

~~TOP SECRET~~

Revised 4  
Rev. B 19 Nov 1955  
REV. C 30 Nov 1961  
Rev. D 25 April 1966



copy

**ELECTRICAL INTERFACE SPECIFICATION**

for the

"J-3" SRV SYSTEM

[Redacted]

Contractor

[Redacted]

Contractor

[Redacted]

Customer

Declassified and Released by the N R C

In Accordance with E. O. 12958

on NOV 26 1997

Sheet One of Sixteen

~~TOP SECRET~~

10/26/97  
[Handwritten notes]

COPY #

NOTE

This Specification was "PRE-RELEASED" (NOT APPROVED) for comment, discussion and correction on the original and Revision "A". It was APPROVED (Signed-Off) on Revision "B" and final changes which had been agreed upon before Sign-Off were incorporated in Revision "C".

Revision "C" therefore becomes the BASIC DOCUMENT and is to be used as such; Any subsequent revisions of this CONTROLLED DOCUMENT shall be furnished to holders of this present "C" Revision and the change will be reflected in the Revision table, below.

REVISIONS

REVISION	DESCRIPTION	SIGNATURE/DATE
D	<p>Pg. 2 (Para. 3.2.1) Was: p - Spare WIJ1-p q - Spare WIJ1-q Is: p - No. 1 T. U. Control (Reduced) WIJ1-p to W2P8-Z q - No. 2 T. U. Control (Reduced) WIJ1-q to W2P8-c Pag. 4 (Para. 3.2.2) Was: Z Continuity Loop (3) c Continuity Loop (3) Is: Z No. 1 T. U. Control (reduced) (1) c No. 2 T. U. Control (reduced) (1) Pg. 5, 6, 11 &amp; 12 Made all necessary changes to change from W2P3/4A1J1 61 Pin connector to 32 Pin connector.</p>	

~~TOP SECRET~~ [REDACTED]

Rev. C 30 Nov. 1965  
Rev. D 25 Apr. 1968

- 1.0 SCOPE
- 2.0 APPLICABLE DOCUMENTS
- 3.0 REQUIREMENTS
- 4.0 QUALITY ASSURANCE PROVISION
- 5.0 PREPARATION FOR DELIVERY

~~TOP SECRET~~ [REDACTED]

1.0 SCOPE

This document shall define the electrical interface between the ~~the system as described in T3-5-015~~ "J-3" system as described in T3-5-016 and the SRV system as described in Specification S0160-00-0007, Recovery Subsystem Specification for (Configuration D).

2.0 APPLICABLE DOCUMENTS

None

3.0 REQUIREMENTS

3.1 Electrical Interface Connectors

- (a) The Electrical Interface between the ~~"J-3"~~ <sup>"J-3"</sup> systems and the SRV system will be through six (6) connectors which shall be located per T3-5-024 Interface Drawing. The ~~six (6) connectors~~ are listed below with the LMSC, DISIC cassette and the ~~"J-3"~~ <sup>"J-3"</sup> cassette half of each connector defined.
- (b) The LMSC/SRV Connection (P28/W1J-1) shall be an in-flight disconnect type. The P28 connector shall be an ~~disconnect assembly~~ which has a PT06SE-22-55S type insert. The SRV shall provide a compatible mating connector and required disconnect hardware.

3.2 Connector Descriptions and Pin Assignments

3.2.1 P28 (PT06SE-22-55S)

<u>Pin</u>	<u>Function</u>	<u>Route &amp; Destination</u>	<u>Wire Type</u>
A	No. 1 Takeup Control	W2J1-A to W2P8-X	
B	No. 2 Takeup Film Footage Monitor	W2J1-e to W2P8-D	3
C	Relay Reset		
D	DISIC Anti-Backup Control	W2J1-g to W2P12-S	
E	+5 VDC T/M Feed	W2J1-E to W2P12-K W2P8-S W2P2-N	5
F	Cassette Heater Feed	W2J1-F to W2P8-F	
G	Transfer Signal No. 1		4)
H	Transfer Signal No. 1 Return		4)

<u>Pin</u>	<u>Function</u>	<u>Route &amp; Destination</u>	<u>Wire Type</u>
J	5 VDC T/M Return	W2J1-J to W2P12-L W2P8-a W2P2-X	5
K	DISIC Takeup Control	W2J1-P to W2P12-U	
L	DISIC Terrain Film Footage Monitor	W2J1-R to W2P12-U	3
M	Arm Signal No. 2		4
N	Arm Signal No. 2 Return		4
P	DISIC Takeup Control Return	W2J1-v to W2P12-P	
R	Spare		
S	Recovery System Structure Ground	W2J1-S	
T	Cassette and Battery Heater Return	W2J1-T to W2P8-T 2A1P3- 2A1P4-	
U	No. 2 Takeup Control	W2J1-U to W2P8-W	
V	No. 1 Anti-Backup Control	W2J1-V to W2P8-U	
W	No. 1 Takeup Control Return	W2J1-W to W2P8-N	
X	Arm Signal No. 1		
Y	Arm Signal No. 1 Return		
Z	No. 1 Film Footage Monitor	W2J1-Z to W2P8-L	
a	Eject. Programmer Gate No. 1		
b	Eject. Programmer Gate Return		
c	Thrust Cone Shorting Loop		
d	Continuity Loop Feed	W2J1-d	
e	Retro Temp Monitor	1A21	
f	Waterseal Monitor	W2J1-f to W2PZ-	
g	Spare	W2J1-u	
h	Eject. Programmer Gate No. 2		
i	No. 2 Anti-Backup Control	W2J1-i to W2P8-J	
j	No. 1 Takeup Control	W2J1-j to W2P8-E	
k	Spare	W2j1-k	
m	No. 2 Takeup Control	W2J1-m to W2P8-V	
n	No. 2 Takeup Control Return	W2J1-n to W2P8-b	
p	No. 1 Takeup Control (Reduced)	W2J1-p to W2P8-Z	
q	No. 2 Takeup Control (Reduced)	W2J1-q to W2P8-c	
r	Battery Voltage Monitor		
s	Transfer Signal No. 2		4
t	Transfer Signal No. 2 Return		4
u	Waterseal Activation Command No. 2 Return	W2J1-b	4
v	Waterseal Activation Command No. 2	W2J1-a	4

<u>Pin</u>	<u>Function</u>	<u>Route &amp; Destination</u>	<u>Wire Type</u>
w	DISIC Takeup Control	W2J1-y to W2P12-V	
x	Temp Sensor	W2J1-x to W2P8-A	
y	DISIC Takeup Control Return	W2J1-CC to W2P12-R	
z	T/M Shield Tie	W2J1-z to W2P12-G W2P8-R	
AA	DISIC Stellar Film Footage Monitor	W2J1-AA to W2P12-H	3
BB	Beacon/T/M AGE Power and Control	W2J1-BB to W2P3-d	
CC	Spare		
DD	Battery Heater Feed	W2J1-FF to 2A1P3- 2A1P4-	
EE	Continuity Loop Return	W2J1-EE	
FF	Waterseal Activation Command No. 1	W2J1-DD	4
GG	Temp Sensor Return	W2J1-GG to W2P8-Y 1A21	
HH	Waterseal Activation Command No. 1 Return	W2J1-HH	4

3.2.2 <sup>4-3</sup> ~~4-2, 3~~ Cassette Connector 3AJ1 (PT02-18-26P)

<u>Pin</u>	<u>Function</u>	<u>Destination</u>	<u>Wire Type</u>
A	Temp Sensor Monitor	(1)	
B	No. 2 T/U Rotation Pot Excitation	(2)	2
C	No. 1 T/U Rotation Pot Wiper	(2)	3
D	No. 2 T/U Film Footage Monitor	(1)	3
E	No. 1 T/U Control	(1)	
F	Heater Power	(1)	
G	No. 2 T/U Motor Voltage Monitor	(2)	3
H	No. 2 T/U Rotation Pot Wiper	(2)	3
J	No. 2 T/U Anti-Backup Control	(1)	
K	No. 1 T/U Rotation Pot Excitation	(2)	2
L	No. 1 Film Footage Monitor	(1)	
M	No. 1 and No. 2 Rotation Pots Common	(2)	2
N	No. 1 and No. 2 Control Return	(1)	
P	No. 1 T/U Motor Voltage Monitor	(2)	3
R	Shield Tie	(1)	
S	No. 1 and No. 2 Film Footage Pot Excitation	(1)	5
T	Heater Power Return	(1)	

<u>Pin</u>	<u>Function</u>	<u>Destination</u>	<u>Wire Type</u>
U	No. 1 Anti-Backup Control	(1)	
V	No. 2 T/U Control	(1)	
W	No. 2 T/U Control	(1)	
X	No. 1 T/U Control	(1)	
Y	Temp Sensor Return	(1)	
Z	No. 1 Takeup Control (Reduced)	(1)	
a	No. 1 and No. 2 Film Footage Pot Return	(1)	
b	No. 1 and No. 2 T/U Control Return	(1)	
c	No. 2 Takeup Control (Reduced)	(1)	

- (1) Reference Paragraph 3. 2. 1
- (2) Recovery System AGE Connector

3. 2. 3 DISIC Cassette Connector (PT02SE-14-19P)

<u>Pin</u>	<u>Function</u>	<u>Destination</u>	<u>Wire Type</u>
A	Torque Motor Reverse Voltage	(2)	
B	Torque Motor Reverse Return	(2)	
C	Stellar Rotation Pot Excitation	(2)	
D	Stellar Rotation Pot Wiper	(2)	3
E	Terrain Rotation Pot Excitation	(2)	2
F	Terrain Rotation Pot Wiper	(2)	3
G	Shield Tie	(1)	
H	Stellar Film Footage Pot Monitor	(1)	3
J	Terrain Film Footage Pot Monitor	(1)	3
K	Film Footage Pots Excitation	(1)	5
L	Film Footage Pots Return	(1)	5
M	Rotation Pots Common	(2)	2
N	Spare		
P	Takeup Control Return	(1)	
R	Takeup Control Return	(1)	
S	Anti-Backup Control	(1)	
T	Spare		
U	Takeup Control	(1)	
V	Takeup Control	(1)	

- (1) Reference Paragraph 3. 2. 1
- (2) Reference Paragraph 3. 2. 6

~~TOP SECRET~~

Rev. D  
1966

3.2.4 4A1 Telemeter Connector 4AJ1 (PT07-18-32P) (Mates with W2PS, PT06P-18-32S).

Pin	Function
A	SRV Battery No. 1 Monitor (+15V DC)
B	Relay K9 Actuate Monitor
C	Unassigned
D	T/C Battery Monitor (+31 V DC)
E	Parachute Cover Off Monitor
F	SRV Battery No. 2 Monitor (+15V DC)
G	Relay K10 Actuate Monitor
H	Beacon AGE Power Feed (+15V DC)
J	T/C Return
K, L, M, N	Spares
P, R	
S	Return inside 4A1 Telemeter (externally S will be jumpered to T with a 6 inch wire within the W2 harness)
T	Unused Despin B/W Mon. Externally Grounded
U	Retro Rocket Breakwire Monitor
V	Relay K11 Monitor Return
W	T/C Spin Breakwire Monitor
X	P28 Disconnect Monitor
Y	Recovery System Structure Ground
Z	TM Test Power & Control (+24V DC Input)
a	Relay Reset (+24V AGE Command)
b	T/C Separation Switch
c	T/C Separation Switch
d	Beacon & TM AGE Power & Control(+24V DC Input)
e	Relay K11 Actuate Monitor
f	4A2 TM Battery Input (+24V DC)
g	4A2 TM Battery Return
h	4A2 TM Battery Return
j	4A2 TM Battery Input (+24 V DC)

~~TOP SECRET~~

3.2.5 4A2 Telemetry Battery Connector (PT1H-12-10P) (Mates with W2P5 PT06P-12-10S)

Pin	Function	Was .
A	+28V DC to 4A1 TM	1
B	+28V DC to 4A1 TM	2
C	Continuity Loop	None
D	Continuity Loop	None
E	Battery Return to 4A1 TM	7
F	Battery Return to 4A1 TM	8
G	Battery Activation Command Input	4
H	Activation Return	5
J*	Heater Input	6
K*	Heater Return	5

\*Note: J & K will not be wired through the W2 harness and the function is not required.

3.2.6 Recovery System AGE Connector (PT06PSE-16-26P)

Pin	Function	Destination	Wire
A	G Switch Bypass #1 (REC)		
B	G Switch Bypass #2 (REC)		
C	G Switch Bypass #3 (REC)		
D	G Switch Bypass #4 (REC)		
E	Battery Activation Mon. (REC)		
F	Battery Activation Mon. (REC)		
G	Spare		
H	Spare		
J	DISIC Terrain Rotation Pot Excitation	W2P12-E	1
K	Spare		
L	No. 1 T/U Rotation Monitor	W2P8-C	3

NO. [REDACTED]

<u>Pin</u>	<u>Function</u>	<u>Destination</u>	<u>Wire Type</u>
M	No. 2 T/U Rotation Monitor	W2P8-H	3
N	No. 1 T/U Rotation Monitor Excitation	W2P8-K	2
P	Spare		
R	Torque Motor Reverse Voltage (DISIC)	W2P12-A	
S	Torque Motor Reverse Return (DISIC)	W2P12-B	
T	No. 2 T/U Motor Voltage Monitor	W2P8-G	3
U	Terrain Rotation Pot Wiper (DISIC)	W2P12-F	3
V	External Power Batt. #1 (REC)		
W	External Power Batt. #2 (REC)		
X	Rotation Pots Common (DISIC)	W2P12-M	1
Y	Stellar Rotation Pot Excitation (DISIC)	W2P12-C	1
Z	No. 2 T/U Rotation Monitor Excitation	W2P8-B	2
a	No. 1 and No. 2 T/U Rotation Monitor Common	W2P8-M	2
b	No. 1 T/U Motor Voltage Monitor	W2P8-P	3
c	Stellar Rotation Pot Wiper (DISIC)	W2P12-D	3

- 1, 2 - Twisted Triade unshielded
- 3 - Single shielded
- 4 - Twisted shielded pair
- 5 - Twisted unshielded pair

Note: All wiring will be single unshielded unless otherwise noted.

### 3.3 Electrical Interface Design Requirement

#### 3.3.1 Electrical Power

LMSC shall supply unregulated DC power to the SRV for all interface signals and heater requirements. The power source shall be the main bus and the pyrotechnic bus of a central system and the power shall have the characteristics specified below.

##### 3.3.1.2 DC Power Supply Characteristics

###### 3.3.1.2.1 Steady State Voltages

The main unregulated source and the pyrotechnic source shall have a steady-state voltage, measured at the distribution buses in the vehicle under zero load condition, of +22.0 to 29.5 volts.

The allowable line drop from the main unregulated bus to the SRV interface is 1.0 volt DC with an average load. The pyrotechnic bus shall not be required to comply with the line drop specification during squib activation signals.

NO. [REDACTED]

### 3.3.1.2.2 Output Impedance

The total source impedance of the pyrotechnic supply shall not exceed 0.50 ohms at 29.5 volts. The impedance of the source includes line resistance from the distribution buses to the SRV system interface.

### 3.3.1.3 Load Characteristics

#### 3.3.1.3.1 Power Utilization

Subsystems utilizing power shall be designed to give required performance when supplied with power having the values and tolerances of parameters at the power distribution buses as specified in 3.3.1.2

### 3.3.1.3.2 Power Consumption

The current requirements of the SRV system shall not exceed the limits listed in paragraph 3.4 Electrical Interface Function Description where applicable.

### 3.3.1.4 Pyrotechnic Circuit Shielding

All circuits carrying pyrotechnic power from the battery bus to the individual squibs shall be in continuously shielded twisted pair. The SRV shall return the shields of the pyrotechnic signals to the SRV structure ground.

### 3.3.1.5 Grounding

The SRV system shall not ground any power signal returns to chassis or structure that are returns for LMSC supplied unregulated or pyrotechnic power. The exception to this requirement shall be the Relay Reset command.

## 3.4 Electrical Interface Function Description

LMSC shall supply twice minimum all fire current to all pyrotechnics fired at a given time. The required currents shall be based upon nominal squib bridgewire resistances.

### 3.4.1 Command Descriptions

#### 3.4.1.2 Relay Reset Command (P28-C)

The Relay Reset Command shall be a +24 VDC unregulated command referenced to LMSC unregulated return and SRV structure. The Relay Reset Command shall be a non-flight, pre-launch command of  $\pm$  seconds or less duration and shall have a current capacity of 2 amps. Upon receipt of the command the SRV system shall be placed in a launch ready condition.

#### 3.4.1.3 Pyrotechnic Commands

The commands listed below shall be supplied from the vehicle pyrotechnic bus and each shall be referenced to their own return. Each

command line shall be shorted to the vehicle pyrotechnic return prior to the initiation of the command. Other command requirements are specified below.

3.4.1.3.1 Water Seal Activation Command No. 1 (P28-FF)  
Return on P28-HH

Function: 2A10 Dimple Motor No. 1 Activation

Signal Description: May be sent anytime after the termination of vehicle powered flight and may be continuous to P28 Electrical Disconnect.

Electrical Requirements: (1)

- a) Pulse duration 5 seconds maximum
- b) Current 4.0 amps minimum
- c) Bus voltage during pulse 8 volts minimum across dimple motor
- d) Impedance  $0.4 \pm .1$  ohms

(1) Command will be current limited and fused with a 1.8 ohm fusistor on LMSC side of P28/W1J-1 interface.

3.4.1.3.2 Water Seal Activation Command No. 2 (P28-v)  
Return on P28-u

Function: 2A10 Dimple Motor No. 2 Activation

The Water Seal Activation Command No. 2 shall be initiated coincident with Water Seal Activation Command No. 1. See paragraph 3.4.1.3.1 for signal specifications.

3.4.1.3.3 Arm Signal No. 1 (P28-X) Return on P28-Y

Function: T/M battery activate, No. 1 Recovery battery activate, latch relay K1 back-up timer start.

Signal Description: Command shall be initiated  $76 \pm 0.5$  seconds prior to P28 Electrical Disconnect and will be continuous from initiation to electrical disconnect.

**Electrical Requirements:**

- a) Pulse duration 500 milliseconds maximum
- b) Current 10.4 amps minimum
- c) Bus voltage during pulse 18. volts minimum
- d) Impedance  $1.0 \pm .1$  ohms

**3.4.1.3.4 Arm Signal No. 2 (P28-M) Return on P28-N**

**Function:** No. 2 Recovery battery activate, latch relay K2

**Signal Description:** See paragraph 3.4.1.3.3

**Electrical Requirements:**

- a) Pulse duration 500 milliseconds maximum
- b) Current 8.0 amps minimum
- c) Bus voltage during pulse 18. volts minimum
- d) Impedance  $1.3 \pm .1$  ohms

**3.4.1.3.5 Transfer Signal No. 1 (P28-G) Return on P28-H**

**Function:** Thrust cone battery No. 1 activation, DISIC Water Seal Dimple motor No. 1 activation, latch relay K3

**Signal Description:** Command shall be initiated one  $(1) \pm 0.5$  seconds prior to P28 Electrical Disconnect and will be continuous to electrical disconnect

**Electrical Requirements:**

- a) Pulse duration 250 milliseconds maximum
- b) Current 9.0 amps minimum
- c) Bus voltage during pulse 18. Volts minimum
- d) Impedance  $1.5 \pm .3$  ohms

3.4.1.3.6 Transfer Signal No. 2 (P28-s) Return on P28-t

Function: Thrust cone battery No. 2 activation,  
DISIC water seal dimple meter No. 2  
activation.

Signal Description See Paragraph 3.4.1.3.5

Electrical Requirements: See Paragraph 3.4.1.3.5

3.4.1.4 Battery Heater Feed (P28-DD)

The Recovery Battery Heater Feed shall be +24 VDC unregulated referenced to cassette and battery heater feed return (P28-T). The battery heater feed line shall present an open to the battery heaters until a Recovery Enable command is received by the vehicle. Upon receipt of the Recovery Enable command LMSC will energize the battery heater feed line for a minimum of one orbital period prior to Electrical Disconnect and shall have a current capacity of 3 amps continuous. Exceptional circumstances may result in Recovery Battery activation without a warm-up period.

3.4.2 SRV Beacon Checkout

The SRV Beacon shall be enabled during vehicle pre-launch tests to verify the operating frequency and measure the radiated power. LMSC shall provide the Beacon system with the power and command required for this test. The power and command shall be generated by a non-flight source. In the de-energized condition the Beacon AGE Power Feed (+15V DC) (4A1J1-H) shall present an open circuit to the Beacon.

3.4.2.1 Beacon AGE Power Feed (+15V DC) 4A1J1-H

The Beacon AGE Power Feed shall be LMSC supplied and shall have the following characteristics:

- a. Voltage +13.8V DC to 17.0 V DC
- b. Current 0.40 amps capacity minimum  
0.20 amps load minimum
- c. Duty Cycle 5 minutes maximum duration  
at 10% duty cycle.

3.4.2.2 Beacon and TM AGE Control (+24V DC) (4A1J1-B)

The Beacon and TM AGE Power and Control shall be +24 V DC unregulated referenced to Recovery System Structure Ground. This function provides for operation of the Beacon and the TM.

3.4.2.3 TM Test Power & Control (+24V DC) (4A1J1-Z)

The TM Test Power & Control (+24V DC) (4A1J1-A) shall be available for operating the telemeter without providing the +15 V DC output from 4A1J1-H.

3.4.3 Data Description

3.4.3.1 Continuity Loop Feed (P28-d) Return to P28-EE

The Continuity Loop is a pre-launch non-flight monitor of the launch ready condition of the SRV system. All functions monitored in the loop shall make the loop continuous when ready for launch, i. e., relays will be monitored through normally closed contacts, connectors must be mated to receptacles etc. LMSC shall activate the continuity loop with +24 VDC unregulated from the launch complex blockhouse and will complete the circuit in the blockhouse via the loop return. The continuity loop will be electrically isolated from all flight hardware and circuitry.

3.4.3.2 Water Seal Monitor (P28-E)

The SRV shall provide monitor circuits which when excited by  $+5 \pm .05$  VDC (P28-E) and referenced to 5 VDC return (P28-J) will indicate the status of the two water seals. The monitor shall provide to LMSC four discrete voltage levels,

- a) 3.0 volts  $\pm$  .2 volts - both water seals open
- b) 1.5 volts  $\pm$  .2 volts - both water seals closed.
- c) 0.5 volts  $\pm$  .5 volts - No. 1 water seal closed, No. 2 water seal open
- d) 4.25 volts  $\pm$  .5 volts - No. 1 water seal open, No. 2 water seal closed

3.4.3.3 Retro Temp Monitor (P28-e) Return to P28-J

The SRV shall provide one (1) temp. sensor which will monitor the Retro Rocket temperature. The temp sensor shall be in series with a 1916 ohm resistor and shall be excited by the  $+5 \pm .05$  V DC voltage (P28-E).

4.0 QUALITY ASSURANCE PROVISION

Not Applicable

5.0 PREPARATION FOR DELIVERY

Not Applicable