

CHAPTER 8

INSTALLATION

8-1. INTRODUCTION.

8-2. This chapter contains information and diagrams to support installation of Input/Output Console OA-7984(V)/UYK (I/O Console). This information includes drawings, site selection, unpacking and handling, mounting procedures, cabling and input requirements, I/O wire list, installation procedures and equipment checkout. Illustrations are provided for outline and mounting data, and cabling requirements.

8-3. INSTALLATION CONTROL DRAWINGS. Installation control drawings which apply to the I/O Console are RE-D5033783B Outline and Dimension Data, and RE-C5033764A, Cable Running Sheets. These drawings contain dimensional data, outline drawings, cabling data, and environmental information. The drawings and pertinent information are duplicated in this chapter.

8-4. Site Information. Placement of the I/O Console depends upon the conditions at the installation site. Selection of a site must be suitable to protect the equipment from damage and keep them free from dust. Provide sufficient area around the back of the cabinet to facilitate maintenance, repair procedures, and access to cable connections.

8-5. Outline and Dimensional Data. Refer to figure 8-1 (FO) for the outline and dimensions of the I/O Console. This drawing may be used as an aid for site selection.

NOTE

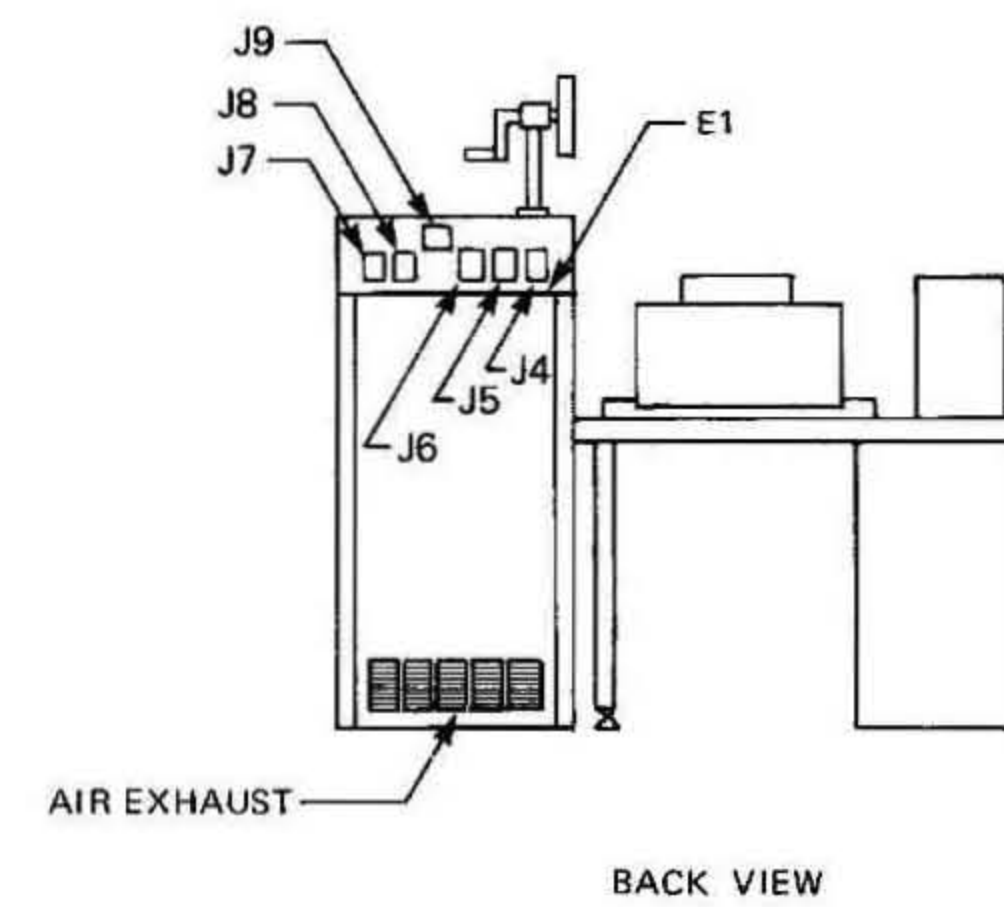
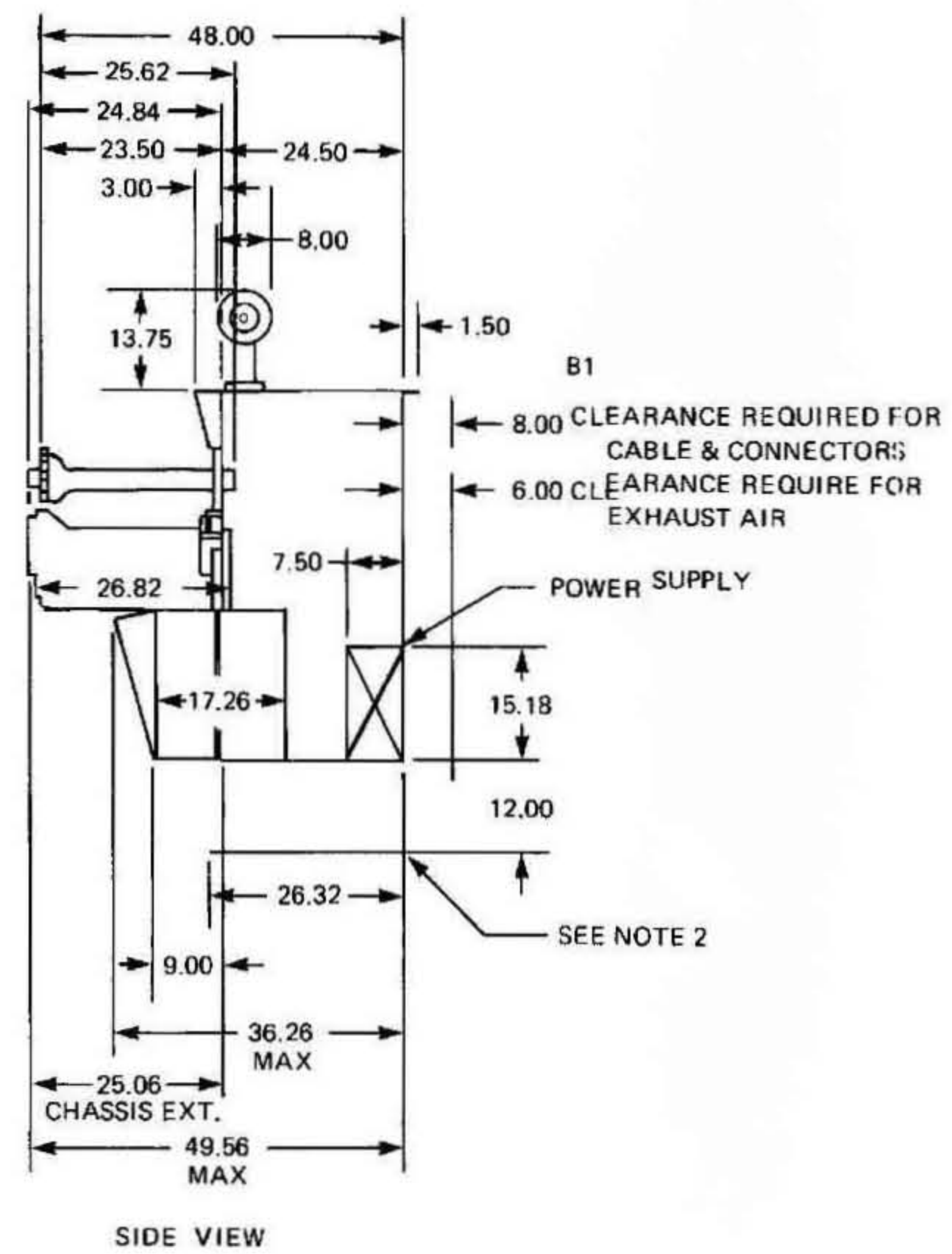
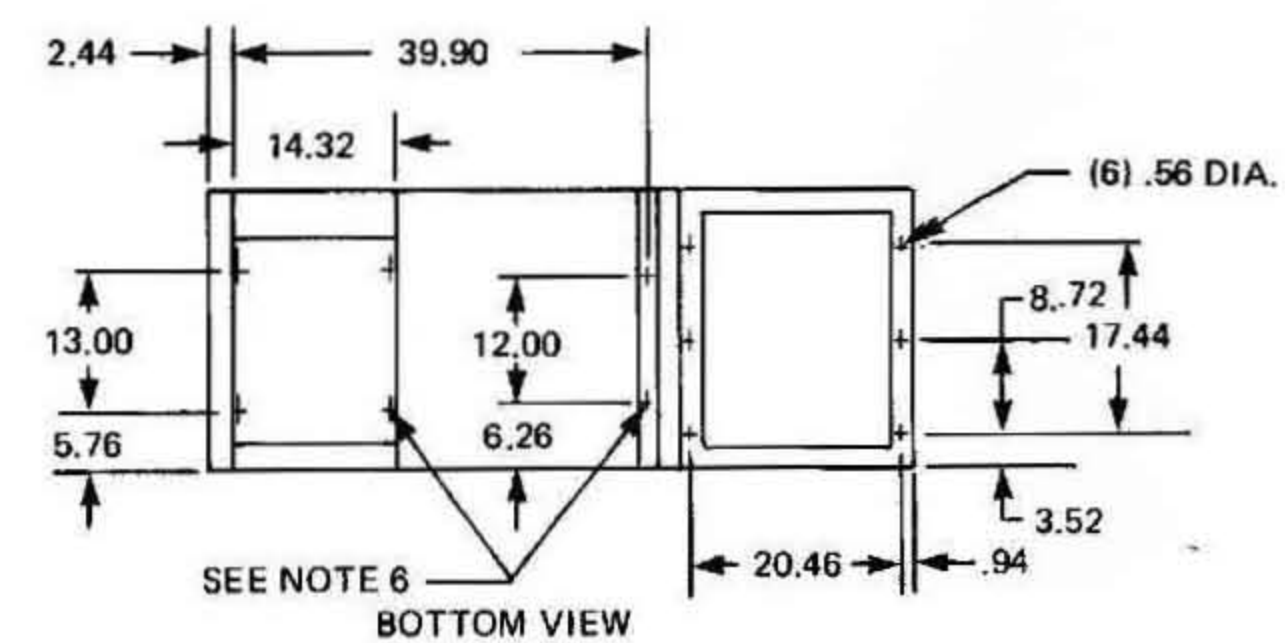
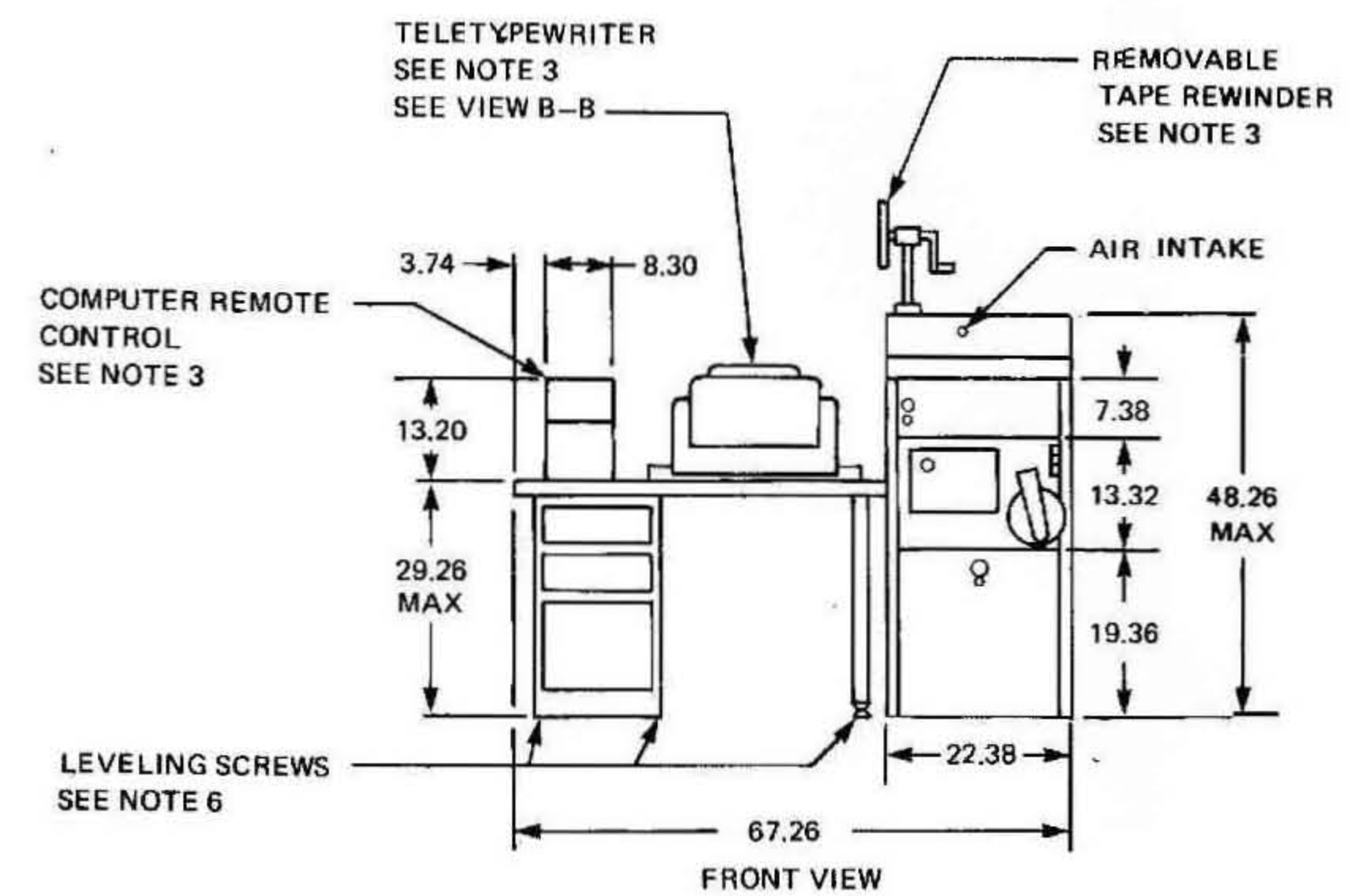
Interconnecting cable types and the conductor grouping may vary among installations.

8-6. UNPACKING AND HANDLING.

8-7. The I/O Console will arrive at the site completely assembled. When shipped by van, the basic unit will arrive at the site uncrated but attached to a skid for ease of handling with a forklift. When shipped by other modes of transportation the basic unit will be attached to a skid and enclosed in a standard shipping crate.

8-8. The following unpacking instructions apply when the I/O Console is received in a shipping crate. If the I/O Console arrives uncrated, omit steps 1, 2, and 3.

1. Remove fasteners from top of shipping crate.
2. Remove top section of crate.
3. Pull away the four sides of crate to expose equipment.
4. Perform a brief visual inspection of I/O Console; note and report any damage to the responsible shipping agency.
5. Move I/O Console to desired area.
6. Remove bolts which hold I/O Console to skid.



NOTES:

1. MOUNTING SURFACE SHALL BE FLAT WITHIN 0.12 OF AN INCH AND UNOBSTRUCTED.
2. 12 INCH BASE OPTIONAL FOR EXTRA HEIGHT.
3. OPTIONAL EQUIPMENT.
4. COVER MUST BE OPENED TO THIS HEIGHT BEFORE BEING REMOVED.
5. PAPER ROLL COVER OPENS TO THIS HEIGHT.
6. WHEN DESK IS FASTENED TO DECK. REMOVE LEVELING SCREWS (6 PLACES) AND DRILL LEVELING SCREW HOLES TO 0.437 IN. TO ACCOMMODATE 3/8 HOLE DOWN SCREWS. PROVIDE (2) 1 INCH HIGH SPACES FOR USE UNDER RIGHT LEG OF DESK.
7. FOR REMOTE TELETYPEWRITER OPTION USE CABLE 7951194.
8. EQUIPMENT GROUNDING TO BE IN ACCORDANCE WITH MIL-STD-1310.
9. MOVE CONSOLE TO DESIRED AREA ON SKID. REMOVE BOLTS WHICH HOLD CONSOLE TO SKID. LIFT OR SLIDE CONSOLE FROM SKID.
10. DIMENSIONS ARE IN INCHES.

SOURCE DWG
RE-D5033783-B

Figure 8-1. OA-7984(V)/UYK I/O Console
Outline and Dimensions (Sheet 1 of 2).

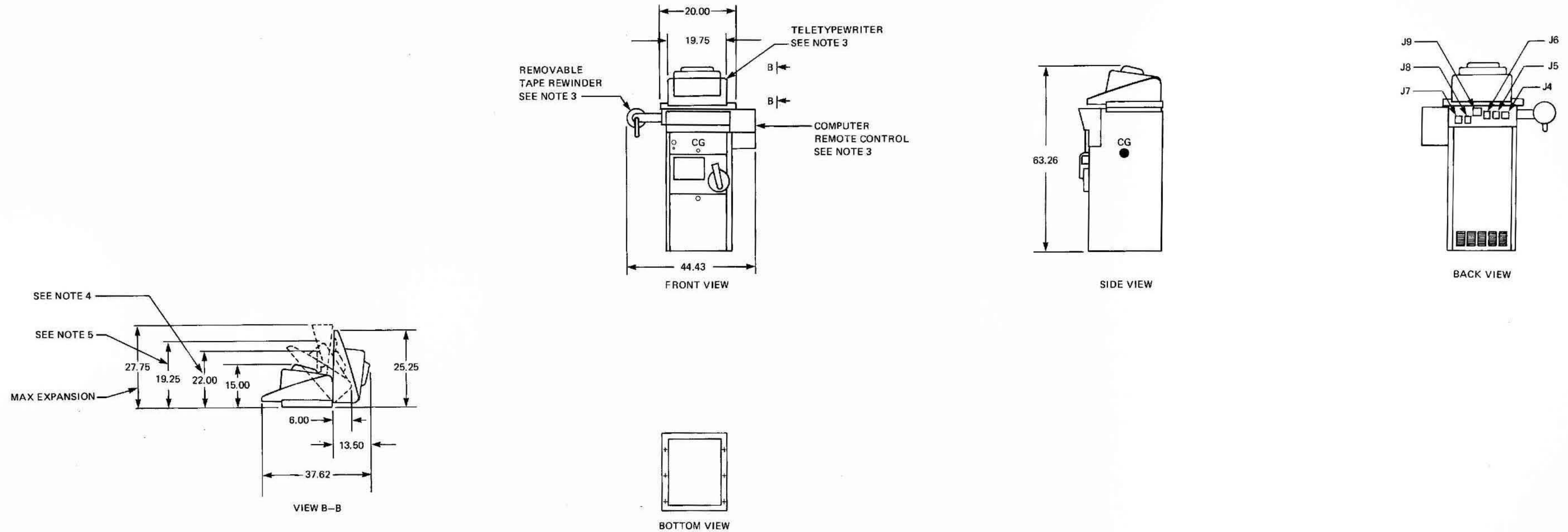


Figure 8-1. DA-7984(V)/UYK I/O Console
Outline and Dimensions (Sheet 2 of 2).

7. Lift or slide I/O Console from skid.

8. Place I/O Console in area shown in installation plans.

8-9. The I/O Console should be inspected for loose hardware, and scratched or chipped paint. Check switches for proper functioning. Ensure all lamps are in place, and all legends clear and undamaged. Ensure that security screws and wiring are intact. Report any discrepancies to the proper authority.

8-10. MOUNTING PROCEDURES. The I/O Console is deck-mounted and may be placed in any convenient location, but in such a way that the operator can easily view the control and indicator panels of both the I/O Console and computer. Provide a minimum 6-inches of clear space behind the I/O Console for air exhaust. Leave approximately 4-feet of unobstructed space in front of and behind the I/O Console to permit the full extension of the I/O Console pull-out chassis and to allow sufficient workspace for maintenance personnel.

NOTE

The I/O cables between the I/O Console and the computer cannot be more than 150-feet long for fast interface, nor more than 300-feet long for slow interface.

8-11. The length of the I/O signal cables will determine the maximum distance which may separate the I/O Console and computer. These cables are fabricated at the installation site to suit particular requirements.

8-12. CABLING REQUIREMENTS. The following paragraph describes cable requirements for the I/O Console.

8-13. Four cables are used with the I/O Console; two of the cables carry operating power to the console, and two of the cables carry signals and data between the I/O Console and computer. The power

and I/O cables are not supplied with the console and must be fabricated. Refer to table 8-1.

8-14. INPUT REQUIREMENTS.

8-15. The input requirements for the I/O Console are summarized here for convenience. Refer to chapter 1 for a more detailed description.

8-16. For its operation, the I/O Console requires power from a 400-Hz power source and a 60-Hz power source. The I/O Console requires 250W of 3 ϕ , 115 \pm 10% VAC, 400 \pm 5%-Hz regulated power for logic circuitry, and 600W of 1 ϕ , 115 \pm 10% VAC, 60 \pm 5%-Hz unregulated power for motors and electromechanical assemblies, and 115-volt line-to-ground (208-volt line-to-line), 400-Hz, 3 ϕ , 250W regulated power for logic circuitry.

8-17. When installing the electrical wiring in the operating area, make provision for controlling the power sources from power distribution panels. Place the panels in a common area to permit the total removal of operating power at a central location.

8-18. Cooling. Heat dissipation for the I/O Console is 2,900 BTU's per hour. To maintain the operating temperature between 0°C (32°F) and 50°C (122°F), the I/O Console circulates 270 ft³/min at 24°C (75°F).

8-19. GROUNDING REQUIREMENTS. The method of grounding the I/O Console is important to ensure the safety of operating and maintenance personnel. Maintenance of the signal line DC level for the I/O communications is also an important consideration.

8-20. A common ground reference is essential for proper operation of the I/O Console and associated computer. The data words transmitted between the I/O Console and computer are in the form of low level DC voltages; any difference in ground potential between the two equipments will affect the ability to discriminate between a logic high and logic low.

Table 8-1. Input/Output Cable Requirements

Max Cable Length in Feet	Cable Type Recommended	Number of Active Conductors
1, 2 1, 2	TSGU-X 2AU-40	3 21 pr
Maximum Branch Ground Cable Length in Feet	Maximum Branch Ground Cable Size	
1	SSGU-X	

NOTES:

¹Branch ground cable, power, and I/O cables should be determined at installation site.

²Maximum cable length from source to destination through switches or junction boxes, where applicable, shall not exceed 300 feet.

8-21. The grounding system must present a low impedance between the I/O Console and computer. A high impedance ground path may increase the rise, fall, and delay times of the data pulses sufficiently to cause a loss of information.

8-22. To provide the shortest possible interconnecting ground scheme, keep the system configuration within the smallest possible floor space. A quasi-ground plane should be used with the I/O Console as shown in figure 8-2. The common tie point or central system ground (E1) is located on the back of the computer. Individual ground straps from the console and the other peripheral equipment terminate at this point. To set up the quasi-ground plane perform the following steps:

1. Install and secure all system equipment in such a manner as to afford a minimum of $1M\Omega$ of DC resistance between any cabinet and primary power ground prior to installation of ground straps, power lines, conducts, or I/O cabling.

2. Connect each unit individually to E1 using interconnecting ground straps that provide maximum surface area per cross sectional area.

3. Connect 400-Hz neutral (E2) to E1.

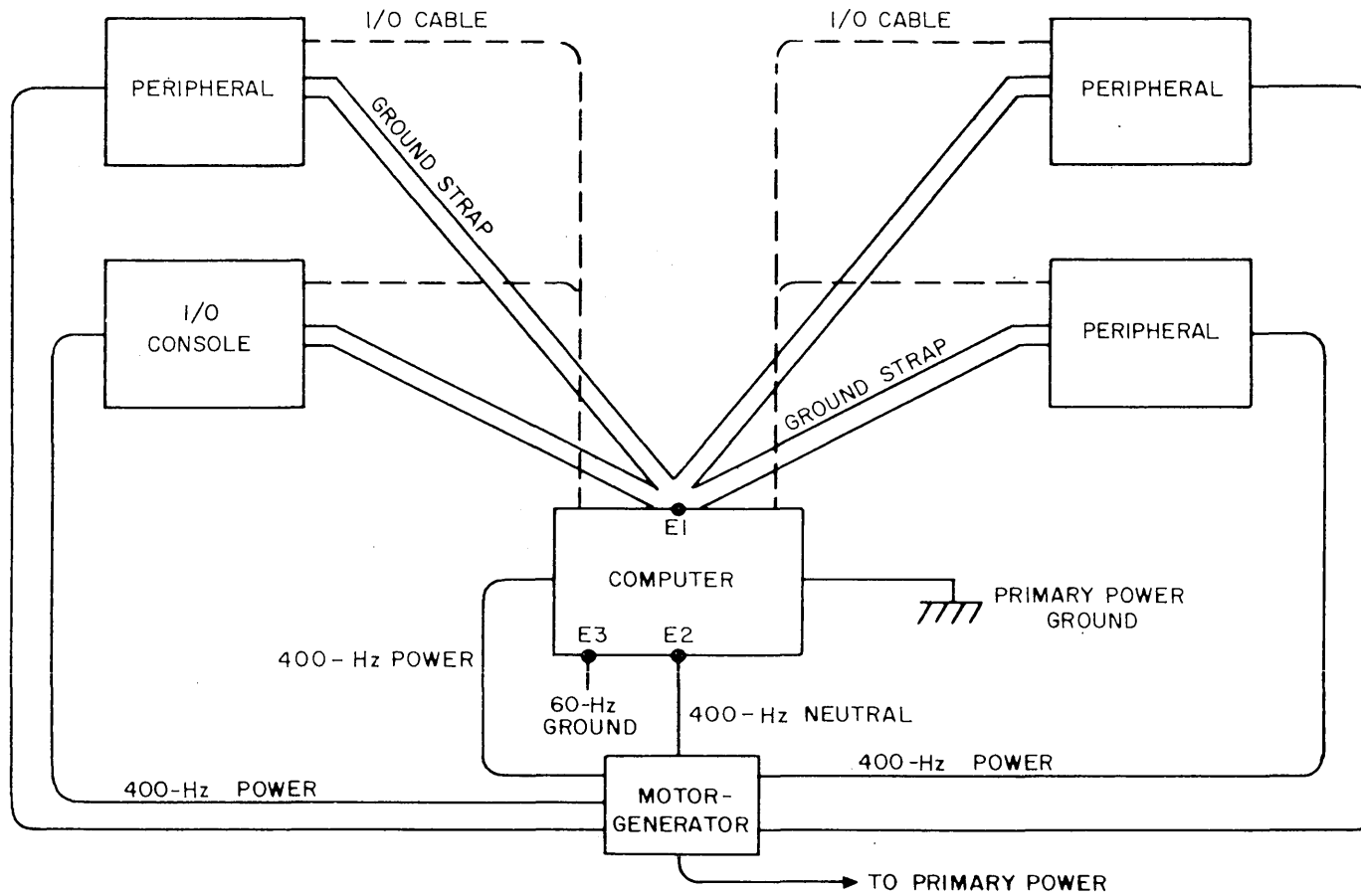
4. Connect 60-Hz ground (E3) to E1.

5. Connect motor generator case to E3.

6. Be sure that shields on I/O cables are adequately grounded to equipment cabinets at both ends.

8-23. CABINET GROUND. The cabinet is grounded to the system ground bus through a branch cable. The branch cable should be of a minimum practical length.

8-24. INTERCABINET GROUND. The ground bus, which has a very low impedance at low frequencies, has a relatively high impedance at the higher frequencies. Because of its low inductance, the ground return wire of each signal-twisted pair carries virtually all the signal return current. Ideally, a signal-twisted pair is carried from an output circuit in one cabinet to an input circuit in another cabinet. If necessary, a common ground return may be used exclusively on the output circuit end of the cable. This is required since the current supplied by an output circuit during transition from the logic low to a logic high state, or vice versa, includes the line changing



SE640-AZ-MMM-010

Figure 8-2. Quasi-Ground Plane System.

current, which is much greater than the direct steady-state current received by the input circuit.

8-25. The cable shield connects to pin 45, which is grounded at both ends to equipment cabinets. This arrangement allows the shield ground to be disconnected at one end if later desired. The aluminum braid armor is primarily for mechanical protection; it serves no direct function in the grounding system, although some protection from radiation is realized. Circuit ground is connected to an internal bus which is isolated from cabinet ground. Provision is made for strapping circuit ground to cabinet ground at a point near the ground lug. This provides maximum flexibility.

8-26. CABLE ASSEMBLIES AND CONNECTOR DATA. A summary of the applicable I/O Console system cables and connector data is given in table 8-2. Cable connector pin, wire and color code assignments are tabulated in table 8-3. The physical location of cable connectors is shown in figure 8-3.

8-27. INSTALLATION.

8-28. INSTALLATION PROCEDURES. Installation personnel must be thoroughly familiar with OPNAVINST 5100.19, Navy Safety Precautions for Forces Afloat before proceeding with the installation of the I/O Console. Ensure compliance with this and any other applicable safety precautions and instructions during the installation of the I/O Console.

8-29. An appropriate foundation must be provided by the installing activity. The I/O Console should be bolted to the foundation using material provided and listed in table 8-4.

8-30. Make all electrical connections in accordance with information provided in table 8-2. Check all connections before attempting to apply power.

8-31. Proper operation with minimum interference requires that all drawers be closed and properly secured. All external cabling connections must be made in accordance with the applicable ship or station cabling plans to conform with MIL-E-16400F.

8-32. INSTALLATION CHECKOUT. The following paragraph contains information relevant to the initial application of power to the I/O Console, as well as the performance of installation procedures. The installation checkout procedure is divided into three phases: phase one, installation inspection and preenergizing procedures; phase two, turn-on and preliminary tests; and phase three, installation-verification test.

8-33. Phase One, Installation Inspection and Preenergizing Procedures. A thorough inspection of the console and individual chassis should be conducted upon completion of the installation and prior to energizing the equipment. Any discrepancies must be corrected prior to applying power. Open all chassis and access doors and inspect for the following:

- a. Damaged or missing fuses and indicators
- b. Damaged or missing lamps and sockets
- c. Loose printed circuit cards
- d. Loose retainers
- e. Components for loose connections or damage
- f. Damaged jacks, plugs, terminals, and pin connections
- g. Hardware secure
- h. Switches and keys (functional)
- i. Defective or missing filter

Table 8-2. Terminal Connector and Conductor Functions

Jack	Function	Mating Connector	Conductor	Jack Part No. ¹
Power (Control Panel) Connectors				
J5	115V, 60-Hz Power	MS3106A20-15P	DSGU-X	(905411-01) MS3102A20-15S
J6	115V, 400-Hz Power	MS3106A20-15PW	TSGU-X	(905411-02) MS3102A20-15SW
E1	Cabinet Ground	-	SSGU-X	-
J4	115V, 60-Hz Convenience Outlet	-	-	7901065-00
I/O Panel Connectors				
J7	Computer Input	DPD4500-1388	2AU-40	259056
J8	Computer Output	DPD4500-1388	2AU-40	259056
J9	Printer/Keyboard	MS3102A20-21S	2AU-40	903889-01

NOTE:

¹Numbers in parentheses refer to Univac part number.

j. Damaged blower or fan assemblies.

8-34. Phase Two, Turn-On and Preliminary Tests. Perform the following operations to apply power to the I/O Console.

a. Set power, 400-Hz and 60-Hz console circuit breakers to the ON position.

CAUTION

In the event that an overtemperature condition occurs after power is applied, immediately set LOGIC POWER switch to the OFF position. Correct the cause of the malfunction before attempting to resume normal operation.

b. Set BLOWER POWER switch to the ON position, and observe that BLOWER POWER indicator lights, and that air is being drawn into the air intake located above the control panel and logic chassis.

c. Set LOGIC POWER switch to ON, and observe that LOGIC POWER indicator lights.

d. Set LOGIC POWER switch to OFF, and observe that LOGIC POWER indicator extinguishes.

e. Set BLOWER POWER switch to OFF, and observe that BLOWER POWER indicator extinguishes and that the blowers stop running.

8-35. INSTALLATION CHECKOUT PROCEDURES. The installation checkout procedures consist of the following:

a. Checking the output voltages from power supply drawer.

b. Checking the temperature sensing devices and associated power control circuits.

c. Check the operation of various indicators and switches.

Table 8-3. Computer Input Cable

Cable Type and Size: 2AU-40		Cable No.: TSGU-X		Cable Connector: 259056	
Signal Reference	Signal Wire		Return Wire		
	Connector Pin	Color	Connector Pin	Color	
Input Request	1	Orange	11	Brown	
Input Acknowledge	2	Orange	12	Blue	
Input Interrupt	3	Green	13	Pink	
Spare #1	4	Green	14	Tan	
Spare #2	5	White	15	Grey	
Spare #3	6	Green	16	Purple	
Spare #4	7	White	17	Brown	
Spare #5	8	Green	18	Yellow	
Data Bit 00	9	White	19	Blue	
Data Bit 01	10	White	20	Orange	
Data Bit 02	22	Red	33	Blue	
Data Bit 03	23	White	34	Pink	
Data Bit 04	24	White	35	Tan	
Data Bit 05	25	White	36	Yellow	
Data Bit 06	26	White	37	Purple	
Data Bit 07	27	Black	38	Grey	
Data Bit 08	28	Black	39	White	
Data Bit 09	29	Black	40	Brown	
Data Bit 10	30	Black	41	Blue	
Data Bit 11	31	White	42	Green	
Data Bit 12	32	Green	43	Grey	
Data Bit 13	47	Red	58	Brown	
Data Bit 14	48	Red	59	Green	
Data Bit 15	49	Black	60	Red	
Data Bit 16	50	Black	61	Yellow	
Data Bit 17	51	Black	62	Purple	
Spare #6	52	Black	63	Green	
Spare #7	53	Black	64	Orange	
Spare #8	54	Black	65	Tan	

Table 8-3. Computer Input Cable (Contd)

Cable Type and Size: 2AU-40	Cable No.: TSGU-X		Cable Connector: 259056	
Signal Reference	Signal Wire		Return Wire	
	Connector Pin	Color	Connector Pin	Color
Spare #9	55	Black	66	Pink
Spare #10	56	White	67	Red
Spare #11	57	Green	68	Brown
Spare #12	70	Red	80	Grey
Spare #13	71	Red	81	Yellow
Spare #14	72	Red	82	Orange
Spare #15	73	Red	83	Purple
Spare #16	74	Red	84	Tan
Spare #17	75	Red	85	Pink
Spare #18	76	Green	86	Orange
Spare #19	77	Green	87	Blue
Shield Ground	45	--	--	--
None	21	--	--	Unused
	44	--	--	
	46	--	--	
	78	--	--	
	79	--	--	
	88	--	--	
	89	--	--	
None	90	--	--	Unused

8-36. POWER SUPPLY. Perform the following steps to check for proper operation of the power supplies.

a. Remove tape bin by unlocking handle, tilting bin forward, pressing catches, and lifting bin out.

b. Pull down power supply (located behind tape bin) by handles.

c. Perform normal turn-on procedure.

d. Connect a voltmeter between TB1 and test points for power supply drawer listed in table 8-5.

e. Set LOGIC POWER and BLOWER POWER switch to the OFF position; observe that LOGIC POWER and BLOWER POWER indicators extinguish and blowers stop running.

f. Lift power supply up by handles and secure.

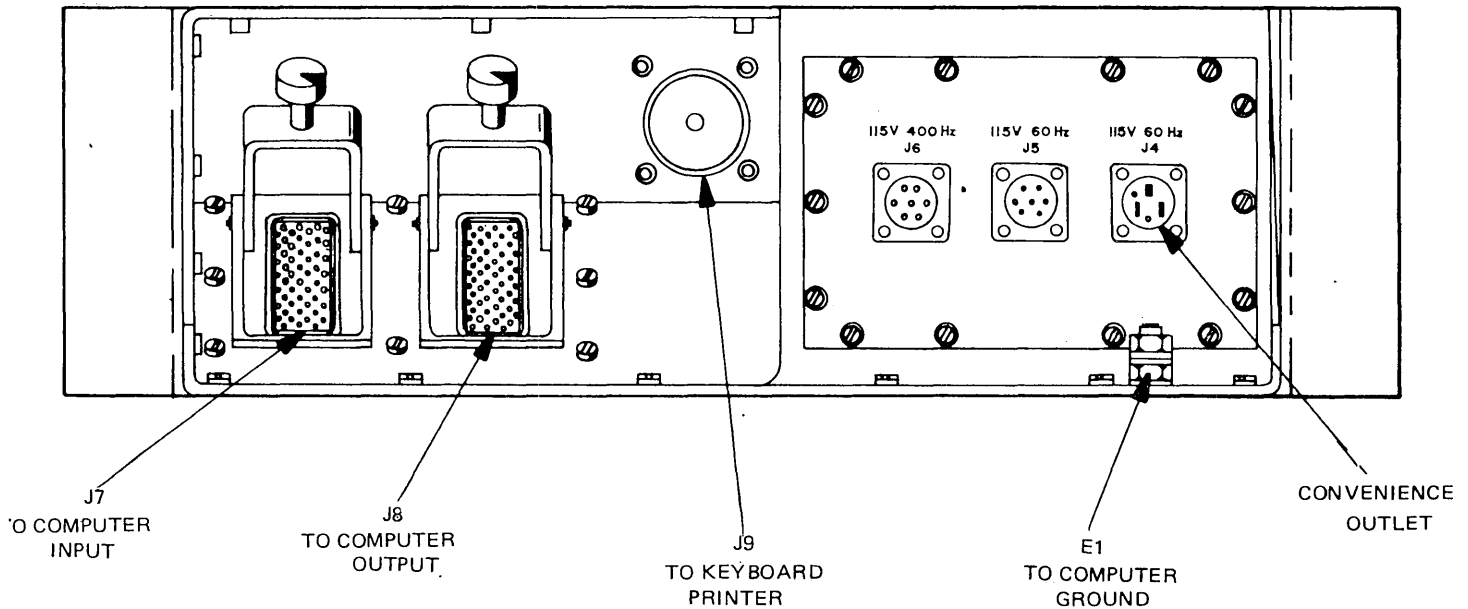


Figure 8-3. I/O Console Cable and Ground Connections.

g. Replace tape bin by performing step a. in reverse order.

8-37. TEMPERATURE SENSING AND POWER CONTROL CIRCUITS. Perform the following steps to check for proper operation of the temperature sensing and power control circuits.

a. Remove rear panel for access to cabinet temperature sensors.

b. Turn logic chassis and control panel lock to left until chassis is released. Pull chassis out to stops. Access to TB1 is gained by dropping control panel down.

c. Pull down power supply (located behind tape bin) by handles, and connect a voltmeter between test points TB1 - * (supply) and TB1 - * (return) to verify that -5 volts are present.

d. Perform normal turn-on procedures.

e. Locate upper cabinet sensor A1.

f. Locate thermostat switches S1 and S2 on sensor (see figure 8-4).

CAUTION

When using a hot air gun to check operation of overtemperature sensors, use caution to prevent possible heat damage sensor and adjacent components and wiring.

g. Use a hot air gun to heat THERMOSTAT switch S1 (figure 8-4). The hot air gun may be removed from the thermostats when operating switches.

h. Observe that, after S1 has been sufficiently heated, overtemperature indicator lights, alarm sounds (115°F thermostat action), and logic voltage remains on.

i. Set NORMAL/ALARM BYPASS switch to ALARM BYPASS.

j. Observe that alarm stops sounding, and alarm bypass indicator lights.

Table 8-4. Summary List of Installation Material

Item No.	Quantity		Nomenclature	Part Type or Model No.	Mfr Name or Code
	NSWE ⁴	SWE ⁴			
1	---	1	I/O Console	0A-7984(V)/UYK	90536
2	---	1	Cable Assembly	7085174	90536 ³
3	---	6	9/16 In. Screws	MS90725-*	2
4	---	6	Nuts, 9/16 In.	MS-51497-18	2
5	---	6	Washers, Lock	MS-35338-49	2
6	---	6	Washers, Flat	MS27183-20	2
7	AR ⁴	---	Cable	2U-40	1
8	AR ⁴	---	Cable	TSGU-X	1
9	---	1	Connector Kit, Computer In	259056	90536
10	---	1	Connector Kit, Computer Out	259056	90536
11	2	---	Lug, Crimp	MS25036-125	1
12	AR ⁴	---	Cable (Ground)	SSGU-X	1
13	---	1	Connector, 60-Hz Power Supply	MS3102A20-15P	---
14	---	1	Connector, 400-Hz Power Supply	MS3102A20-15PW	---

NOTES:

¹To be determined by installing activity.

²For additional information on mounting hardware, see (OM) DWG. NAVSEA RED-5033783B, Sheet 2 of 2.

³This cable assembly is supplied as an integral part of the keyboard/printer.

⁴Abbreviations have the following meanings: AR indicates as required; NSWE indicates not supplied with equipment; SWE indicates supplied with equipment.

k. Remove hot air gun from S1, and heat THERMOSTAT switch S2 (figure 8-4).

p. Observe that -5V logic supply voltage returns.

l. Observe that, after S2 has been sufficiently heated, logic supply voltage shuts off (refer to step c.).

q. Remove hot air gun from S2.

m. Set NORMAL/BATTLE SHORT switch to BATTLE SHORT position.

r. Observe that, after thermostats have cooled sufficiently, overtemperature indicator extinguishes.

n. Observe that battle short indicator lights.

s. Set NORMAL/BATTLE SHORT switch to the NORMAL position.

o. Momentarily operate the LOGIC POWER switch to the OFF, and then ON positions.

t. Observe that the alarm bypass indicator extinguishes, and alarm does not sound.

Table 8-5. I/O Console Power Supply Voltages

Power Supply (volts)	Voltage Range (volts)	Maximum Ripple (Peak-to-Peak) (volts)	Fuse Test Points
-15	-13.5 to -16.5	0.7	F8
-28	-27 to -33	0.7	F11
+15	+13.5 to +16.5	0.7	F9
-4.5	-4.0 to -5.2	0.7	F10

u. Locate lower cabinet temperature sensor A6.

v. Repeat steps f through t.

w. Perform normal turnoff procedures.

x. Remove voltmeter from TB1; lift power supply to NORMAL position.

y. Replace rear panel; lift control panel up, push chassis in, and turn lock to the right until chassis is secured.

8-38. Indicators and Switches. Perform the following procedures to check for proper operation of indicators and switches on the I/O control panel.

a. Perform normal turn-on procedure.

b. Set OFF LINE/ON LINE switch to OFF LINE position.

c. Press MASTER CLEAR switch to clear I/O Console circuits.

d. Set tape reader ON/OFF switch, tape perforator ON/OFF switch, and keyboard/printer ON/OFF switch to ON position.

e. Depress READ, START READ, PUNCH, and PRINT switches.

f. Observe that indicators set in step e. do not clear.

g. Press MASTER CLEAR switch.

h. Observe indicators in step e. clear.

i. Press READ, START READ, and PUNCH switches.

j. Observe that indicators set in step i. do not clear.

k. Press MASTER CLEAR switch.

l. Observe that indicator in step i. clear.

m. Press READ, START READ, and PRINT switches.

n. Observe that indicators set in step m. do not clear.

o. Press MASTER CLEAR switch.

p. Observe that indicators set in step m. clear.

q. Perform normal turnoff procedure (see paragraph 8-36 step e.).

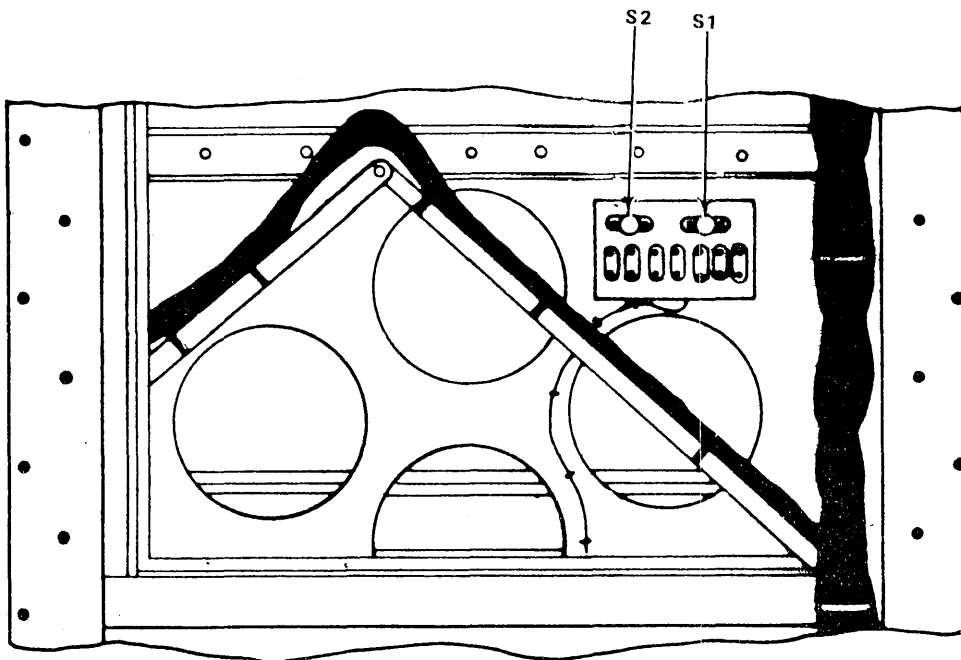


Figure 8-4. I/O Console Cabinet Thermostats.

8-39. Phase Three, Installation-Verification Test. The installation-verification test is conducted by successful completion of the Programmed Operational Functional Analysis (POFA).

On-line and off-line operating procedures to be used in checking the functional operation of the I/O Console are described in the appropriate POFA manual listed in table 8-6.

Table 8-6. List of I/O Console POFA's Available

Title	Computer	Document ¹	NAVSEA Number ²	Class
OA-7984 I/O Console	642 A/B/855	Op Proc	0967-LP-011-4890	U
OA-7984 I/O Console	642 A/B/855	Prog List	0967-LP-011-4900	---
OA-7984 I/O Console	642 A/B/855	Prog Tape	0967-LP-011-4910	---
Stand Offline UYK-7 TEST Driver (Rev 2)	AN/UYK-7	---	0967-LP-011-5110 Revision 1	U
OA-7984(V)/UYK I/O Console	AN/UYK-7	Op Proc	0967-LP-011-6521	U
OA-7984(V)/UYK I/O Console	AN/UYK-7	Prog List	0967-LP-011-6531	---
OA-7984(V)/UYK I/O Console	AN/UYK-7	Prog Tape	0967-LP-011-6541	---

NOTE:

¹ Definitions for DOCUMENT are as follows:

Op Proc - Operating Procedure

Prog List - Program Listing

Prog Tape - Program Tape

²Books referenced from NAVSEA 0967-LP-011-0172, Combat Director Systems (CDS) test software, user documentation index, dated 1 Nov 1984.