APOLLO SOYUZ TEST PROJECT (ASTP)

ATS-6/CSM TRAINING CONSOLE

OPERATIONS MANUAL

Job Order 17
Task Order 060

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TECHNICAL REPORT INDEX/ABSTRACT

(See instructions on reverse side.)

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13. ABSTRACT

This manual will assist in operating the Madrid Training Console.

14. SUBJECT TERMS

Apollo Soyuz Test Project

JSC-09673

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CONTENTS

ABBREVIATIONS AND ACRONYMS

AGC	Automatic gain control
BiØ	Bi-phase-L
BiØ-L	Bi-phase level
CPS	Cycles per second
CSM	Command Service Module
CTE	Central timing equipment
FM	Frequency modulation
NRZ	Non-return-to-zero
PA	Power amplifier
PCM	Pulse code modulation
PM	Phase modulation
PMP	Pre-modulation processor
RF	Radio frequency
SCO	Subcarrier oscillator
TV	Television
UDL	Up-data link
USBE	Unified S-band equipment
Vdc	Volts direct current
ac	Alternating current
dc	Direct current
kb/s	Kilobits per second
pk-pk	Peak-to-peak

ATS-6/COMMAND SERVICE MODULE TRAINING CONSOLE OPERATIONS MANUAL

1.0 INTRODUCTION

1.1 GENERAL

The ATS-6/Command Service Module (CSM) Training Console houses, controls, and cools telecommunication subsystems during support of ASTP test programs. Paragraphs 2, 3, and 4 describe the function of each switch on the Power Control and Mode Control panels, as well as the input functions on the Stimulus Input panel. Paragraph 5 presents the switch settings for each mode of operation.

2.0 CONTROL SWITCHES

Refer to figure 1 for the Power Control Panel.

2.1 400 CYCLES PER SECOND (CPS) 3-PHASE

- IN: Applies 3-phase power for subsequent operation of the unified S-band equipment (USBE).
- OUT: Open circuit.

2.2 POWER AMPLIFIER (PA) 28 VOLTS DIRECT CURRENT (Vdc)

- IN: Supplies 28 Vdc for subsequent operation of power amplifier.
- OUT: Open circuit.

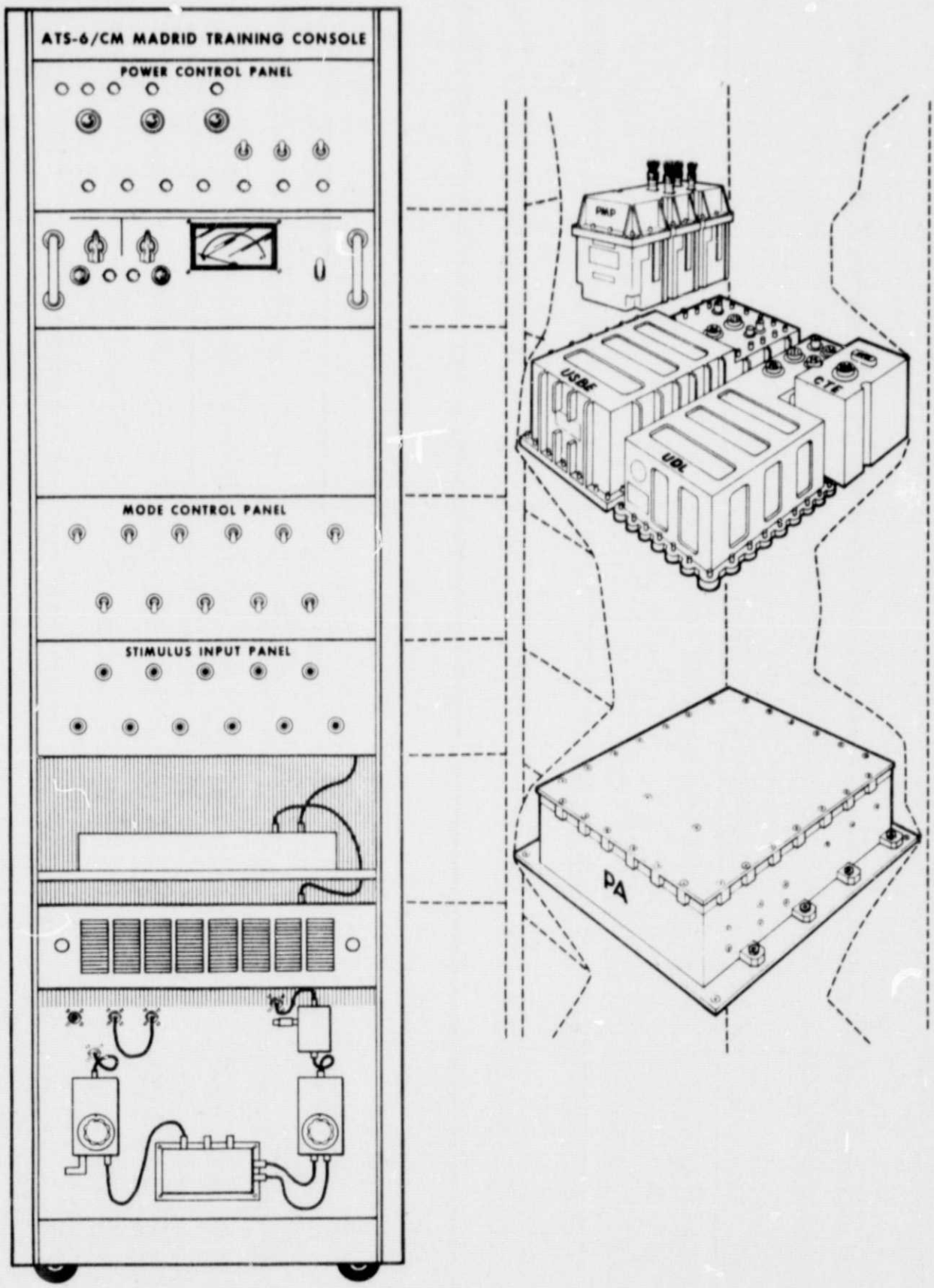

Figure 1. – ATS-6/CM Madrid training console.

2.3 CONSOLE 28 Vdc

- IN: Supplies the 28-Vdc control voltages to the Mode Control Panel.
- OUT: Open circuit.

3.0 MODE CONTROL PANEL

Refer to figure 1 for the Mode Control Panel.

3.1 PA (S-1)

- ON: Applies 28 Vdc for PA operation.
- OFF: Turns off the PA.

CAUTION: Be sure blower is operating.

3.2 USBE (S-2)

- PRIM: Applies 28 Vdc for Primary Transponder operation.
- OFF: Turns off both transponders.
- SEC: Applies 28 Vdc for Secondary Transponder operation.

3.3 PMP (S-3)

- ON: Applies 28 Vdc for auxilliary mode pre-modulation processor (PMP) operation.
- OFF: Turns off the PMP.

3.4 UDL (S-4)

- ON: Applies 28 Vdc for up-data-link (UDL) operation.
- OFF: Turns off the UDL.

3.5 CTE-1 (S-5)

- ON: Applies 28 Vdc to central timing equipment (CTE) power supply 1.
- OFF: Turns off power supply 1.

3.6 CTE-2 (S-6)

- ON: Applies 28 Vdc to CTE power supply 2.
- OFF: Turns off power supply 2.

3.7 RANGING (S-7)

- ON: Applies 28 Vdc to ranging logic.
- OFF: Turns off ranging.

3.8 BIT RATE (S-8)

- HI: Applies 5 Vdc to PMP for high bit rate operation.
- LO: Removes 5 Vdc for low bit rate operation.

3.9 TV-OFF-DATA (S-9)

- TV: Applies 28 Vdc to enable the USBE television (TV) input; turns on the frequency modulation (FM) transmitter; and enables the 95 kHz subcarrier oscillator (SCO).
- OFF: Removes the 28 Vdc.
- DATA: Applies 28 Vdc to wipers of S-10 and S-11.

3.10 PCM-OFF-PCM/SC1 (S-10)

- PCM: Applies 28 Vdc for PMP normal power mode.
- OFF: Removes the 28 Vdc.
- PCM/SC1: Applies 28 Vdc to turn ON the FM transmitter and enable the 95 kHz subcarrier oscillator.

3.11 REALTIME-OFF-PLAYBACK (S-11)

- REALTIME: Open circuit.
- OFF: Removes the 28 Vdc.
- PLAYBACK: Applies 28 Vdc to turn ON the FM transmitter; enables the 95 kHz SCO; and puts the PMP in the normal power mode.

4.0 STIMULUS INPUT PANEL

Refer to figure 1 for the Stimulus Input Panel.

4.1 REAL TIME 51.2 NRZ

A 0-5 Vdc, NRZ-L 51.2 or 1.6 kb/s input signal to the PMP. It modulates the normal 1.024 MHz bi-phase modulator in phase modulation (PM) modes and the auxillary 1.024 MHz bi-phase (BiØ) modulator in FM modes.

4.2 PLAYBACK 51.2 NRZ

A 0-5 Vdc, NRZ-L 51.2 (1:1) or 1.6 kb/s (32:1) input signal to the PMP. It modulates the auxillary bi-phase modulator in FM modes.

4.3 4 kb/s 125 kHz

A 0-5 Vdc bi-phase-L (BiØ-L) real time input signal to the PMP modulates the 125 kHz SCO.

4.4 4 kb/s 165 kHz

A 5 V peak-to-peak (pk-pk), BiØ-L playback input signal to the PMP modulates the 165 kHz SCO.

4.5 TV

A 3.5 V pk-pk signal riding on a +1 Vdc bias modulates the FM carrier.

4.6 REAL TIME DOWNVOICE

A 2 V pk-pk speech input signal to the PMP. It modulates the 1.25 MHz subcarrier in PM modes or the 95 kHz SCO in FM modes.

4.7 REAL TIME UPVOICE

An output signal from the 30 kHz discriminator in the PMP.

4.8 PLAYBACK VOICE

A 6 V P-P input signal to the PMP modulates the FM carrier.

4.9 MESSAGE ACCEPTANCE PULSE (MAP)

A 0-5 Vdc Message Acceptance Pulse is an output from the UDL at a frequency rate determined by the uplink command rate.

4.10 AUTOMATIC GAIN CONTROL (AGC)

AGC is a 0-5 Vdc analog voltage output from the USBE. The voltage increases as signal strength increases.

4.11 BIT RATE +5 Vdc

This is a 5 Vdc level input to the PMP, for the purpose of changing the modulation indices of the 1.024 and 1.25 MHz subcarriers during high bit rate operation.

5.0 MODE CONFIGURATION

1. Ensure that the dc and ac power supplies each have an individual power source.

2. Ensure that all circuit breakers are "IN" on the Power Control Panel.

3. Ensure that the PMP, UDL, CTE-1, CTE-2, and Ranging switches on the Mode Control Panel are in the "ON" position.

4. The following matrices in tables I and II will assist in setting switch positions on the Mode Control Panel for modes F0 through F4, and R1 through R8.

6.0 TEMPERATURE MONITOR

This is a thermocouple device preset to 120°F. Should the power amplifier reach this limit a warning buzzer will sound and a red light will come "ON". At which time S1 on the Mode Control Panel should be turned off IMMEDIATELY.

7.0 RADIO FREQUENCY (RF) PATH PANEL

The two variable attenuators adjust for the desired input and output RF power levels. A diplexer will route the received power to the USBE and the output power to the antenna.

TABLE I.– MODE CONTROL SWITCHES

	S1	S2	S8	S9	S10	S11
Mode						
F0	OFF	PRIM	HI	OFF	OFF	OFF
F1	OFF	PRIM	HI	OFF	OFF	OFF
F2	OFF	PRIM	HI	OFF	OFF	OFF
F3	OFF	PRIM	HI	OFF	OFF	OFF

TABLE II.- MODE CONTROL SWITCHES

	S1	S2	S8	S9	S10	S11	
Mode							
* R1	ON	PRIM	HI	OFF	OFF	OFF	
R2	ON	PRIM	LO	OFF	OFF	OFF	
** R3	ON	OFF	HI	TV	OFF	OFF	
R4	ON	OFF	HI	TV	OFF	OFF	
R5	ON	OFF	HI	DATA	OFF	PLAYBACK	
R6	ON	OFF	HI	DATA	PCM/SC1	OFF	Remove PB voice and 165 kHz 4 kb/s
R7	ON	OFF	HI	DATA	OFF	PLAYBACK	Remove PB voice and 165 kHz 4 kb/s
R8	ON	OFF	HI	DATA	PCM/SC1	OFF	Remove PB voice and 165 kHz 4 kb/s

*For modes R1 and R2 connect "PA IN" to "PM".

**For modes R3 through R8 connect "PA IN" to "FM".

TABLE III.– ASTP TRANSMISSION COMBINATIONS

Forward Modes (2077.4 MHz)

F0	Carrier Only
F1	30 kHz – Voice
F2	30 kHz – Voice 70 kHz – Command
F3	70 kHz – Command

Reverse Modes (2256.0 MHz)

R1	(PM)	1.024 MHz – HBR TLM, Real Time 1.25 MHz – Voice, Real Time
R2	(PM)	1.024 MHz – LBR TLM, Real Time 1.25 MHz – Voice, Real Time
R3	(FM)	TV With I/L Voice, Real Time
R4	(FM)	P/B TV With I/L Voice
R5	(FM)	BB – P/B Voice, 1:1 95 kHz – Voice, Real Time 125 kHz – 4 kb/s, Real Time 165 kHz – P/B 4 kb/s, 1:1 1.024 MHz – P/B HBR TLM, 1:1
R6	(FM)	95 kHz – Voice, Real Time 125 kHz – 4 kb/s, Real Time 165 kHz – Unmodulated 1.024 MHz – HBR, TLM, Real Time
R7	(FM)	BB – P/B Voice, 32:1 95 kHz – Voice, Real Time 125 kHz – 4 kb/s, Real Time 165 kHz – P/B 4 kb/s, 32:1 Unusable 1.024 MHz – P/B LBR, TLM, 32:1
R8	(FM)	Same as R6 except 1.024 MHz – LBR, TLM, Real Time