note:
This approval indicates that the data listed above only demonstrates compliance with the regulations specified by paragraph and subparagraph listed below as 'Applicable Requirements'. This approval is only for the engineering design approval.

Compliance to additional regulations not listed here may be required. This 8110-3 does not constitute FAA approval of all the data necessary for substantiation of compliance to the necessary requirements for the entire alteration / repair.

Flammability test witnessing only, does not constitute installation approval of the material. No FAA Conformity Inspection of the test samples. Authorized By Mauricio Kuttler, LAACO to witness testing

PURPOSE OF DATA

Material Flammability Substantiation in Support of Major Alteration for the above Aircraft Serial or N Number Only

APPLICABLE REQUIREMENTS (List specific sections)

FAR 25.1359 (d) AMENDMENT 25-32 EFFECTIVE 5/1/72.

CERTIFICATION - Under authority vested by direction of the Administrator and in accordance with conditions and limitations of appointment under Part 183 of the Federal Aviation Regulations, data listed above and on attached sheets numbered _____ have been examined in accordance with the established procedures and found to comply with applicable requirements of the Federal Aviation Regulations.

I Therefore
- ☐ Recommend approval of these data
- ☒ Approve these data

Signature(s) of Designated Engineering Representative(s)	Designation Number(s)	Classification
J R Colao	DERT-605096-NM	Systems & Equipment

FAA Form 8110-3 (11-70) SUPERSEDES PREVIOUS EDITION

GPO 901-613

Job # 2831

FAA APPROVED
FLAMMABILITY TESTING

FLAMMABILITY TEST REPORT

JOHN R. COLAO, INC. FAA DER NM-682
1299 Wooden Valley Crossroad, Suisun, CA 94585
(707) 425-9666

JOB # 2831
REPORT # 2831
PAGE 1 of 1

IDENTIFICATION	WIRE - P/N: S33141		
APPLICATION	VARIOUS AIRCRAFT		
CUSTOMER	PIC WIRE & CABLE	REFERENCE	CHARLES VAN HECKE
TESTED BY	John Colao	TEST DATE	12/5/91

TEST METHOD				TEST REQUIREMENTS (MAXIMUM)					
	IGNITION TIME - MATERIAL POSITION	FEDERAL AVIATION REGULATION	CIVIL AIR REGULATION CAR 4b.381	EXTINGUISH TIME	BURN LENGTH	DRIP EXTINGUISH	BURN RATE AVG.	FLAME PENETRATION	AFTER GLOW
	1. 60 SECOND IGNITION - VERTICAL	FAR 25.853 (a)		15 SEC AVG	6 IN AVG	3 SEC AVG			
	2. 12 SECOND IGNITION - VERTICAL	FAR 25.853 (b)		15 SEC AVG	8 IN AVG	5 SEC AVG			
	3. 15 SECOND IGNITION - HORIZONTAL	FAR 25.853 (b-2)					2.5 IN/MIN		
	4. 15 SECOND IGNITION - HORIZONTAL	FAR 25.853 (b-3)	FLAME RESISTANT				4 IN/MIN		
	5. 30 SECOND IGNITION - 45 DEGREE	FAR 25.855 (a-1)	FIRE RESISTANT	15 SEC AVG				NONE	10 SEC
X	6. 30 SECOND IGNITION - 60 DEGREE	FAR 25.1359 (d)		30 SEC AVG	3 IN AVG	3 SEC AVG			
	7. 12 SECOND IGNITION - VERTICAL	FAR 25.853 (a)	EFFECTIVE 10/24/67		8 IN AVG				

TEST VALUES

SAMPLE NO.	EXTINGUISH TIME (SECS.)	BURNED LENGTH (INCHES)	DRIP EXTINGUISH TIME (SECS.)	BURN RATE (IN/MIN)	AFTER GLOW (SECS.)	GRAIN DIRECTION	
1	0.0	<1.0	—	—	—	LAY	☒ PASSED ☐ FAILED
2	0.0	<1.0	—	—	—	LAY	
3	0.0	<1.0	—	—	—	LAY	COMMENTS
4						WARP	
5						WARP	
6						WARP	
AVERAGES	0.0	<1.0	—	—	—		

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

STATEMENT OF COMPLIANCE WITH THE FEDERAL AVIATION REGULATIONS

DATE: 07/06/05

AIRCRAFT OR AIRCRAFT COMPONENT IDENTIFICATION

MAKE	MODEL NO.	TYPE (Airplane, Radio, Helicopter, etc.)	NAME OF APPLICANT
GULFSTREAM S/N 677	GV	Airplane	Skandia, Inc. U. C. A. R.

LIST OF DATA

IDENTIFICATION	TITLE
Document ID 7404 Work Order # 127011-05 PO # RC55158	PIC WIRE AND CABLE: SUPER LOW LOSS COAXIAL CABLE, 8AWG, #S22089, REF TEST ID # 60DEG-102 PIC WIRE AND CABLE: LOW LOSS COAXIAL CABLE, 19AWG, S44191, REF TEST ID # 60DEG-103

RECEIVED
JUL 18 2005
CONTRACTS & SPONSORED AGREEMENTS

JUL 18 05

PURPOSE OF DATA
DEMONSTRATION OF COMPLIANCE WITH MATERIAL FLAMMABILITY REQUIREMENTS

APPLICABLE REQUIREMENTS (List specific sections)
FAR 25.869 (a)(4) Appendix F Part I (a)(3)

CERTIFICATION -Under authority vested by direction of the Administrator and in accordance with conditions and limitations of appointment under Part 183 of the Federal Aviation Regulations, data listed above and on attached sheets numbered _____ have been examined in accordance with established procedures and found to comply with applicable requirements of the Federal Aviation Regulations.

I (We) Therefore ☐ Recommend approval of these data ☒ Approve these data

SIGNATURE(S) OF DESIGNATED ENGINEERING REPRESENTATIVE	DESIGNATION NUMBER(S)	CLASSIFICATION(S)
Carin Demus	DERY-405143-CE	Structural Special
Carin Demus		

FAA Form 8110-3 (11-70) SUPERSEDES PREVIOUS EDITION

Fire Worthiness, LLC
6280 Helena Rd.
Helena, Alabama 35080
Phone: 205-620-4990

FlammibilityTest Report for AMS3652/ASTM D-3294

Doc. Num.: **00063**

Date: 6/27/2005

Aeromet
P/N: AMS3652/ASTM D
Description: Upper/Lower Valve
Project: Dropwinsonde Lau

Effectivity
Make: Gulfstream
Model: G-V
S/N: 677 (N677F)

12 Second Vertical

Test Article
Length (in): 12 Width (in): 3.0
Thk (in): 0.3
Conformity Record:
Aeromet P/N(s) 01901-10102-009 & -011

Environmental Data

	Temp (°F)	RH (%)
Chamber:	70 / 71	55 / 55
Room:	76	85

Burner: 3/8" ID Bunsen with 99% pure Methane fuel
T/C: T/C 1
Flame Height (in): 1.5
Flame Temp (°F): 1550

	Ignition Time	Flame Extingishing Time	Drip Extingishing Time	Burn Length	Condition Time	Date and Time Tested	Note
00063-01	12	0	0	0.0	41:10	06/27/05 7:15 AM	
00063-02	12	0	0	0.0	41:12	06/27/05 7:17 AM	
00063-03	12	0	0	0.0	41:10	06/27/05 7:18 AM	
00063-04	12	0	0	0.0	41:10	06/27/05 7:19 AM	
Averages		0.0	0.0	0.0			**PASS**

Conducted By: Mark Johnston 6-27-05

Witnessed By: William B. Cotton Jr 6-27-05

Fire Worthiness, LLC
6280 Helena Rd.
Helena, Alabama 35080
Phone: 205-620-4990

FlammibilityTest Report for Low Density Polvethvlene

Doc. Num.: **00064**

Date: 6/27/2005

Aeromet
P/N: Low Density Polyet
Description: Low Density Polyet
Project: Dropwinsonde Lau

Effectivity
Make: Gulfstream
Model: G-V
S/N: 677 (N677F)

12 Second Vertical

Test Article
Length (in): 12 Width (in): 3.0
Thk (in): 0.3
Conformity Record:
Aeromet P/N 01901-SK105

Environmental Data

	Temp (°F)	RH (%)
Chamber:	70 / 71	55 / 55
Room:	76	85

Burner: 3/8" ID Bunsen with 99% pure Methane fuel
T/C: T/C 1
Flame Height (in): 1.5
Flame Temp (°F): 1550

	Ignition Time	Flame Extingishing Time	Drip Extingishing Time	Burn Length	Condition Time	Date and Time Tested	Note
00064-01	12	0	0	0.0	41:13	06/27/05 7:20 AM	
00064-02	12	0	0	0.0	41:13	06/27/05 7:21 AM	
00064-03	12	0	0	0.0	41:13	06/27/05 7:22 AM	
00064-04	12	0	0	0.0	41:13	06/27/05 7:22 AM	
Averages		0.0	0.0	0.0			**PASS**

Conducted By: Mark Johnston 6-27-05

Witnessed By: William B. Coley Jr 6-27-05

Fire Worthiness, LLC
6280 Helena Rd.
Helena, Alabama 35080
Phone: 205-620-4990

FlammibilityTest Report for FED SPEC LL-P-410a (Black)

Doc. Num.: **00065**

Date: 6/27/2005

Aeromet
P/N: FED SPEC LL-P-4
Description: 6M Cast Nylon or
Project: Dropwinsonde Lau

Effectivity
Make: Gulfstream
Model: G-V
S/N: 677 (N677F)

12 Second Vertical

Test Article
Length (in): 12 Width (in): 3.0
Thk (in): 0.4
Conformity Record:
Aeromet P/N 01901-10104-001

Environmental Data

	Temp (°F)	RH (%)
Chamber:	70 / 71	55 / 55
Room:	76	85

Burner: 3/8" ID Bunsen with 99% pure Methane fuel
T/C: T/C 1
Flame Height (in): 1.5
Flame Temp (°F): 1550

	Ignition Time	Flame Extingishing Time	Drip Extingishing Time	Burn Length	Condition Time	Date and Time Tested	Note
00065-01	12	0	0	0.0	41:17	06/27/05 7:23 AM	
00065-02	12	0	0	0.0	41:17	06/27/05 7:24 AM	
00065-03	12	0	0	0.0	41:17	06/27/05 7:25 AM	
00065-04	12	0	0	0.0	41:17	06/27/05 7:26 AM	
Averages		0.0	0.0	0.0			**PASS**

Conducted By: Mark Johnston 6-27-05

Witnessed By: William B. Cotney Jr 6-27-05

Fire Worthiness, LLC 6280 Helena Rd. Helena, Alabama 35080 Phone: 205-620-4990	**FlammibilityTest Report for FED SPEC LL-P-410a (White)**	Doc. Num.: **00066** Date: 6/27/2005

Aeromet	12 Second Vertical	Environmental Data
P/N: FED SPEC LL-P-4 Description: 6M Cast Nylon or Project: Dropwinsonde Lau	Test Article Length (in): 12 Width (in): 3.0 Thk (in): 0.5 Conformity Record: Aeromet P/N(s) 01901-10101-001, -003; & 01901-10102-023	Temp (°F) / RH (%) Chamber: 70 / 71 / 55 / 55 Room: 76 / 85
Effectivity Make: Gulfstream Model: G-V S/N: 677 (N677F)	Burner: 3/8" ID Bunsen with 99% pure Methane fuel T/C: T/C 1	Flame Height (in): 1.5 Flame Temp (°F): 0

	Ignition Time	Flame Extingishing Time	Drip Extingishing Time	Burn Length	Condition Time	Date and Time Tested	Note
00066-01	12	0	0	0.0	41:22	06/27/05 7:27 AM	
00066-02	12	0	0	0.0	41:22	06/27/05 7:28 AM	
00066-03	12	0	0	0.0	41:22	06/27/05 7:28 AM	
00066-04	12	0	0	0.0	41:22	06/27/05 7:29 AM	
Averages		0.0	0.0	0.0			**PASS**

Conducted By: Mark Johnston 6-27-05

Witnessed By: William B. Cotney Jr 6-27-05

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION

STATEMENT OF COMPLIANCE WITH THE FEDERAL AVIATION REGULATIONS

DATE: June 28, 2005

AIRCRAFT OR AIRCRAFT COMPONENT IDENTIFICATION

MAKE	MODEL NO.	TYPE *(Airplane, Radio, Helicopter, etc.)*	NAME OF APPLICANT
Gulfstream	G-V	AIRPLANE	Aeromet

LIST OF DATA

IDENTIFICATION		TITLE			
Test Report	**Dated**	**Part Number**	**Reference Test Results:** 12 Second Vertical	**Flame Extingish Time**	**Drip Extingish Time**	**Burn Length**
00063	6/27/2005	Flammibility Test Report for AMS3652/ASTM D-3294		0.0	0.0	0.0
00064	6/27/2005	Flammibility Test Report for Low Density Polyethylene		0.0	0.0	0.0
00065	6/27/2005	Flammibility Test Report for FED SPEC LL-P-410a (Black)		0.0	0.0	0.0
00066	6/27/2005	Flammibility Test Report for FED SPEC LL-P-410a (White)		0.0	0.0	0.0

----------***END***----------

PURPOSE OF DATA

To show compliance with the flammibility requirements for project: Dropwinsonde Laucher and effective for aircraft S/N: 677 (N677F).

APPLICABLE REQUIREMENTS *(List specific sections)*

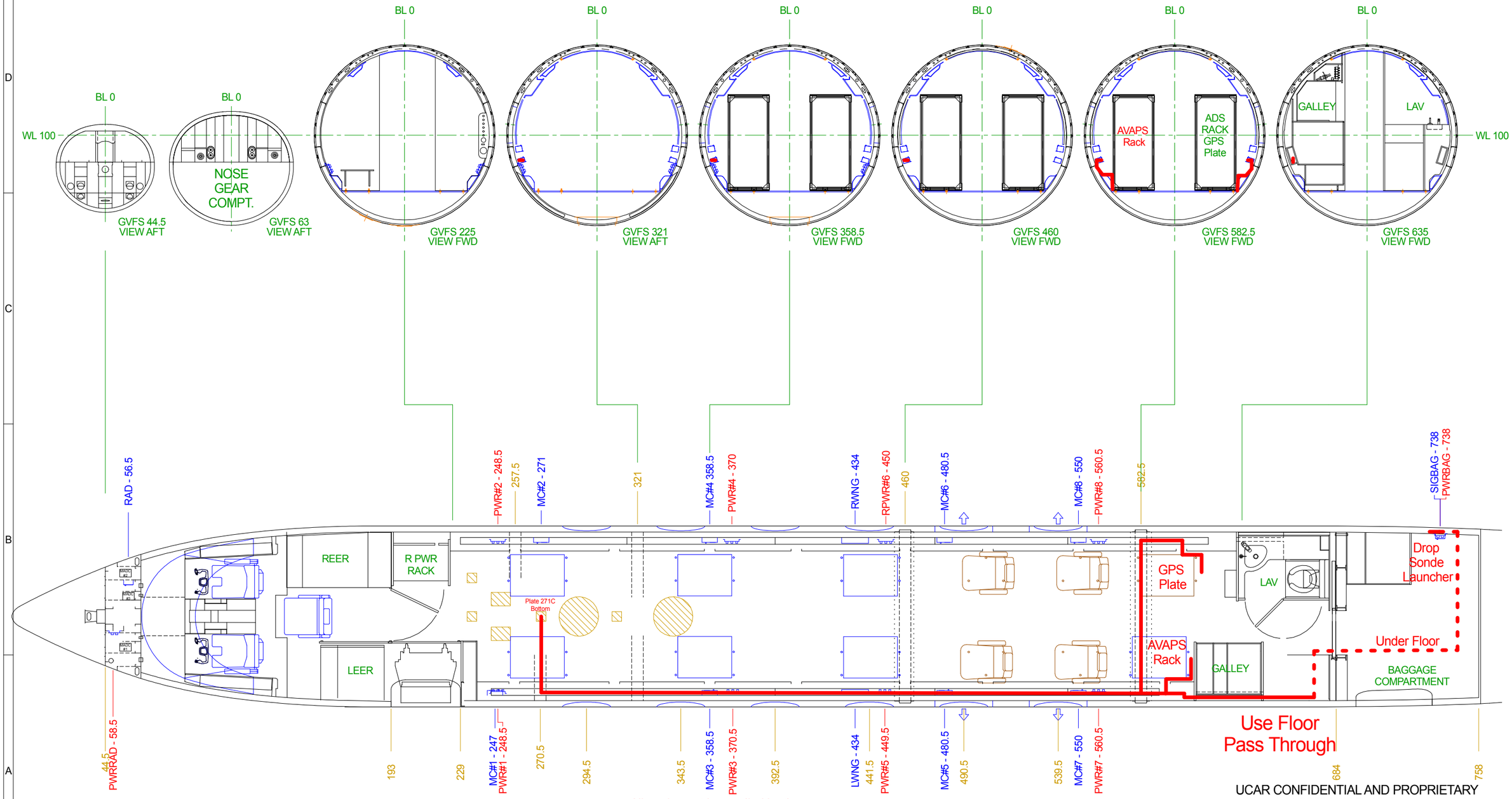
FAR 25.853(a) and Appendix F Part I (a)(1)(ii), Amendment 25.116

CERTIFICATION -Under the authority vested by direction of the Administrator and in accordance with the conditions and limitations of appointment under Part 183 of the Federal Aviation Regulations, data listed above and on attached sheets numbered AS ABOVE have been examined in accordance with established procedures and found to comply with applicable requirements of the Federal Aviation Regulations.

I (~~We~~) Therefore ☐ Recommend approval of these data
☒ Approve these data

SIGNATURE(S) OF DESIGNATED ENGINEERING REPRESENTATIVE(S)	DESIGNATION NUMBERS(S)	CLASSIFICATION(S)
William B. Cotney, Jr	DERT-510080-CE	STRUCTURES

FAA Form 8110-3 (11-70) SUPERSEDES PREVIOUS EDITION

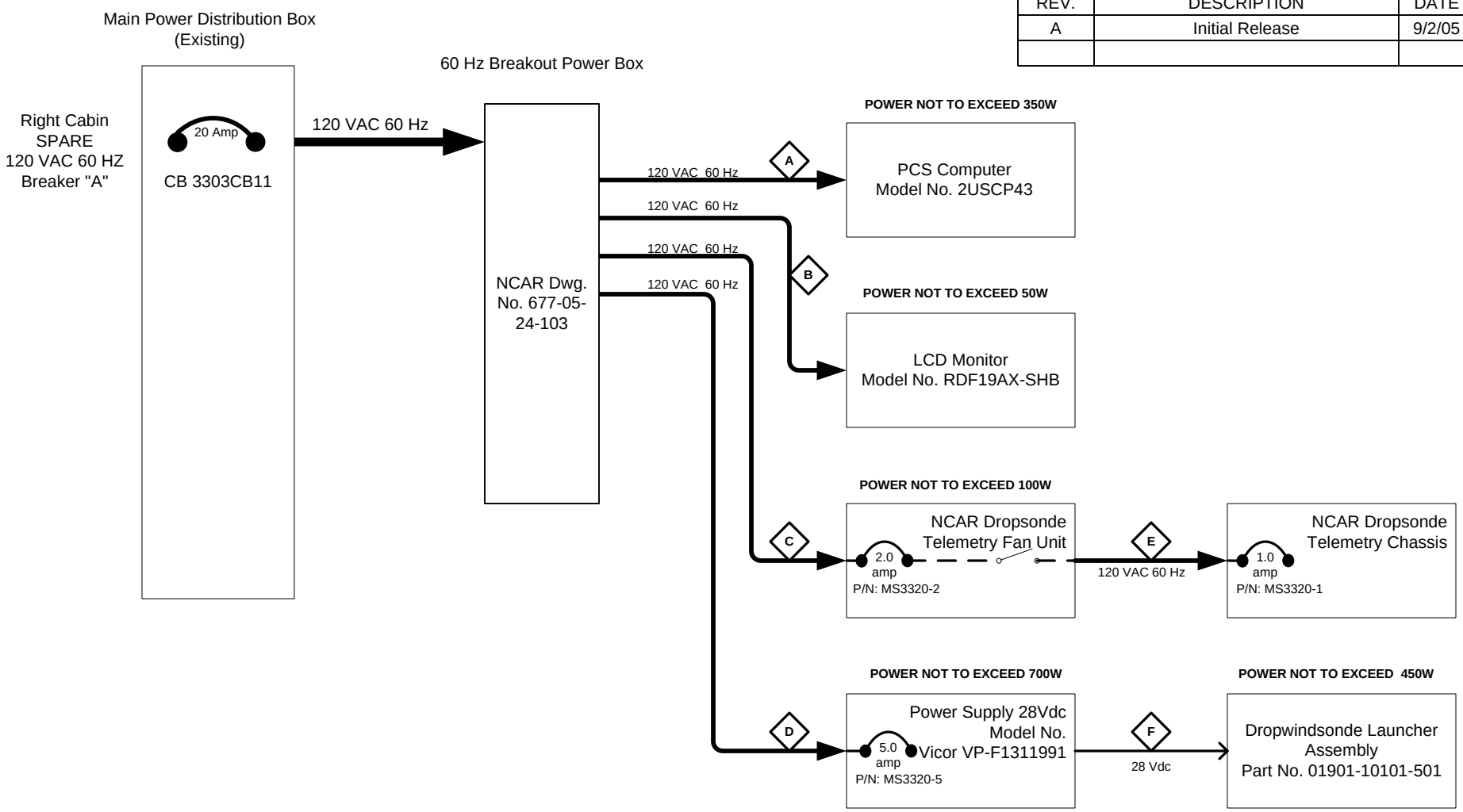


All equipment is supplied by the user.
The forward route is for one (1) antenna cable P/N S22089, the GPS cable P/N S44191 goes to the GPS Plate and the aft route is for a control cable consisiting of three (3) Mil-W-22759/16-16-9, two (2) Mil-W-22759/16-22-9 and one (1) RF cable P/N 11023-1816-02.

SCALE = 1:50

DRAWN BY: Cowan	DATE: 10/04/05	DRAWING TITLE: GV AVAPS Rack Cable Run				
CHECKED: Irwin	DATE: 10/13/05					
ENGINEERING: K.A.Zrubek	DATE: 10/14/05	SIZE: B	DRAWING NUMBER: 677-05-EE-503	FILENAME: GVAVAPSRack1CR.SKF	REV.: A	SHEET: 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	9/2/05	TFH



REF.	CABLE DESCRIPTION	NCAR Dwg. No.
A	AC Power 3-wire 16 gauge	677AVAPS-3-08
B	AC Power 3-wire 16 gauge	677AVAPS-3-08
C	AC Power 3-wire 16 gauge	677AVAPS-3-01
D	AC Power 3-wire 16 gauge	677AVAPS-3-03
E	AC Power 3-wire 16 gauge	677AVAPS-3-02
F	DC Power 2-wire 16 gauge, 3-wire 22 gauge	677AVAPS-3-05

ENG: T. Hock 9/2/05

National Center for Atmospheric Research
Earth Observing Lab
3450 Mitchell Lane, Boulder CO 80307

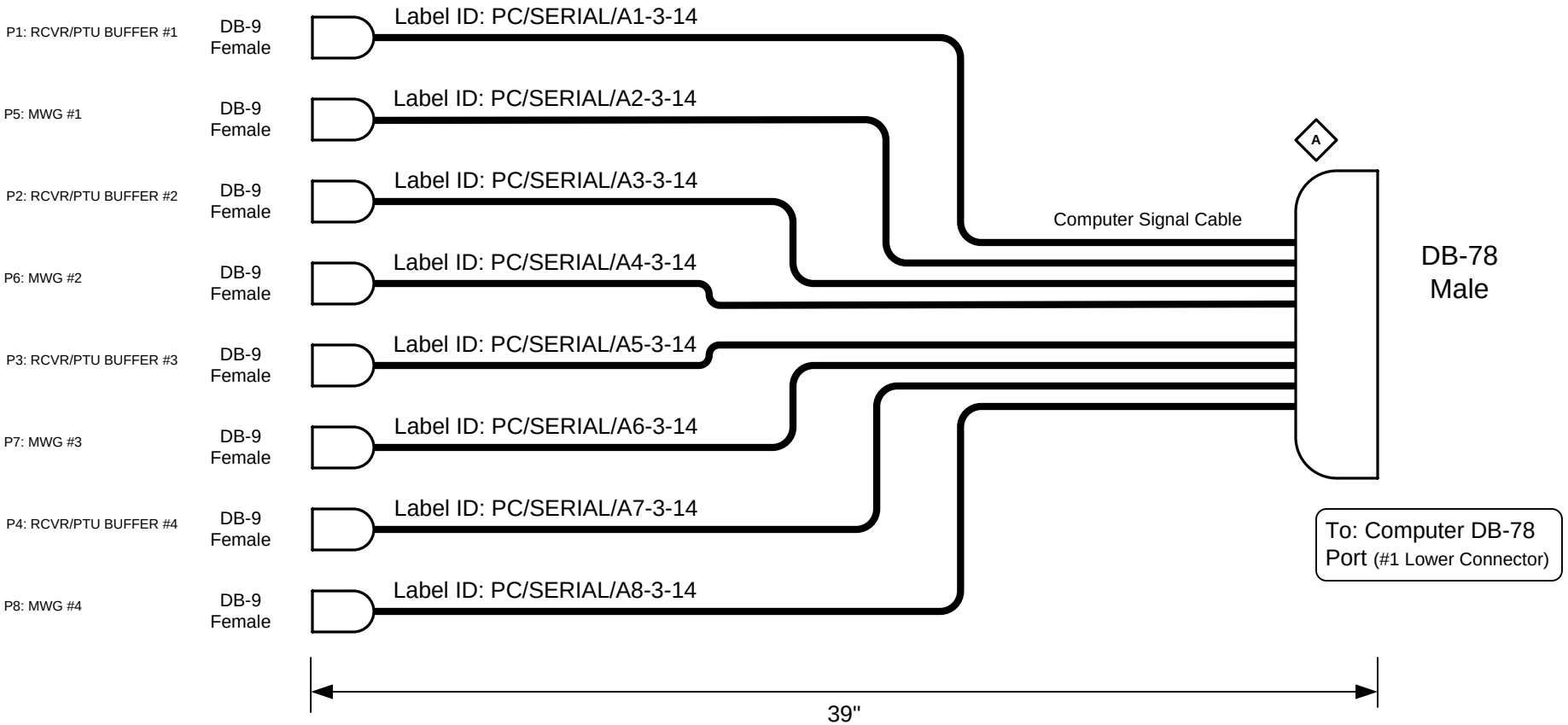
HIAPER Dropsonde
Power Distribution Block Diagram

SIZE	File Name:	DWG NO	REV
A	HAIPER ELA Diagram Rev A	677AVAPS-100-01	A

SCALE	1 : 1		SHEET	1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	10/19/05	TFH

To: Telemetry Chassis



To: Computer DB-78 Port (#1 Lower Connector)

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	2	Video Computer Cable	760002042F	WhyteHaus Cables

National Center for Atmospheric Research
Earth Observing Lab
3450 Mitchell Lane, Boulder CO 80307

Computer Octopus Serial Cable to Telemetry Chassis

ENG: T. Hock 10/19/05

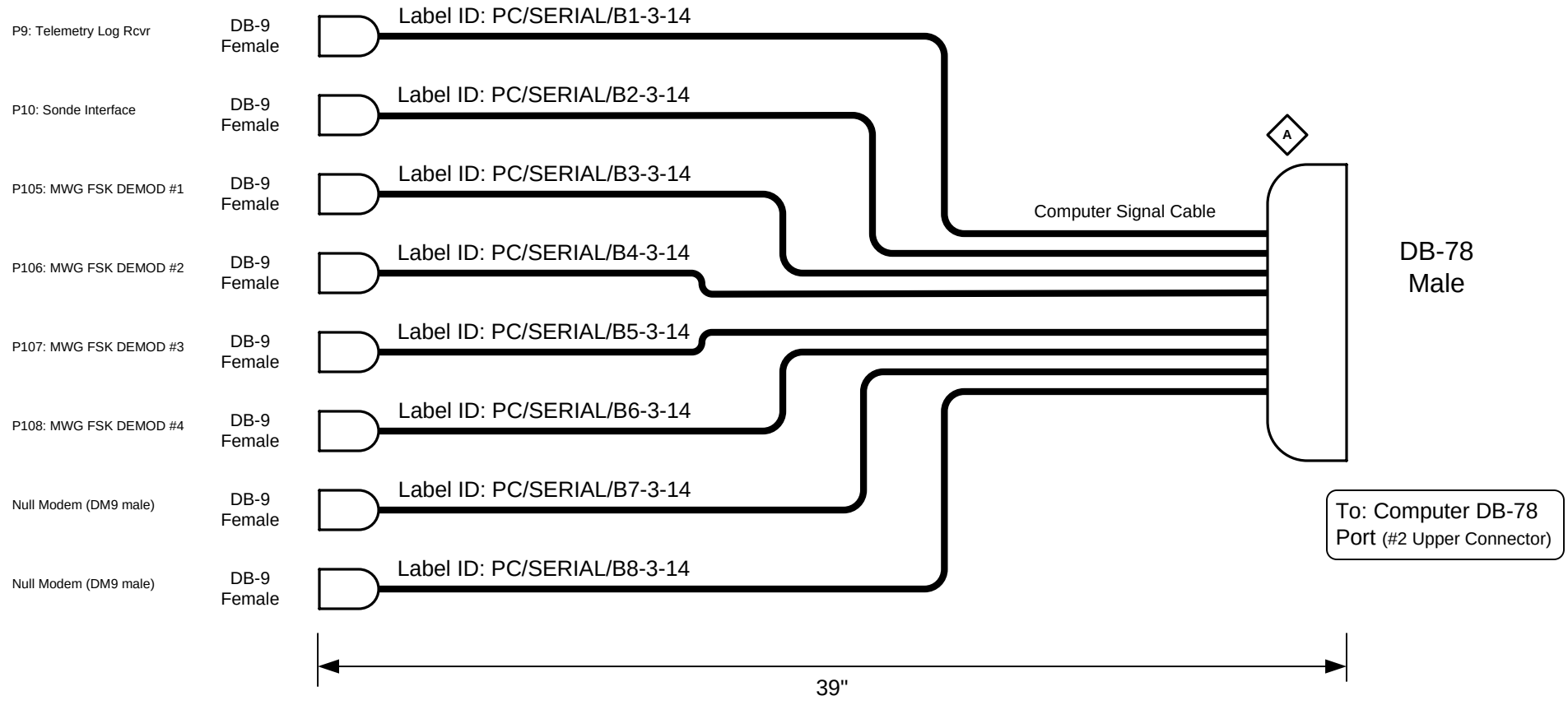
SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-14	A

SCALE 1 : 1

SHEET 1 OF 2

REV.	DESCRIPTION	DATE	BY
A	Initial Release	10/19/05	TFH

To: Telemetry Chassis



To: Computer DB-78 Port (#2 Upper Connector)

National Center for Atmospheric Research
Earth Observing Lab
3450 Mitchell Lane, Boulder CO 80307

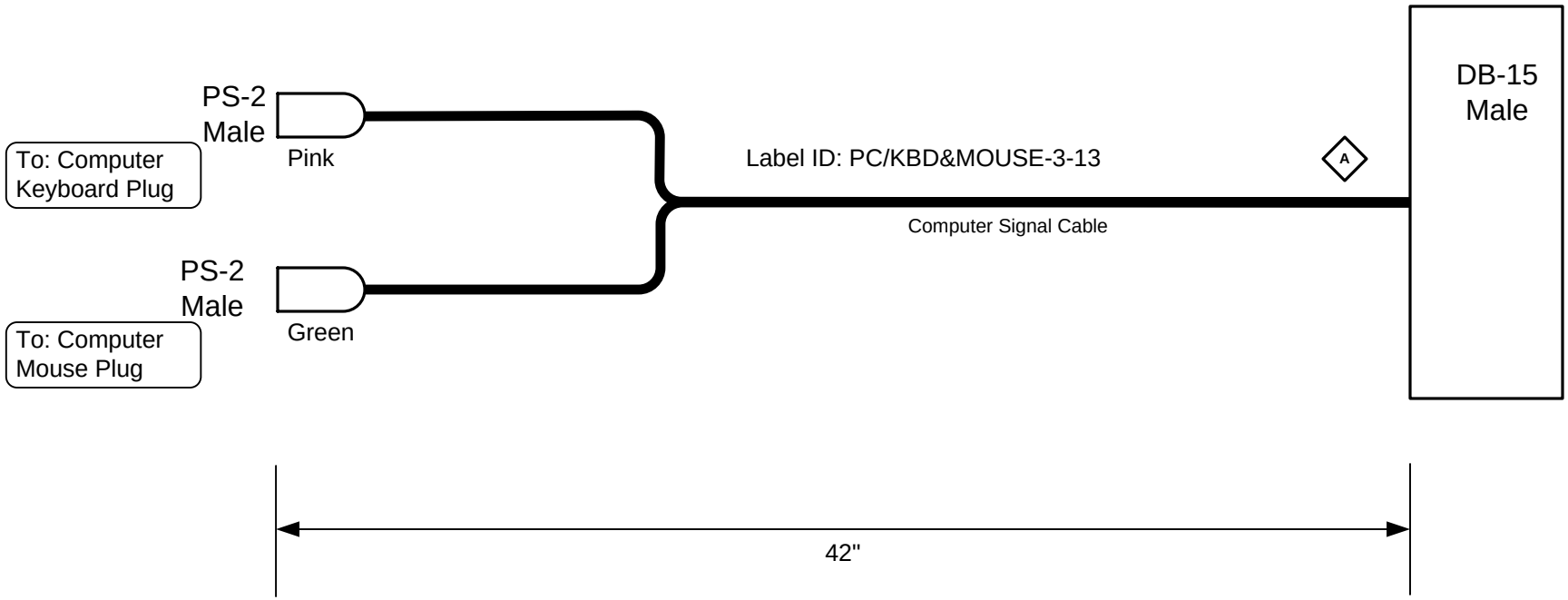
Computer Octopus Serial Cable to Telemetry Chassis

ENG: T. Hock 10/19/05

SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-14	A

SCALE 1 : 1 SHEET 2 OF 2

REV.	DESCRIPTION	DATE	BY
A	Initial Release	10/19/05	TFH



Note: Apply label ID within 6" of each end and at 5' increments

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	1	Keyboard/Mouse Computer Cable/Keyboard	DU-5K	Ikeu

National Center for Atmospheric Research
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3450 Mitchell Lane, Boulder CO 80307

Keyboard/Mouse Cable

ENG: T. Hock 10/19/05

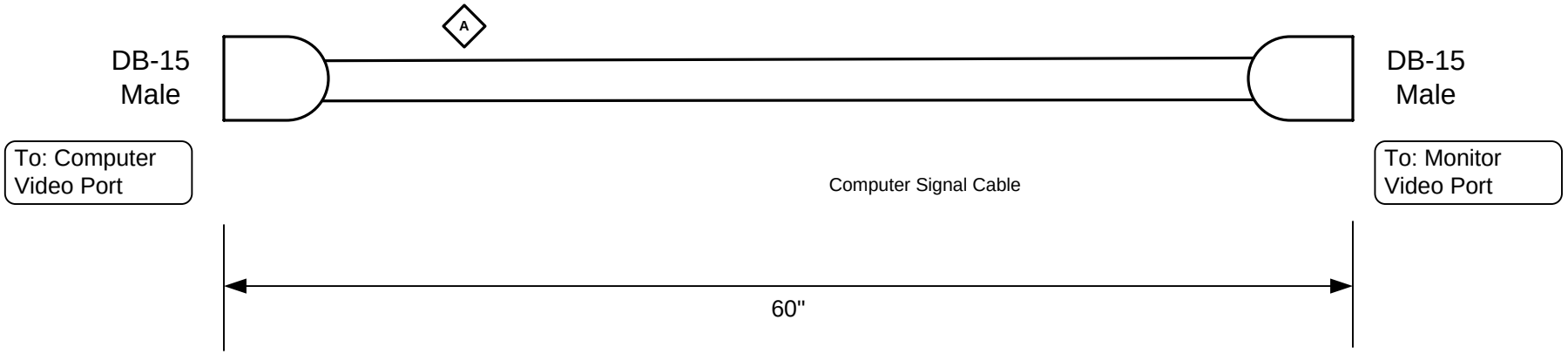
SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-13	A

SCALE 1 : 1

SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	10/19/05	TFH

Label ID: MONITOR/VIDEO-3-12



Note: Apply label ID within 6" of each end and at 5' increments

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	1	Video Computer Cable	EVNPS06-005-MM	Black Box Network Services.

National Center for Atmospheric Research
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3450 Mitchell Lane, Boulder CO 80307

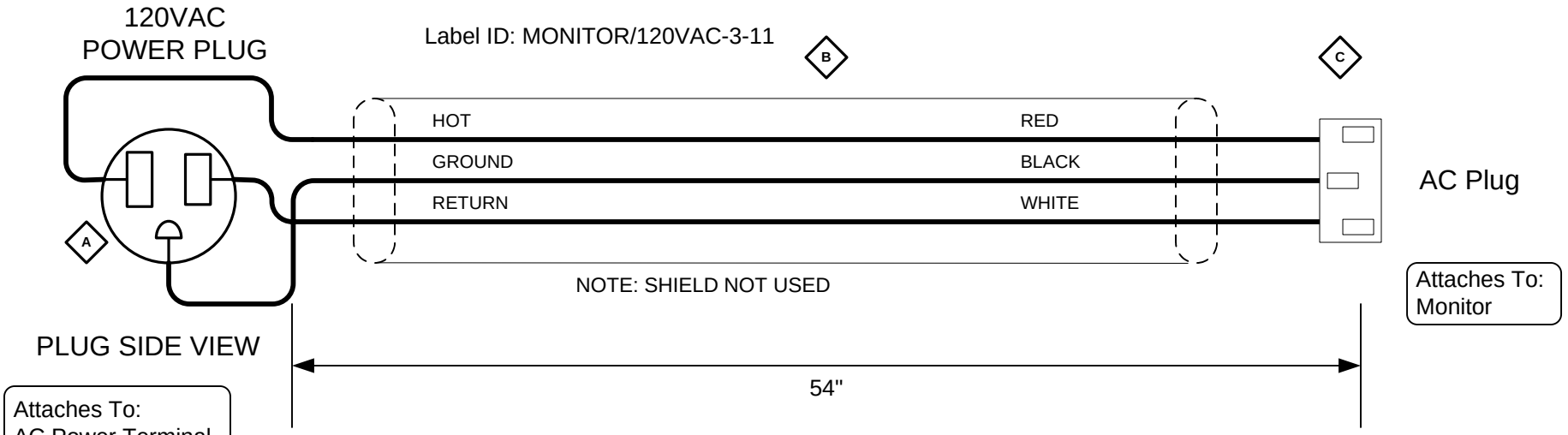
Computer Video Monitor Cable

ENG: T. Hock 10/19/05

SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-12	A

SCALE 1 : 1 SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	10/19/05	TFH



Note: Apply label ID within 6" of each end and at 5' increments

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	1	Connector, AC Power / Plug, Hospital grade, 15A/125V	HBL8215C	Hubbell
B	1	3 conductor 16 gauge wire Teflon insulation	STT-16 16-TE-1929(3) STJ TYPE E	THERMAX
C	1	Connector, AC POWER PLUG / 3-circuit Female	4781.0000	SCHURTER

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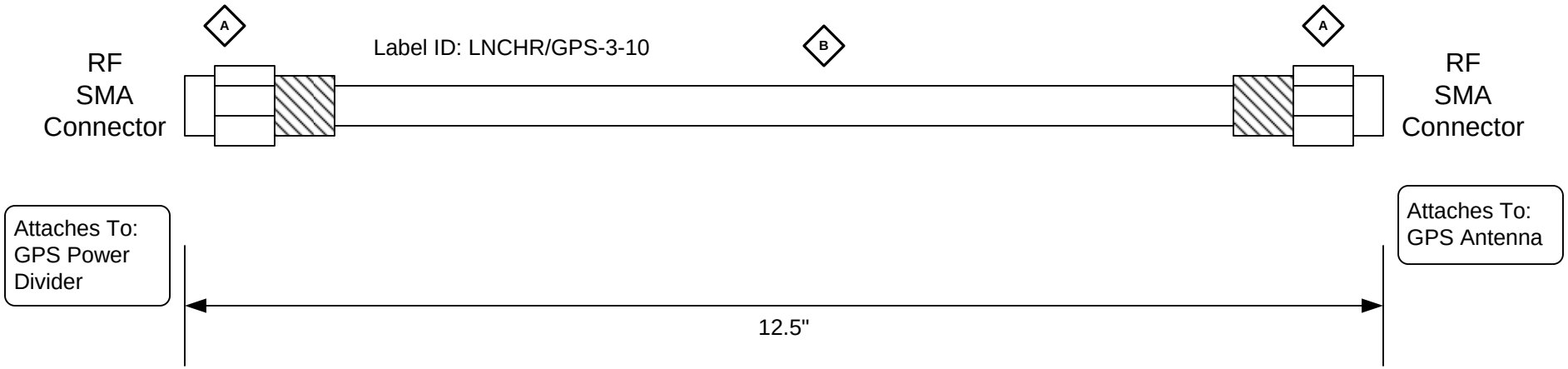
HIAPER Dropsonde
AC Power Cable, Monitor

ENG: T. Hock 10/19/05

SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-11	A

SCALE 1 : 1 SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	10/19/05	TFH



Note: Apply label ID within 6" of each end and at 5' increments

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	2	SMA RF CONNECTORS	190314	PC WIRE & CABLE
B	1	50 ohm COAX	S44191	PC WIRE & CABLE

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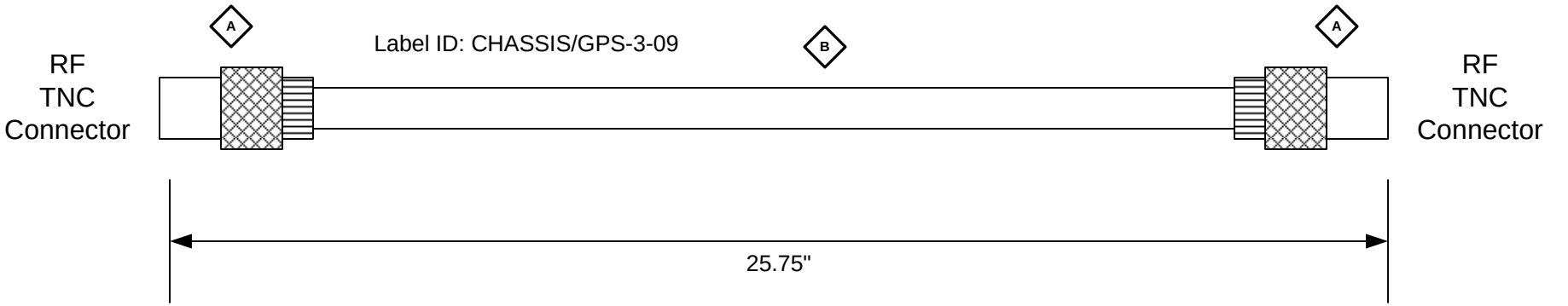
HIAPER Dropsonde
GPS RF Cable, Sonde Storage Box

ENG: T. Hock 10/19/05

SIZE	File Name:	DWG NO	REV
A	HAIPER ELA Diagram Rev A	677AVAPS-3-10	A

SCALE 1 : 1 SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	10/19/05	TFH



Attaches To:
Sonde Storage Box

Attaches To:
Telemetry Chassis

Note: Apply label ID within 6" of each end and at 5' increments

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	2	TNC RF CONNECTOR	190308	PC WIRE & CABLE
B	1	50 ohm COAX	S44191	PC WIRE & CABLE

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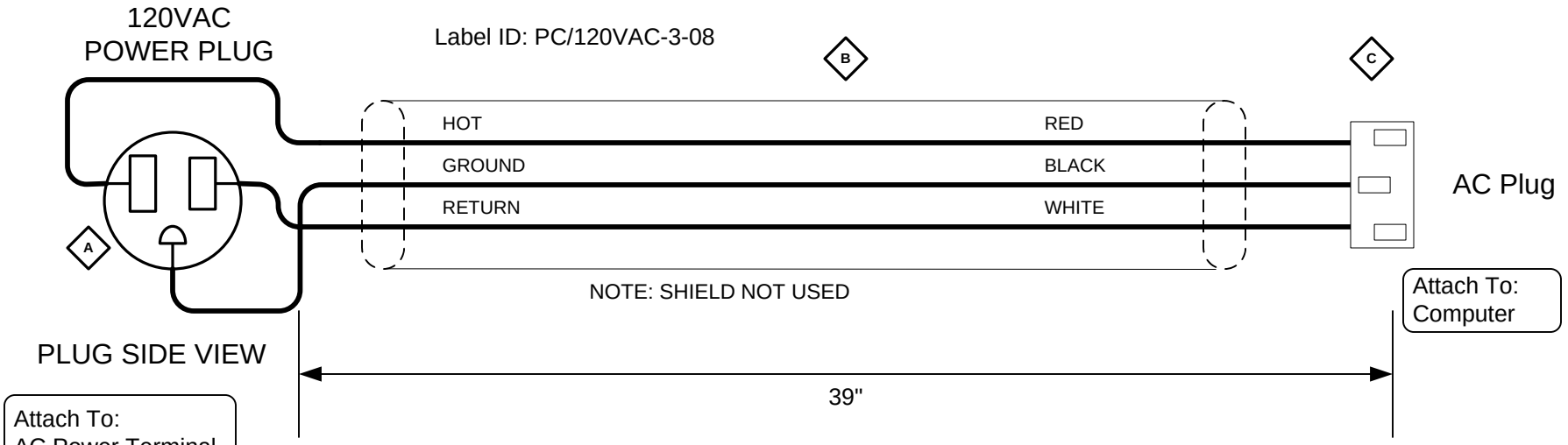
HIAPER Dropsonde
GPS RF CABLE, Sonde Storage Box to Telemetry Chassis

ENG: T. Hock 10/19/05

SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-09	A

SCALE 1 : 1 SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	10/19/05	TFH



Note: Apply label ID within 6" of each end and at 5' increments

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	1	Connector, AC Power / Plug, Hospital grade, 15A/125V	HBL8215C	Hubbell
B	1	3 conductor 16 gauge wire Teflon insulation	STT-16 16-TE-1929(3) STJ TYPE E	THERMAX
C	1	Connector, AC POWER PLUG / 3-circuit Female	4781.0000	SCHURTER

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HIAPER Dropsonde
AC Power Cable, COMPUTER

ENG: T. Hock 10/19/05

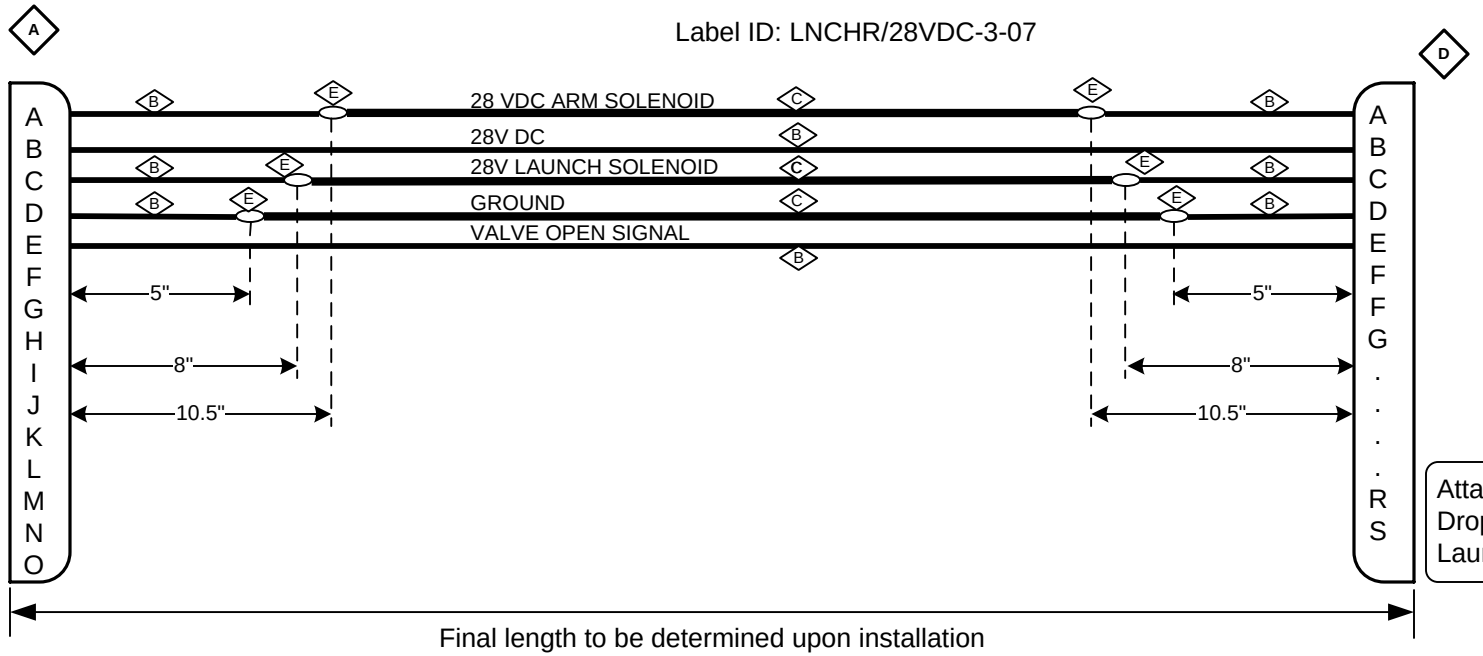
SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-08	A

SCALE 1 : 1

SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	10/25/05	TFH

Label ID: LNCHR/28VDC-3-07



MS Circular Female Connector

Attaches to 28VDC Power Supply

MS Circular Female Connector

Attaches To: Dropwindsonde Launcher Assembly

Final length to be determined upon installation
(Shall not exceed 30')

Note: Apply label ID within 6" of each end and at 5' increments

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	1	Connector, MS Circular / MIL-C-5015 15-circuit Female	MS3126F14-15S	ITT Cannon
B	1	1 conductor 22 gauge wire, TEFLON WHITE	M22759/1619WE	THERMAX
C	1	1 conductor 16 gauge wire, TEFLON WHITE	M22759/161619WE	THERMAX
D	1	Connector, MS Circular / MIL-C-5015 19-circuit Female	MS3126F14-19S	ITT Cannon
E	6	Crimp wire connector, covered with heat shrink tubing	BS18C	3M

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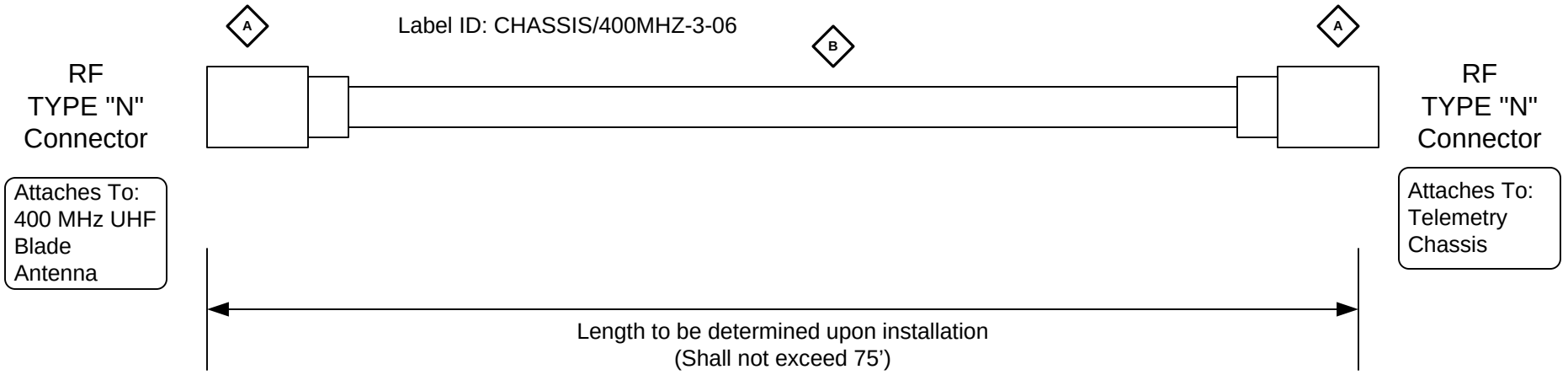
HIAPER Dropsonde
Launcher Control Cable, to Dropwindsonde Launcher Assembly

ENG: T. Hock 10/25/05

SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-07	A

SCALE 1 : 1 SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	10/19/05	TFH



Note: Apply label ID within 6" of each end and at 5' increments

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	2	TYPE N RF CONNECTORS	190410	PC WIRE & CABLE
B	1	50 ohm COAX, RG-8 TYPE	S22089	PC WIRE & CABLE

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HIAPER Dropsonde
RF COAX CABLE, UHF ANTENNA

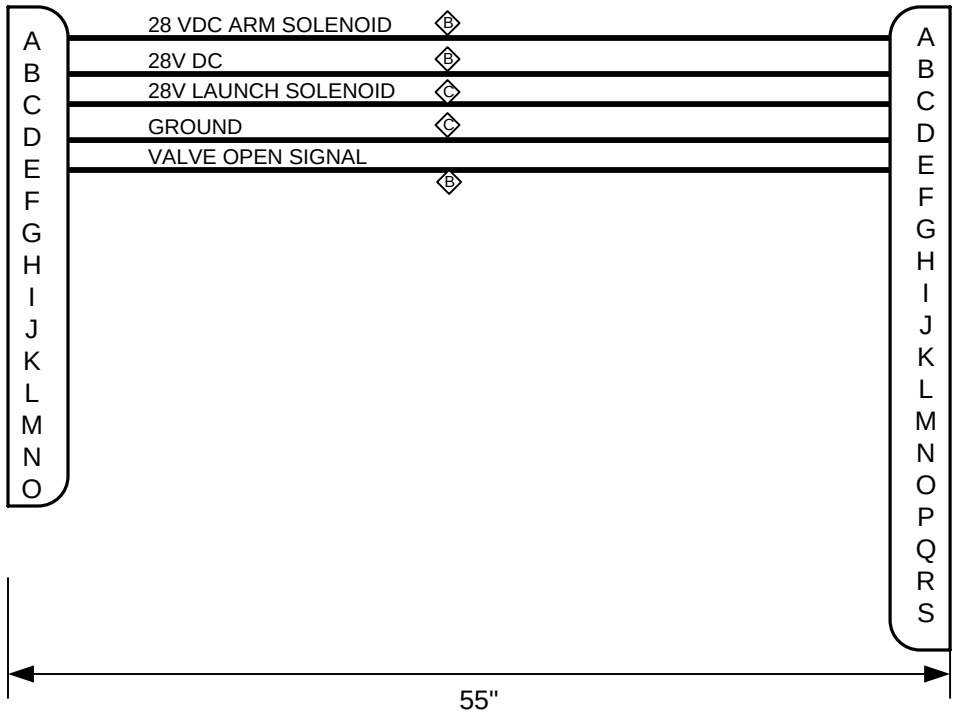
ENG: T. Hock 10/19/05

SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-06	A

SCALE 1 : 1 SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	9/7/05	TFH

Label ID: LNCHR/28VDC-3-05



MS Circular Female Connector

Attaches to 28VDC Power Supply

MS Circular Female Connector

Attaches to Launch Control Panel

Note: Apply label ID within 6" of each end and at 5' increments

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	1	Connector, MS Circular / MIL-C-5015 15-circuit Female	MS3126F14-15S	ITT Cannon
B	1	1 conductor 22 gauge wire, TEFLON WHITE	M22759/1619WE	THERMAX
C	1	1 conductor 16 gauge wire, TEFLON WHITE	M22759/161619WE	THERMAX
D	1	Connector, MS Circular / MIL-C-5015 19-circuit Female	MS3126F14-19S	ITT Cannon

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HIAPER Dropsonde
Launcher Control Cable, Launch Control Panel to 28VDC Power Supply

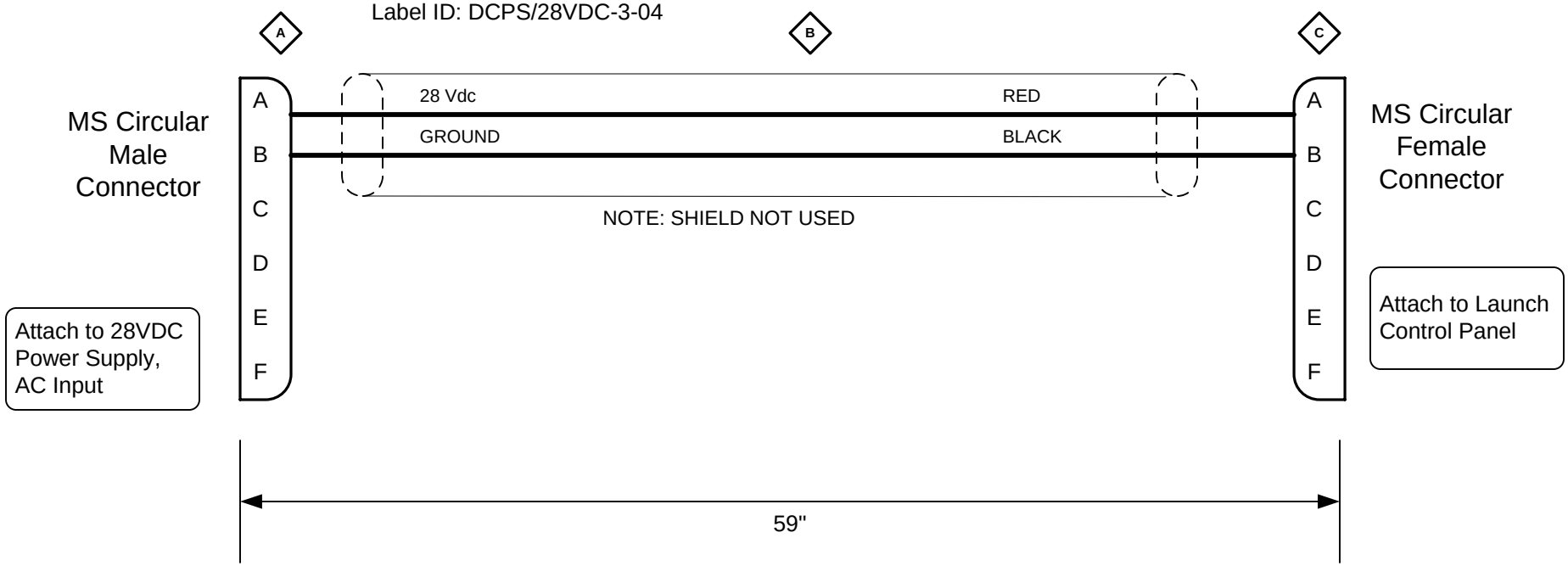
ENG: T. Hock 9/7/05

SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-05	A

SCALE 1 : 1

SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	9/7/05	TFH



REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	1	Connector, MS Circular / MIL-C-5015 6-circuit Male	CA3106E14S-6PB	ITT Cannon
B	1	3 conductor 16 gauge wire Teflon insulation	STT-16 16-TE-1929(3) STJ TYPE E	THERMAX
C	1	Connector, MS Circular / MIL-C-5015 6-circuit Female	CA3106E14S-6SB	ITT Cannon

Note: Apply label ID within 6" of each end and at 5' increments

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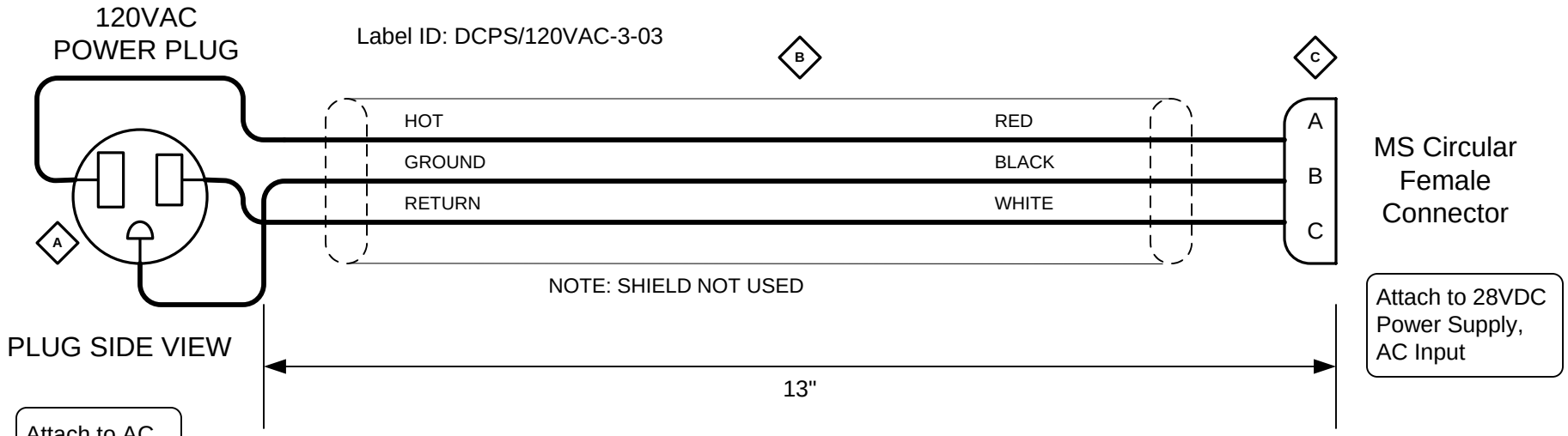
HIAPER Dropsonde
DC Power Cable, 28 Vdc Power Supply to Launch Control Panel

ENG: T. Hock 9/7/05

SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-04	A

SCALE 1 : 1 SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	9/7/05	TFH



Note: Apply label ID within 6" of each end and at 5' increments

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	1	Connector, AC Power / Plug, Hospital grade, 15A/125V	HBL8215C	Hubbell
B	1	3 conductor 16 gauge wire Teflon insulation	STT-16 16-TE-1929(3) STJ TYPE E	THERMAX
C	1	Connector, MS Circular / MIL-C-5015 3-circuit Female	CA3106E14S-7SB	ITT Cannon

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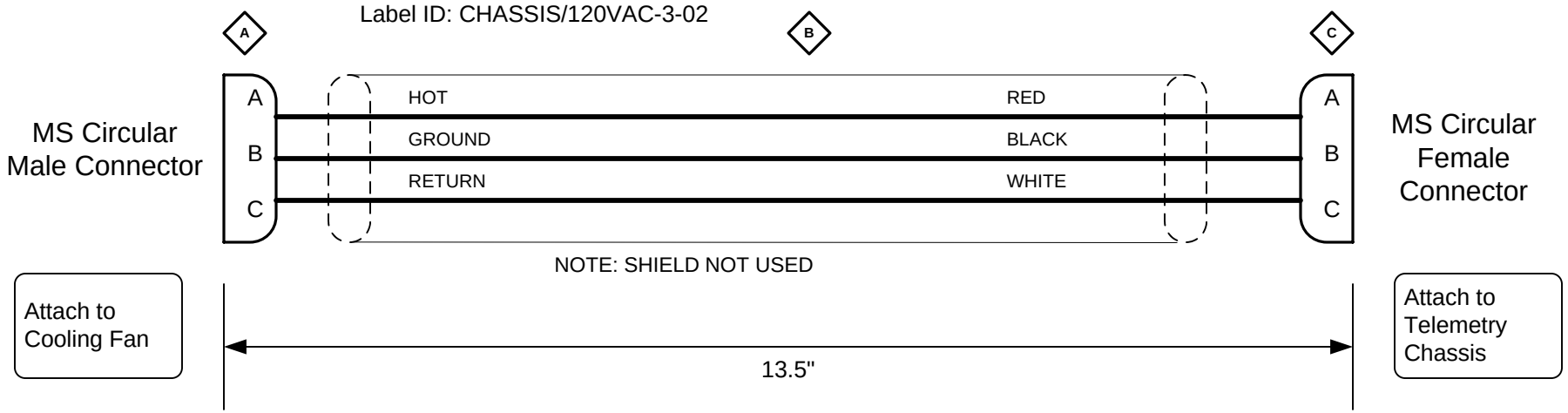
HIAPER Dropsonde
AC Power Cable, 28 Vdc Power Supply

ENG: T. Hock 9/7/05

SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-03	A

SCALE 1 : 1 SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	9/7/05	TFH



Note: Apply label ID within 6" of each end and at 5' increments

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	1	Connector, MS Circular / MIL-C-5015 3-circuit Male	CA3106E14S-7PB	ITT Cannon
B	1	3 conductor 16 gauge wire Teflon insulation	STT-16 16-TE-1929(3) STJ TYPE E	THERMAX
C	1	Connector, MS Circular / MIL-C-5015 3-circuit Female	CA3106E14S-7SB	ITT Cannon

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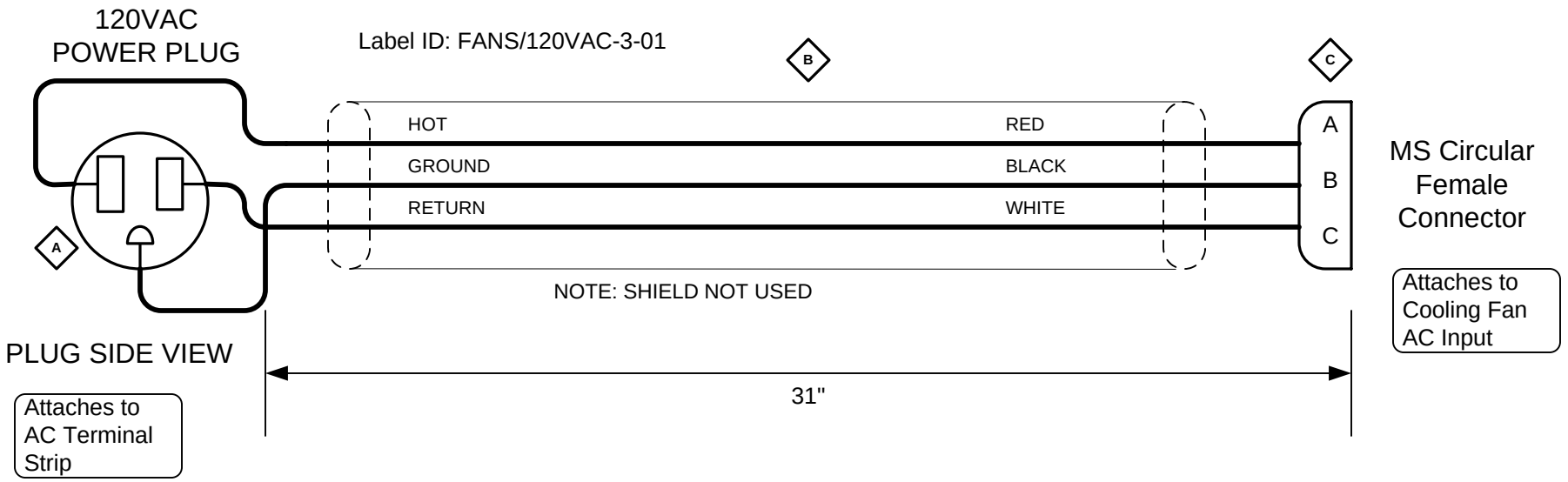
HIAPER Dropsonde
AC Power Cable, Cooling Fan unit to Telemetry Chassis

ENG: T. Hock 9/7/05

SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-02	A

SCALE 1 : 1 SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	10/19/05	TFH



Note: Apply label ID within 6" of each end and at 5' increments

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	1	Connector, AC Power / Plug, Hospital grade, 15A/125V	HBL8215C	Hubbell
B	1	3 conductor 16 gauge wire Teflon insulation	STT-16 16-TE-1929(3) STJ TYPE E	THERMAX
C	1	Connector, MS Circular / MIL-C-5015 3-circuit Female	CA3106E14S-7SB	ITT Cannon

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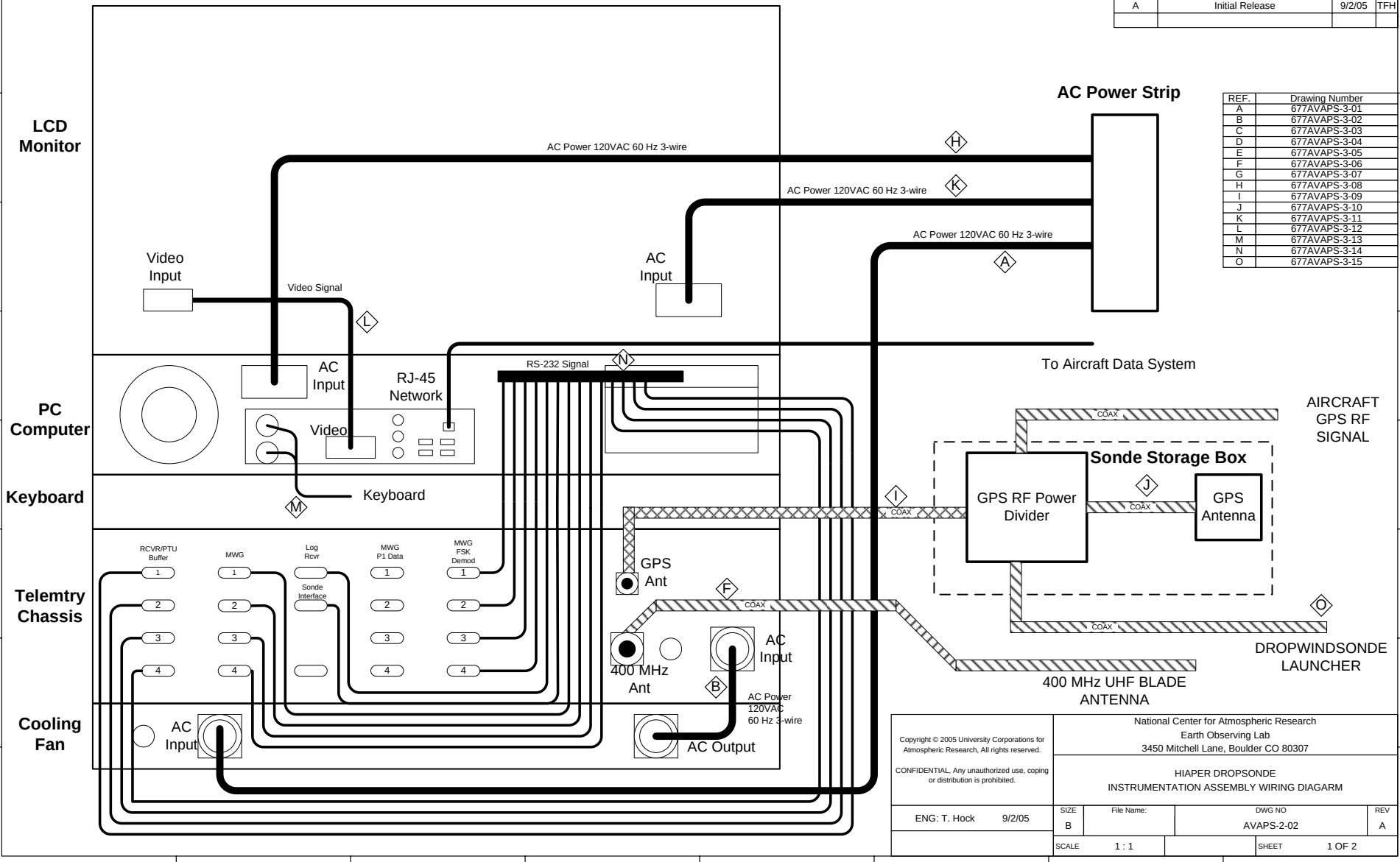
HIAPER Dropsonde
AC Power Cable, Cooling Fan

ENG: T. Hock 10/19/05

SIZE	File Name:	DWG NO	REV
A		677AVAPS-3-01	A

SCALE 1 : 1 SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	9/2/05	TFH



REF.	Drawing Number
A	677AVAPS-3-01
B	677AVAPS-3-02
C	677AVAPS-3-03
D	677AVAPS-3-04
E	677AVAPS-3-05
F	677AVAPS-3-06
G	677AVAPS-3-07
H	677AVAPS-3-08
I	677AVAPS-3-09
J	677AVAPS-3-10
K	677AVAPS-3-11
L	677AVAPS-3-12
M	677AVAPS-3-13
N	677AVAPS-3-14
O	677AVAPS-3-15

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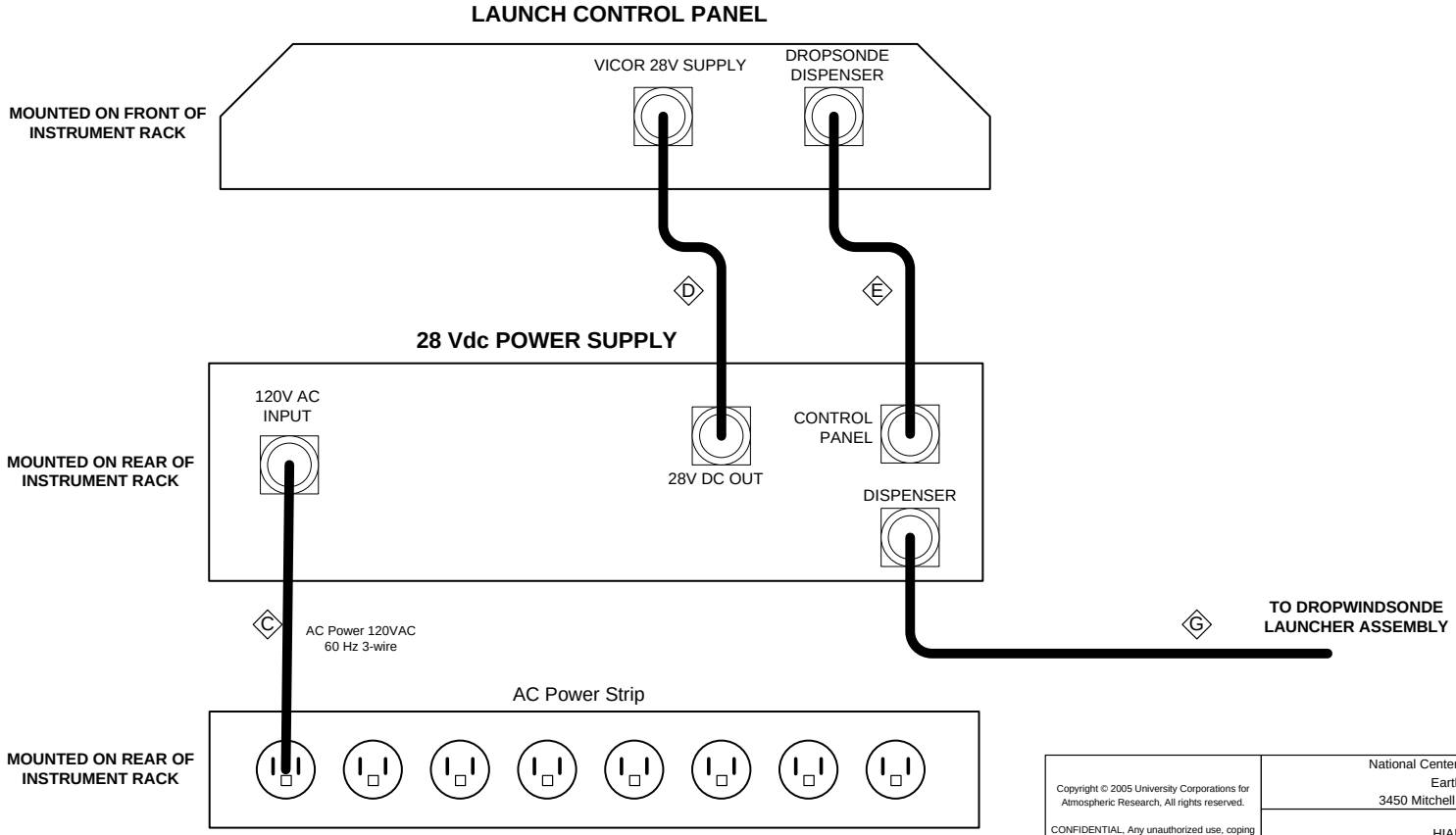
HIAPER DROPSONDE
INSTRUMENTATION ASSEMBLY WIRING DIAGARM

ENG: T. Hock 9/2/05

SIZE	File Name:	DWG NO	REV
B		AVAPS-2-02	A

SCALE 1 : 1 SHEET 1 OF 2

REV.	DESCRIPTION	DATE	BY
A	Initial Release	9/2/05	TFH



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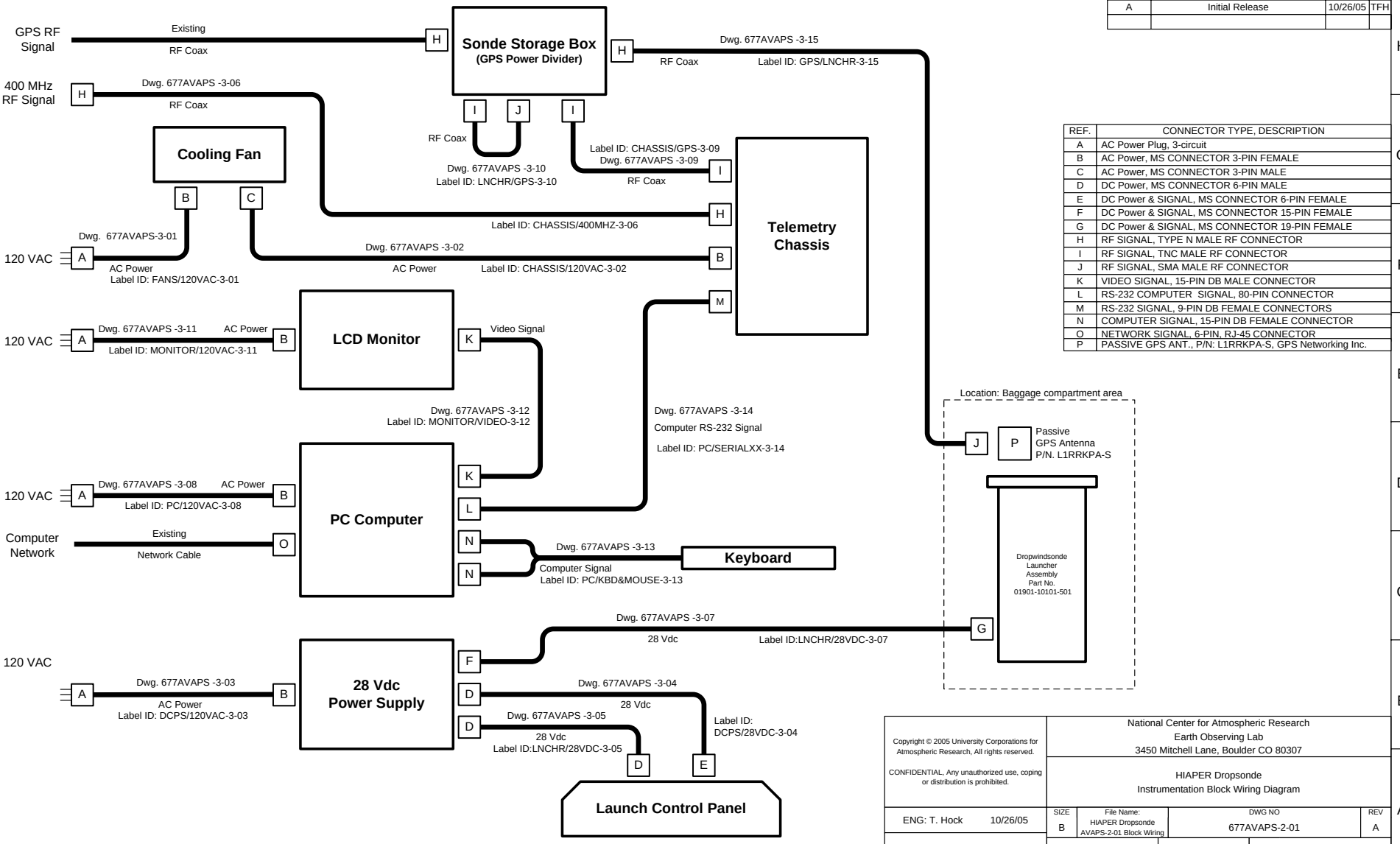
HIAPER Dropsonde
Assembly Wiring Diagram

ENG: T. Hock 9/2/05

SIZE	File Name:	DWG NO	REV
B	HAIPER ELA Diagram Rev A	AVAPS-2-02	A

SCALE 1 : 1 SHEET 2 OF 2

REV.	DESCRIPTION	DATE	BY
A	Initial Release	10/26/05	TFH



REF.	CONNECTOR TYPE, DESCRIPTION
A	AC Power Plug, 3-circuit
B	AC Power, MS CONNECTOR 3-PIN FEMALE
C	AC Power, MS CONNECTOR 3-PIN MALE
D	DC Power, MS CONNECTOR 6-PIN MALE
E	DC Power & SIGNAL, MS CONNECTOR 6-PIN FEMALE
F	DC Power & SIGNAL, MS CONNECTOR 15-PIN FEMALE
G	DC Power & SIGNAL, MS CONNECTOR 19-PIN FEMALE
H	RF SIGNAL, TYPE N MALE RF CONNECTOR
I	RF SIGNAL, TNC MALE RF CONNECTOR
J	RF SIGNAL, SMA MALE RF CONNECTOR
K	VIDEO SIGNAL, 15-PIN DB MALE CONNECTOR
L	RS-232 COMPUTER SIGNAL, 80-PIN CONNECTOR
M	RS-232 SIGNAL, 9-PIN DB FEMALE CONNECTORS
N	COMPUTER SIGNAL, 15-PIN DB FEMALE CONNECTOR
O	NETWORK SIGNAL, 6-PIN, RJ-45 CONNECTOR
P	PASSIVE GPS ANT., P/N: L1RRKPA-S, GPS Networking Inc.

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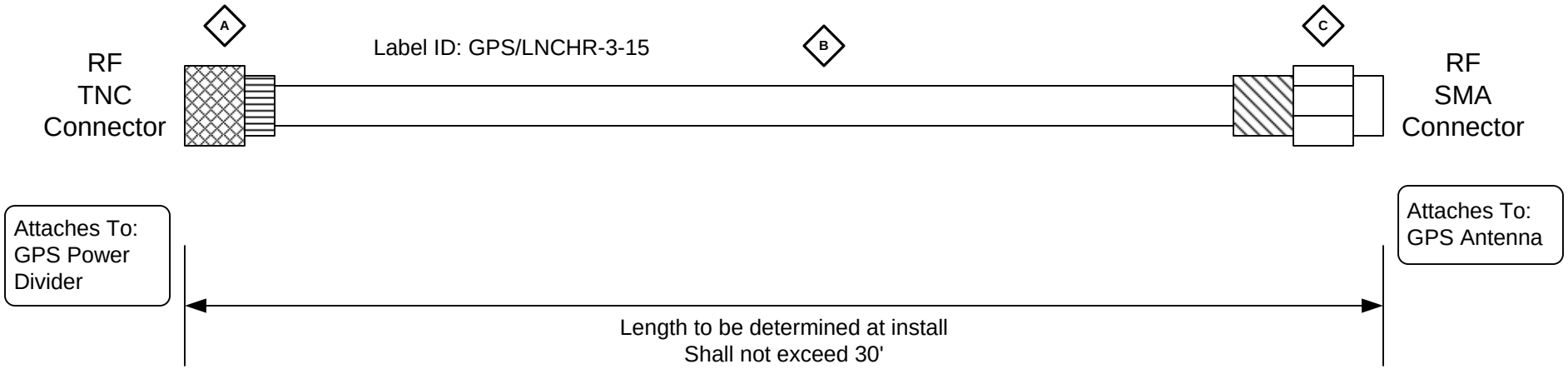
HIAPER Dropsonde
Instrumentation Block Wiring Diagram

ENG: T. Hock 10/26/05

SIZE	File Name:	DWG NO	REV
B	HIAPER Dropsonde AVAPS-2-01 Block Wiring	677AVAPS-2-01	A

SCALE 1 : 1 SHEET 1 OF 1

REV.	DESCRIPTION	DATE	BY
A	Initial Release	10/19/05	TFH



Note: Apply label ID within 6" of each end and at 5' increments

PC WIRE & CABLE Cable Assembly Part No. 11023-1816-01

REF	Qty	DESCRIPTION	PART NO.	MANUFACTURE
A	1	SMA RF CONNECTORS	190314	PC WIRE & CABLE
B	1	50 ohm COAX	S44191	PC WIRE & CABLE
C	1	TNC RF CONNECTOR	190308	PC WIRE & CABLE

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3450 Mitchell Lane, Boulder CO 80307

HIAPER Dropsonde
GPS RF Cable, Launcher GPS Reradiating Antenna

ENG: T. Hock 10/19/05

SIZE	File Name:	DWG NO	REV
A	HAIPER ELA Diagram Rev A	677AVAPS-3-15	A

SCALE 1 : 1 SHEET 1 OF 1