55401–90002
Edition A

HP 55400A NETWORK SYNCHRONIZATION UNIT

SITE PREPARATION GUIDE

1. PURPOSE OF THIS GUIDE

1.1. This guide provides information that will help you to prepare your site for the installation of the Hewlett-Packard 55400A Network Synchronization Unit (NSU). This information includes such items as connector pinouts that are not part of the *HP 55400A User's Manual*. **Keep this document for future reference.**

1.2. This guide is intended for use by planners, engineers, technicians, and craft personnel.

Assumptions Made in This Guide

1.3. This site preparation guide was developed with the following assumptions:

- The reader of this guide is familiar with basic electronics and the typical requirements associated with telecom equipment installations.
- A −48 Vdc source is being used to power all telecom equipment to be installed.
- This document will be used as a reference when building all cables for connection to the HP 55400A subracks. After completing the tasks in this guide, continue with chapter 4, "Installation," in the *HP 55400A User's Manual*.

2. SYSTEM OVERVIEW

2.1. The HP 55400A (shown in Figure 1) is a modular, fully redundant timing distribution system for 2048 kbps or 2048 kHz primary rate networks. It is ideal for situations where SDH (Synchronous Digital Hierarchy) technology is being deployed or expanded. The system provides precise timing synchronization signals to network equipment within a wireline network node or office.

2.2. The HP 55400A (Figure 1) conforms to telecommunication design standards, supporting both the ETSI SSU (Synchronization Supply Unit) and the Bellcore BITS (Building Integrated Timing Supply) concepts. The HP 55400A tracks up to nine incoming reference signals from higher or equal levels of the network, qualifies the signals, then filters and distributes a precise signal to the node's equipment. Incoming reference signals may come from cesium standards at the top level of the network, GPS reference sources, or live traffic signals.

2.3. The HP 55400A consists of a master subrack (HP 55401B) and plug-in cards that provide the following functions:

- Tracks incoming reference signals (ITH cards)
- Distributes synchronization signals (output cards)
- Manages alarms (AIC)
- Provides local and remote network and alarm management (IMC)

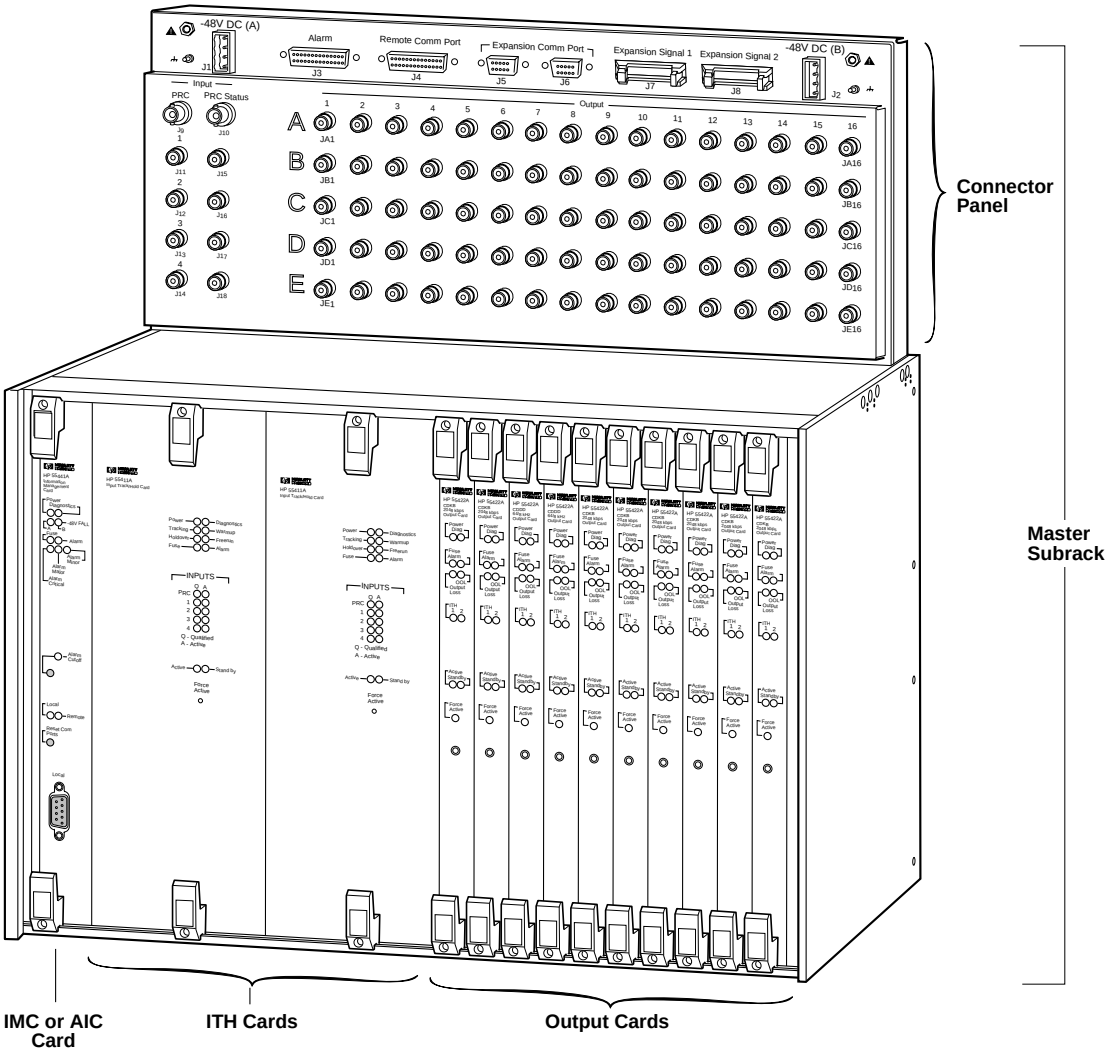


Figure 1. HP 55400A Network Synchronization Unit

2.4. Systems that require more than 80, 1:1 protected outputs can be configured with expansion subracks (HP 55402B) under the control of the master subrack. Up to four expansion subracks can be supported providing a total of 400, 1:1 protected outputs.

2.5. The HP 55400A accepts up to nine reference inputs. One input is for a primary reference clock (PRC) of 5 or 10 MHz and eight inputs accept any combination of 2048 kbps or 2048 kHz signals.

2.6. Output cards can be of three types:

- 2048 kbps.
- 2048 kHz.
- Composite clock 64/8 kHz.

2.7. Each pair of protected output cards, or each individual unprotected card, provides 16 output signals.

3. A TYPICAL SYSTEM CONFIGURATION

3.1. A typical system configuration is shown in Figure 2. The system includes the following equipment:

- HP 5071A Primary Frequency Standard.
- HP 55300A GPS Telecom Primary Reference Source.
- HP 55400A Network Synchronization Unit.
- A computer for local management control.

3.2. The system configuration is included only as an example to help you plan your installation. The drawing shows the amount of space occupied by each device and suggested mounting positions. If your installation also includes a GPS frequency source, one important element requiring advance planning is the antenna system. The process of determining how to install the antenna, whether you need line amplifiers for the required cable length, lightning protection, and more should be considered while planning for the installation of a GPS telecom frequency source.

3.3. A configuration guide titled, “Designing Your GPS Antenna System,” (HP Publication Number 5964-9068E) is available from your local HP sales office. This document can assist you in planning your antenna system.

3.4. Most telecom equipment is operated from a −48 Vdc source. The equipment usually has two power inputs so that the failure of one power source cannot cause the device to fail. Ensure this redundancy is maintained by running power from two separate sources to dual-power input devices.

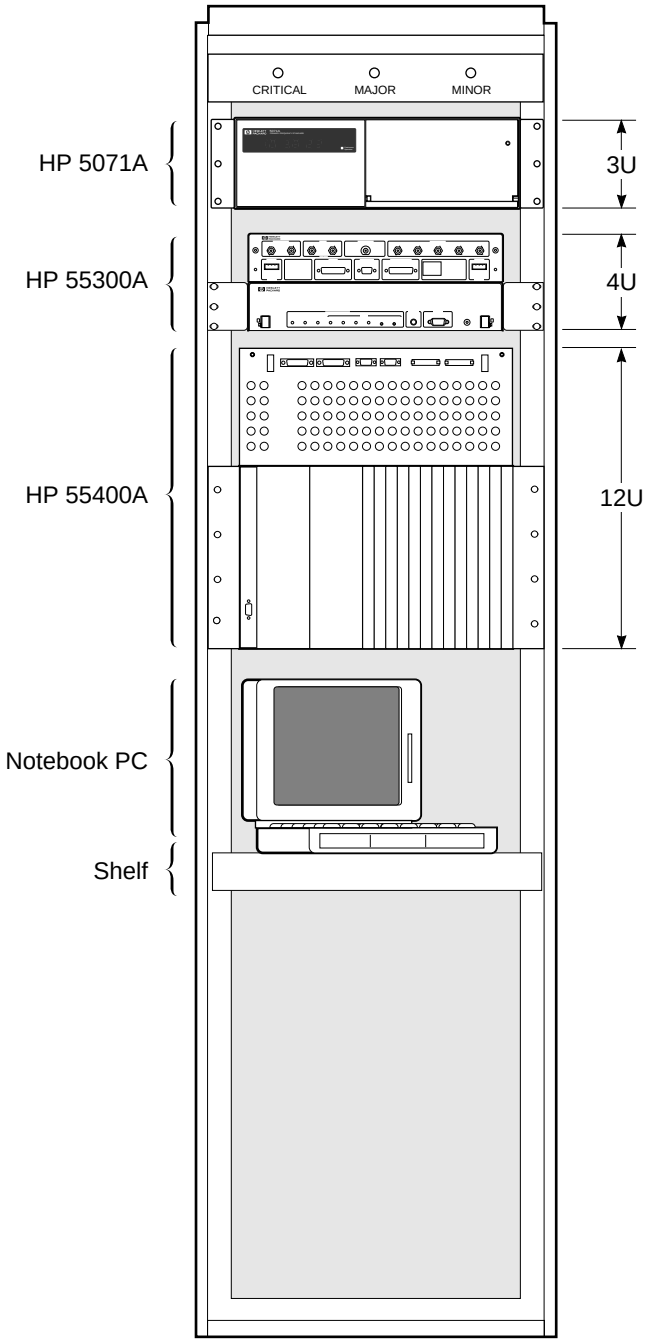


Figure 2. A Typical System Configuration

4. SPACE REQUIREMENTS

4.1. Use the information in this section to help allocate floor space and rack space for the planned equipment installation.

A. Rack Description

4.2. You may be preparing to install equipment into a telecom rack consisting only of upright rails with no doors or panels, or you may want to install your equipment in a more secure, enclosed rack cabinet. For example, in an ETSI environment the typical rack cabinet dimensions are 2200 mm H × 600 mm W × 300 mm or 600 mm D.

4.3. The depth required will depend on the specific equipment being installed. The HP 55400A will fit into a 300 mm deep opening although an HP 5071A Primary Frequency Standard will require the 600 mm depth. Evaluate your own situation when deciding on the rack cabinet size needed.

B. Racking Space

4.4. Typically, a 2200 mm rack will provide usable racking space of 2000 or 2050 mm. In standard units of 25 mm, this is 80 or 82 standard units. This can also be expressed as 45 or 46 rack units where one rack unit (U) is equal to 44.45 mm/1.75 in.).

C. Telecom Equipment Dimensions

4.5. The dimensions of the equipment shown in Figure 2 are included here so you can estimate the space requirements in your rack. The height is expressed in millimeters and rack units.

Table 1. HP 5071A Primary Frequency Standard Dimensions

Height	134 mm (3U)
Width	426 mm
Depth	524 mm
Weight	30 kg*

* You must use support rails or a support shelf with the HP 5071A.

Table 2. HP 55300A GPS Telecom Primary Reference Source Dimensions*

Height (with ETSI rack mount shelf)	169 mm (4U)
Width	425 mm
Depth	258 mm
Weight	3.6 kg

* The dimensions in Table 2 are for the HP 55320A ETSI rack mount shelf. The HP 55300A is a GPS reference source module that is inserted into the shelf.

Table 3. HP 55400A NSU Dimensions (HP 55401B Master Subrack)

Height	533 mm (12U)
Width	435 mm
Depth	275 mm
Weight	18 kg (fully loaded)

D. Rack Mount Flanges

4.6. The HP 55400A includes rack mount flanges for both ETSI (535 mm/21 in.) and EIA (482.6 mm/19 in.) racks.

4.7. For information about the rack mounting requirements for the other equipment, consult the documentation for those products.

E. Expansion Subracks

4.8. For applications requiring more than 80 outputs, up to four expansion subracks can be used with one master subrack. The dimensions of the expansion subrack (HP 55402B) are identical to those of the master subrack (HP 55401B). See the cabling diagram in Figure 8.

5. ENVIRONMENTAL REQUIREMENTS

5.1. The HP 55400A is designed for installation into a standard equipment room environment. The operating temperature range is 5°C to 40°C.

> **Caution:** Do not install the HP 55400A near motors, generators, transformers, or other equipment which can radiate strong magnetic fields. Location near such equipment may impair operation of the HP 55400A.

5.2. Whether installed in a telecom rack or a rack cabinet enclosure, leave an air gap of 50 mm below the HP 55400A to encourage maximum air flow through the unit. If a filler panel is used to cover the front opening below the subrack, be certain there is an unobstructed opening for ventilation on the other three sides of the reserved space.

Rack Cabinet Ventilation

5.3. If the rack cabinet will have a door on the front, leave the back of the rack open, if possible, or use a vented rear wall. Should the rack need to be enclosed on four sides, provide an opening at the top and bottom of the rack cabinet to allow ventilation via convection.

6. POWER REQUIREMENTS

6.1. Due to the high reliability requirements for telecom equipment, it is recommended that you take advantage of the dual-redundancy power supply capability of the HP 55400A by providing two separate power connections to the equipment rack or cabinet from separate power sources.

A. Current Demands

6.2. Table 4 lists the maximum current usage for the equipment shown in the system configuration, Figure 2.

Table 4. Maximum Current Usage

Equipment	Current Demands
HP 55400A	7 A at −48 Vdc
HP 5071A	3 A at −48 Vdc
HP 55300A	1 A at −48 Vdc

6.3. If you are planning for multiple 55400A subracks, sum the individual current demands of each subrack to help determine the power cable specification.

B. Fusing Recommendations

6.4. Individual situations will differ in regard to the fusing requirements. Some installations will incorporate fusing as part of the power source itself so fusing at the rack may not be necessary. It is recommended that the power source be fused. Then power can be routed to a power strip or busbar in the rack for distribution to the equipment.

6.5. The HP 55400A plug-in cards have individual fusing for the −48 V supply. If additional fusing is desired, a 10 amp fuse box for each −48 Vdc line is recommended.

> ***Note:*** Perform all power installation tasks in accordance with local electrical ordinances.

7. REQUIRED ACCESSORIES AND TOOLS

Accessories

7.1. An installation accessories kit will be supplied with the HP 55401B. It contains connectors you will need for making cables. These connectors are also available in a kit that can be ordered separately if you want to prepare the cables beforehand. To obtain the connectors, order the following part number, HP p/n 55401-67001. The items included in this kit are described in Table 5. These are the same items that will be included with the shipment of the HP 55401B.

Table 5. Installation Accessories Kit (HP p/n 55401-67001)

Accessory	Qty	Purpose	HP Part #
Modular interlocking connector	2	−48 Vdc power inputs	0360-2599
25-pin connector – IDC type (female)	1	Alarm connector	1252-7105
25-pin connector – IDC type (male)	1	Remote port on master subrack	1252-7104
9-pin connector – IDC type (male)	1	Local port on Information Management Card	1252-7107
Spade lug connectors	2	Frame ground connection	0360-0041
Screw-10-32 w/nylon washer	6	EIA Rack mounting	0570-1366
U-nut	6	EIA Rack mounting	0590-0804

Tools

7.2. Table 6 describes the required tools and where they are used. The list of tools does not include a crimp tool that will be needed to make the mating connectors for the input/output BNC or Siemens-type connectors that were ordered for your HP 55401B subrack.

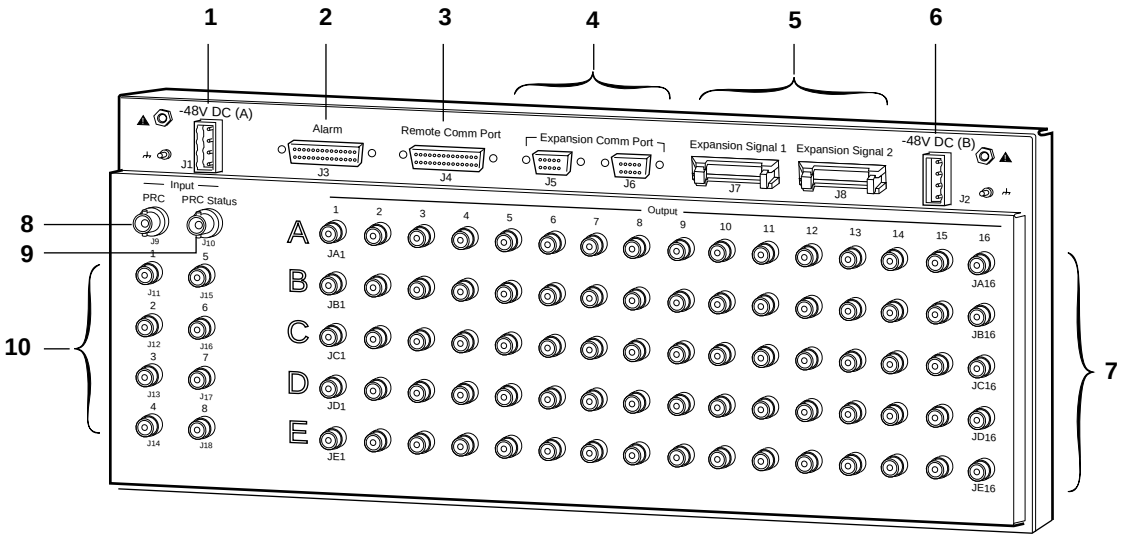
7.3. Request purchase and ordering information for crimping tools from a vendor of the connectors you will be using. More details are included in the section below, “Cabling and Connectors.”

Table 6. List of Tools

Tool	Purpose
Multimeter (HP E2377A handheld multimeter or equivalent)	Checking voltage and cables for opens/shorts
Pozidriv® #2 screwdriver	Rack mounting screws
Small flat blade screwdriver (blade approx. 3.4 mm wide)	Power input connectors
AMP Manual Arbor Tool (AMP p/n 608868-1)	Connector crimping device for making alarm, remote comm, local comm cables
7 mm nut driver	Frame ground stud on subrack front panel
Wire stripper	Making cables
Diagonal cutters	Making cables

8. CABLING AND CONNECTORS

8.1. This section provides information about preparing the cabling and connectors for mating with the front panel power, alarm, and communication functions. Refer to Figure 3 for the location of the front-panel connections.



1 DC input connector, modular interlocking (A).

2 Alarm connector, 25-pin male, IDC type.

3 Remote Comm Port connector, 25-pin female, IDC type.

4 Expansion Comm Port connectors, two 9-pin (one male, one female).

5 Expansion Signal connectors, two 16-pin (both male).

6 DC input connector, modular interlocking (B).

7 80 output connectors. BNC-type is standard; Siemens-type available as Option 001.

8 PRC (5 or 10 MHz only) input reference connector (only BNC-type available).

9 PRC Status input connector (only BNC-type available).

10 Eight 2048 kHz/kbps input reference connectors. BNC-type is standard; Siemens-type available as Option 001 (shown).

Figure 3. Connector Panel Detail

Example of Cabling

8.2. There are a number of ways to group and run the cables that you will connect to the HP 55401B. Figure 4 shows an example of how cables might be run in facilities that have overhead cabling.

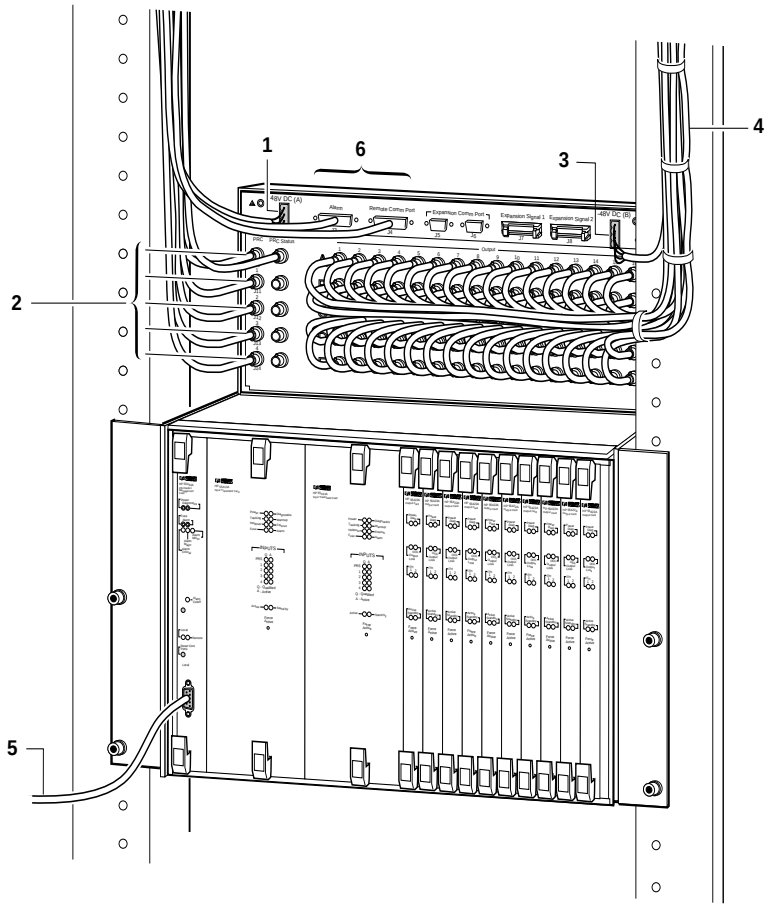


Figure 4. Example of a Cabled HP 55401B Master Subrack

1 **DC input connector (A)** cabling

2 **Input references** connector cabling

3 **DC input connector (B)** cabling

4 **DC input connector (B)** and **Output connector** cabling

5 Information Management Card **local serial connector** cabling to PC

6 **Alarm** and **Remote Comm Port** cabling

A. ±48 Vdc Inputs (2)

8.3. The procedures that follow describe how to prepare and route the dc power cabling for the HP 55400A.

> **WARNING:** The Network Synchronization Unit uses a −48 Vdc office battery as its primary voltage source. Though not normally considered high voltage, the office battery has more than the minimum power necessary to present a potential fire hazard. Use extreme caution when working around or connecting circuits energized by the office battery.

Cabling Recommendations

8.4. Power to the master or expansion subrack is applied at the connector panel. Use the following procedure to provide power to the subrack.

a. Following local practices, select a wire size appropriate to ensure an office battery voltage of –36 to –60 Vdc at the master or expansion subrack. (Use wire size no larger than 2 mm diameter.)

b. Switch off the circuit breakers or remove the fuses to the branch circuit feeds intended for the master or expansion subrack.

c. Route redundant ('A' and 'B') −48 Vdc office battery feeds to the master subrack to ensure uninterrupted operation. If your facility does not provide redundant 'A' and 'B' battery sources, split the power feeds at the main battery distribution fuse board (BDFB), a branch battery feed panel, or at the master subrack itself.

d. If split from the BDFB or branch panel, run the 'A' and 'B' battery feeds to the master subrack through cable runs on opposite sides of the facility. Running both feeds in the same cable rack creates a single-point source of power failure and should be avoided.

e. Route the power cables down (up if the facility has sub-floor cable runs) the sides of the rack ('A' feed on one side and 'B' on the other). Leave a length of cable for both feeds sufficient for later arrangement into the cable bundle and for attaching the modular power connectors.

f. Check the battery feed lines for continuity, shorts to one another, and to ground.

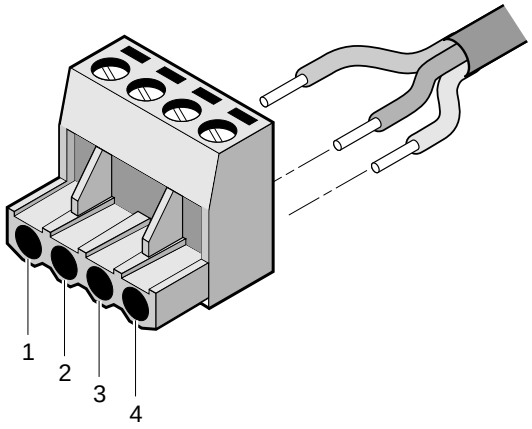
g. Connect the leads of the battery feed lines to the branch circuit power source terminals according to local practices.

h. Set the branch circuit breakers to On or re-install the branch fuses.

i. Measure the voltage of the battery feed leads at the subrack. The voltage must measure in the range –36 to –57 Vdc.

Assembling Power Connector

8.5. Use the following procedures to provide frame ground and dc power to the HP 55401B subrack. Figure 5 shows the pin assignments for the office battery power connections. Read about grounding issues in the next section.



1 chassis ground

2, 3 dc battery return (Com Gnd)

4 −48 Vdc supply

Figure 5. Power Connector

> **Caution:** Com Gnd pins of the two −48 Vdc subrack connectors are internally connected.

a. Strip 9 mm of insulation from the wires. (Use wire no larger than 2 mm diameter.)

b. Connect the chassis (frame) ground wire (if present) to plug position 1.

c. Connect the Com Gnd (battery return) wire to plug position 2 or 3.

Note: Ensure that the battery return is low noise.

d. Connect the −48 Vdc wire to plug position 4.

B. Grounding Issues

8.6. A frame ground can be connected in one of three ways:

- As part of the −48 Vdc modular connector.
- Through a single-wire connection to the ground stud on the front panel. (Use the spade lug that is part of the installation kit.)
- Through the rack mount brackets and assembly when the rack itself is properly grounded.

8.7. To prevent battery return-to-frame ground faults, do not connect battery return on the subrack to the frame ground.

8.8. The difference voltage measured between frame ground and battery return should not exceed ± 15 V to avoid damage to the transient suppressor. This component protects the system from noise on the power supply.

C. Reference Inputs

8.9. The PRC (primary reference clock) and PRC Status inputs both use only BNC connectors.

8.10. The remaining eight inputs (and all the outputs) can be either BNC or Siemens 75 Ω 1.6/5.6 connectors, depending on how the subrack is ordered. BNC connectors are standard. Option 001 substitutes Siemens connectors.

8.11. Male-type BNC connectors are available from vendors such as AMP. Siemens connectors are screw-on/snap-on (Type A or B) cable connectors (Siemens p/n V23612-A1027-A1). The mating connectors will need to be selected based on the diameter of the cable used. Table 7 lists some of the Siemens connectors available for different cable diameters.

8.12. When building cables, follow the suggested cable assembly procedures supplied by the vendor of the connectors.

Table 7. Available 75 Ω Siemens Cable Types and Connectors

Cable Type	Cable Diameter (mm)	Siemens Connector Part Number
RG 179	2.67	V23612–A602–G41
02XSCC(St)6Y 0.37/1.6	3.3	V23612–A602–G73
02XSC(mS)C6Y 0.45/2.0	3.8	V23612–A602–G62
2YCY 0.4/2.5	4.0	V23612–A602–G42
2YCCY 0.4/2.5 2YC(mS)CY 0.4/2.5	5.0 5.0	V23612–A602–G45
2YCY 0.7/4.4	6.1	V23612–A602–G49
2YCCY 0.7/4.4	7.8	V23612–A602–G50
2YC(mS)CY 0.5/3.0	6.2	V23612–A602–G46

D. Outputs

8.13. The HP 55401B master subrack has 80 outputs. The connectors are female-type and can be either BNC or Siemens-type 75 Ω

1.6/5.6 connectors. BNC connectors are standard. Ordering the 55401B subrack with Option 001 substitutes Siemens connectors in place of the BNC output connectors. Refer to the section, "Reference Inputs," above for more information on Siemens connectors.

E. Alarm Connector

8.14. The HP 55401B master subrack front panel has a single 25-pin D male connector (J3) for all office alarms supported by the Information Management Card or Alarm Interface Card assemblies. A total of seven alarms are available:

- Critical Visual
- Critical Audible
- Major Visual
- Major Audible
- Minor Visual
- Minor Audible
- Card Assembly Fuse

8.15. All alarm relay outputs are Form-C, dry contact closures (common, alarmed open, and alarmed closed) except for the card assembly fuse alarm which supplies a −48 Vdc alarm-active output.

8.16. Alarmed open (AO) relay contacts are held closed during normal operation. An alarm condition will cause the AO relay contacts to open. Likewise, an alarmed closed (AC) relay will have contacts held open during normal operation. An alarm condition will cause the AC relay contacts to close.

Combining Critical and Major Alarms

8.17. If your facility supports only major and minor alarms, the Information Management Card or Alarm Interface Card can be configured to combine critical and major alarms. See switch setting S5–3 in Table 15 or 16.

> ***Note:*** When critical alarms are combined with major alarms, the critical relays are enabled to indicate the latched condition of the Alarm Cutoff switch (ACO). That is, any time that the ACO is activated to silence an audible alarm, the critical relays (audible and visual) will go into the alarmed condition.

8.18. The J3 Alarm connector mates with a 25-pin D female connector that is customer-wired. Table 8 lists the pin numbers along with their alarm function. See Figure 3 for the subrack front-panel connector locations.

Table 8. Alarm Connector Pinout (J3)

Pin Number	Description
1	Card Assembly Fuse Alarm— –48V
2	Minor Alarm Audible—alarmed open
3	Minor Alarm Audible—common
4	Minor Alarm Visual—alarmed open
5	Minor Alarm Visual—common
6	Major Alarm Audible—alarmed open
7	Major Alarm Audible—common
8	Major Alarm Visual—alarmed open
9	Major Alarm Visual—common
10	Critical Alarm Audible—alarmed open
11	Critical Alarm Audible—common
12	Critical Alarm Visual—alarmed open
13	Critical Alarm Visual—common
14	GND (Ground)
15	Minor Alarm Audible—alarmed closed
17	Minor Alarm Visual—alarmed closed
19	Major Alarm Audible—alarmed closed
21	Major Alarm Visual—alarmed closed
23	Critical Alarm Audible—alarmed closed
25	Critical Alarm Visual—alarmed closed

8.19. Each alarm can be wired as alarmed open (AO) or alarmed closed (AC). Refer to your alarm system to determine the appropriate configuration.

Note: If your office alarm system uses AO contacts, provide jumpers on your alarm system to override the alarm(s) while wiring the office alarm connector.

Note: If your office alarm system uses only major and minor alarms, wire those pins only. Then configure the IMC or AIC card to connect critical alarms generated by the HP 55400A to the major alarm relays. (See Tables 15 and 16.)

8.20. Once the alarm cable is fabricated, test the wiring as needed for this installation. Short together the common and alarm lines for AC relays to generate an alarm. Remove jumper from the common and alarm lines for AO relays.

F. Remote Comm Port

8.21. The HP 55401B subrack front panel has a 25-pin D female connector (J4) located on the Connector Panel for remote serial data communications supported by the Information Management Card. Through this port it is possible to perform network management tasks including security management, configuration, performance monitoring, and fault diagnosis. These same tasks can be performed via the Local Port described below. See Figure 3 for the subrack front-panel connector locations.

PC Connection

8.22. The Remote Comm Port supports communication with a remote serial data terminal or computer equipped with an RS-232C serial port and a terminal emulator program. The port is a standard serial interface with full-duplex capability (DTE configuration). Table 9 shows the pinout for the Remote connector. Signal voltage levels comply with the EIA-232-E standard and mates with a supplied 25-pin D male connector.

Modem Connection

8.23. A modem cable is available from HP (HP 40242M). It is a 5 meter, standard 25-pin male connector to 25-pin male connector. Otherwise, the 25-pin male connector that is supplied in the Installation Accessories Kit can be used for a cable you make.

8.24. If you choose to make your own cable, see Figure 6. This figure illustrates the HP 24542G cable (25-pin male to 9-pin female connector). Note that pins 2 and 3 do not cross; nevertheless, this cable is a null-modem cable.

Table 9. Remote RS-232C Connector Pinout

Pin Number	Description (DTE)
2	TxD (Transmitted data)
3	RxD (Received data)
4	RTS (Request to send)
5	CTS (Clear to send)
6	DSR (Data set ready)
7	GND (Signal ground)
8	DCD (Data carrier detect)
20	DTR (Data terminal ready)
22	RI (Ring indicator)

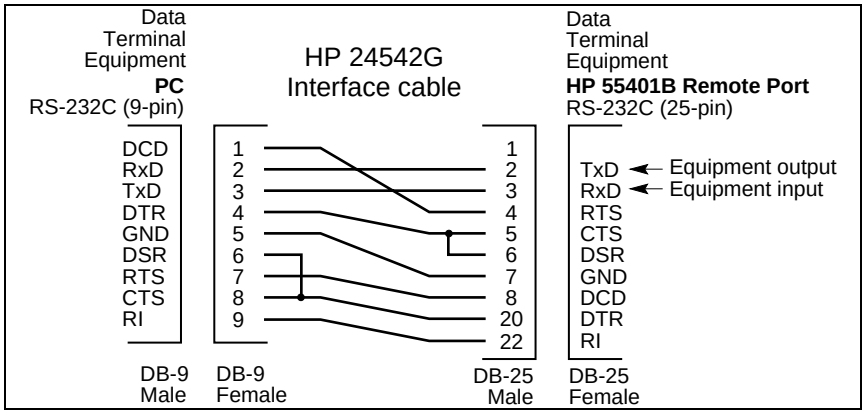


Figure 6. Remote Comm Port Connector

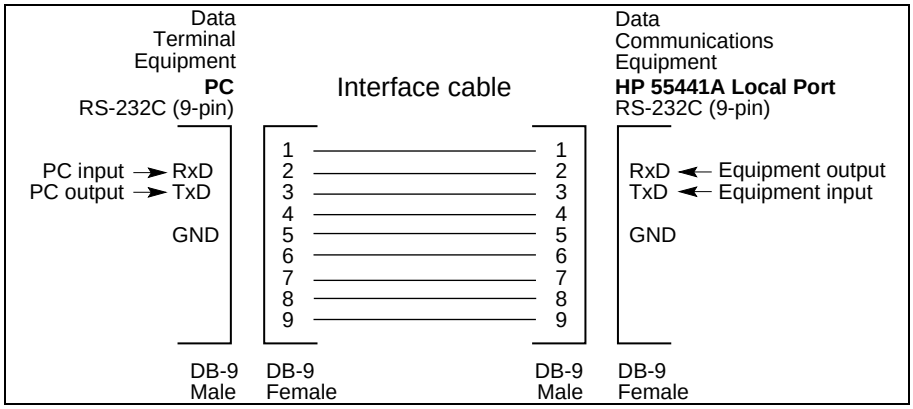


Figure 7. Local Comm Port Connector

G. Local Port

8.25. This port (located on the Information Management Card) is wired as a DCE device and provides for system communication with a local terminal or computer running a terminal emulator program. Table 10 shows the pinout for the Local port connector. It is a 9-pin female connector. Through this port it is possible to perform network management tasks including security management, configuration, performance monitoring, and fault diagnosis. These same tasks can be performed via the Remote Comm Port described above.

8.26. A serial communications interface cable wired as a straight-through cable is needed to connect between the Local port and a computer. The Local port uses a DB-9 female connector while PC Com ports typically use a DB-9 male connector. In many cases, you may find that interface cables are terminated with either male or female connectors at both ends. Use a "gender changer" connector to allow correct mating of the connectors.

8.27. If you choose to make your own cable, see Figure 7. An illustration shows the cable (9-pin female to 9-pin male connectors). Make a cable to go from the 9-pin male connector (included in the Installation Accessories Kit) to a 9-pin female for mating to the serial port on the controller.

Table 10. Local RS-232C Connector Pinout

Pin Number	Description (DCE)
1	DCD (Data carrier detect)
2	RxD (Received data)
3	TxD (Transmitted data)
4	DTR (Data terminal ready)
5	GND (Signal ground)
6	DSR (Data set ready)
7	RTS (Request to send)
8	CTS (Clear to send)
9	RI (Ring indicator)

Expansion Subracks

8.28. A master subrack (HP 55401B) can support up to four expansion subracks (HP 55402B). The internal communications between the master subrack and expansion subracks are accomplished via the Expansion Comm Ports and Expansion Signal connectors. Refer to Figure 3 for a view of the connector panel. The cabling requirements for expansion subracks are described below.

H. Expansion Comm Port (2)

8.29. If you are planning to communicate with the HP 55400A system via terminal or computer, cables will be needed for the Expansion Comm Port connections. These ports use a daisy-chain scheme that is shown in Figure 8 below. The J5 connector of the master subrack is connected to the J6 connector of the first expansion subrack, and so on (see Figure 3 for location of J5 and J6). A loop will be closed when the cable from the last expansion subrack is connected to the J6 connector of the master subrack. See Figure 8.

8.30. The Expansion Comm Port connectors are two DB-9 connectors (1 male, 1 female).

I. Expansion Signals (2)

8.31. There are two 16-pin Expansion Signal connectors that provide backplane bus access for all the internal communications between the multiple subracks. The "Expansion Signal 1" connectors of all the subracks need to be connected together with a single ribbon cable. The same is required for "Expansion Signal 2" connectors of each subrack. See Figure 8.

8.32. The expansion signal connectors are two 16-pin connectors (both male). They are 2×8 male ribbon cable connectors. An installation accessories kit is supplied with the HP 55402B (HP p/n 55402-67001). It contains two 16-pin connectors and two 9-pin connectors for the expansion cabling, along with two power input connectors, and two spade lug connectors.

> ***Note:*** The two expansion signal cables must be identical in length and routing, that is, the length of corresponding segments must be the same, and the order in which they connect the subracks must be the same.

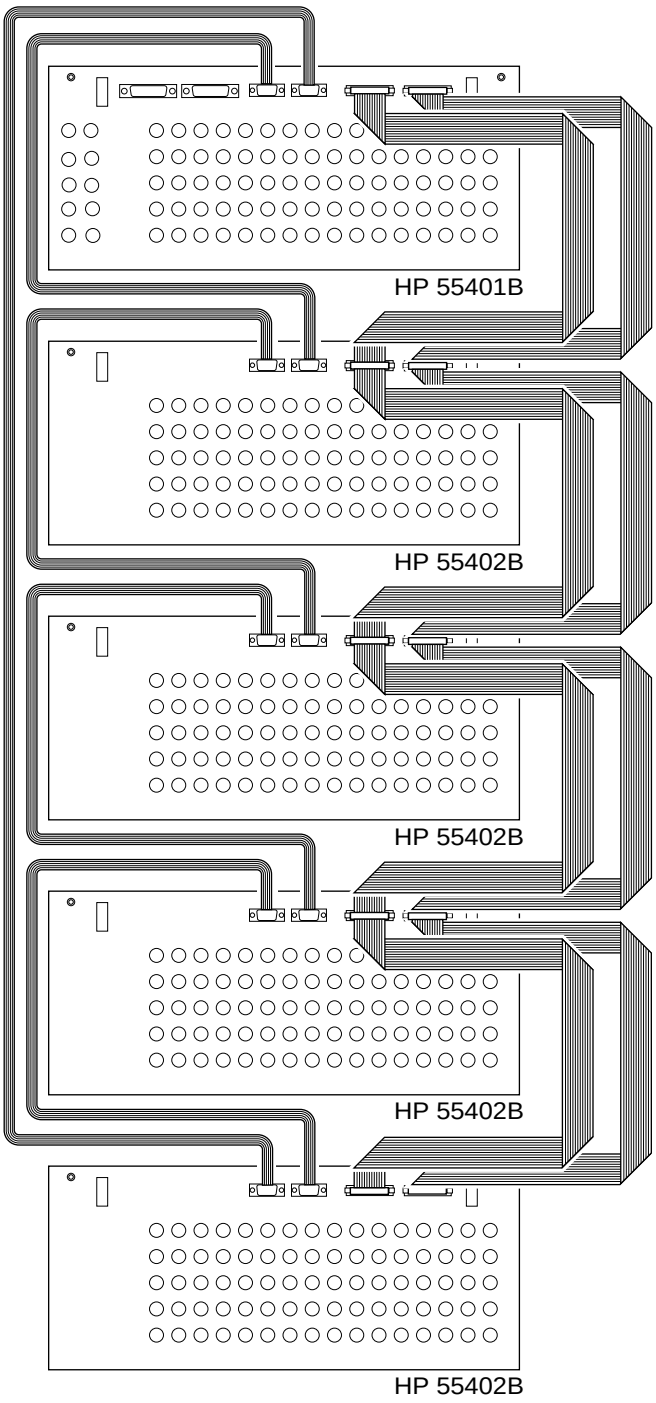


Figure 8. Expansion Subrack Cabling Diagram

9. INPUT SIGNAL REQUIREMENTS

9.1. This section describes the important parameters of the input and output signals.

A. PRC Input Signal

9.2. The primary reference clock signal should have the following characteristics:

- **Input impedance:** 50 Ω.
- **Frequency:** 5 MHz or 10 MHz.
- **Waveform:** sine or square wave.
- **Minimum amplitude:** 0.5 V p-p.
- **Damage level:** 5 Vrms.

B. 2048 kbps Input Signal

9.3. The 2048 kbps input references should have the following characteristics:

- **Input impedance:** 75 Ω, (120 Ω, option*).
- **Signal Type:** Framed 2048 kbps HDB3.
- **Signal Level:** Per ITU G.703, Table 6.
- **Disqualification Threshold:** –25 dB (typical)
- **Damage level:** 3.5 V peak.

* See 120 Ω option paragraph below.

C. 2048 kHz Input Signal

9.4. The 2048 kHz input references should have the following characteristics:

- **Input impedance:** 75 Ω, (120 Ω, option*).
- **Signal Type:** 2048 kHz per ITU G.703, Table 10.
- **Signal Level:** Per ITU G.703, Table 10.
- **Disqualification Threshold:** –25 dB (typical)
- **Damage level:** 2.5 V peak.

* See 120 Ω option paragraph below.

120 B Option

9.5. If your 2048 kbps or 2048 kHz input signals have a 120 Ω impedance, you will need to use a 75 Ω to 120 Ω Balun on the front panel of the HP 55401B subrack to properly terminate the signals. The following Baluns are available for this purpose from HP:

- **Balun for Siemens connector:** HP p/n 1250-2739 (Option 002 to the HP 55401B Master Subrack).
- **Balun for BNC connector:** HP p/n 1250-2735 (Option 003 to the HP 55401B Master Subrack).

10. OUTPUT SIGNAL DRIVE CAPABILITY

10.1. The following paragraphs provide information to help you in planning the cable runs to the network elements receiving timing signals from the HP 55400A.

10.2. The HP 55481A clock distribution output card–2048 kbps can drive up to 200 meters of 0.8 mm cable (22 AWG) or RG 59.

10.3. The HP 55482A clock distribution output card–2048 kHz can drive up to 200 meters of 0.8 mm cable (22 AWG) or RG-59.

10.4. The HP 55483A composite clock output card–64/8 kHz can drive up to 450 meters of twisted pair 0.8 mm cable (22 AWG).

11. PLUG-IN CARD SWITCH SETTINGS

11.1. Each plug-in card contains switches that need to be configured before installation to ensure proper operation. The card parameters are included in this guide to help you prepare for the task of installing the equipment. An appropriate person in your facility should review the following tables to determine the required selections for each of the plug-in cards ordered. It is recommended that these pages be copied and then marked with the preferences. Keep this documentation accessible to expedite the equipment installation.

11.2. A description of switch selection is provided in the *HP 55400A User's Manual*. It includes illustrations showing switch locations

A. ITH Card

11.3. The Input Track and Hold cards provide selection of:

- The characteristics of each of the reference input signals.
- The method for selecting among the qualified input signals (non-revertive/revertive).
- ITH start-up state (part of installation).
- Firmware download mode.

11.4. Table 11 lists the switch settings for the ITH card.

B. Output Cards

11.5. The Output card switches provide selection of:

- Protection mode.
- Output format.
- Error correction.

11.6. Tables 12, 13, and 14 list the switch settings for the output cards.

C. Alarm Interface Card

11.7. If your office alarms support only major and minor, the on-board switch can be set to combine critical alarms with major alarms. Refer to the section, "Alarm Connector," for more information.

11.8. Table 15 lists the switch settings for the Alarm Interface Card.

D. IMC

11.9. The Information Management card switches provides selection of:

- Communication parameters.
- Security.
- IMC start-up state (part of installation).
- Local port operation.
- Firmware download mode.
- Critical and major alarm behavior.

11.10. Tables 16, 16A, and 16B list the switch settings for the Interface Management Card.

Table 11. ITH Card Switch Configuration

Switch	Bit	Configuration Parameter	Off	On (Default)
S2	1	Input 1 Type	2048 kbps	2048 kHz
	2	Input 1 Enable	Disabled	Enabled
	3	Input 1 Signal Mode	CAS	CCS
	4	Input 1 CRC4	Enabled	Disabled
	5	Input 2 Type	2048 kbps	2048 kHz
	6	Input 2 Enable	Disabled	Enabled
	7	Input 2 Signal Mode	CAS	CCS
	8	Input 2 CRC4	Enabled	Disabled
S3	1	Input 3 Type	2048 kbps	2048 kHz
	2	Input 3 Enable	Disabled	Enabled
	3	Input 3 Signal Mode	CAS	CCS
	4	Input 3 CRC4	Enabled	Disabled
	5	Input 4 Type	2048 kbps	2048 kHz
	6	Input 4 Enable	Disabled	Enabled
	7	Input 4 Signal Mode	CAS	CCS
	8	Input 4 CRC4	Enabled	Disabled
S4	1	PRC Frequency	5 MHz	10 MHz
	2	PRC Enable	Disabled	Enabled
	3–6	HDB3 Coding	(invalid selection)	(always On)
	7	Reserved	—	—
	8	Tracking Mode	Non-revertive	Revertive
S5	1–6	Reserved	—	—
	7	ITH startup state	Switch settings override non-volatile memory values.	Switch settings do not override non-volatile memory values.
	8	Firmware Download	Force download mode.	Verify downloaded code.
S6	1–8	Reserved	—	—

Table 12. HP 55481A 2048 kbps Clock Distribution Output Card Switch Configuration

Switch	Bit	Configuration Parameter	Off	On (Default)
S1	1	Output Protection Mode	Stand-alone	Protected
	2	CCS/CAS Output	CCS	CAS
	3	Transmit CRC4	Disabled	Enabled
	4–8	Undefined	—	—

Table 13. HP 55482A 2048 kHz Clock Distribution Output Card Switch Configuration

Switch	Bit	Configuration Parameter	Off	On (Default)
S1	1	Output Protection Mode	Stand-alone	Protected
	2–8	Undefined	—	—

Table 14. HP 55483A Composite Clock, Clock Distribution Output Card Switch Configuration

Switch	Bit	Configuration Parameter	Off	On (Default)
S1	1	Output Protection Mode	Stand-alone	Protected
	2–8	Undefined	—	—

Table 15. HP 55431A Alarm Interface Card Switch Configuration

Switch	Bit	Configuration Parameter	Off	On (Default)
S5	1–2	Undefined	—	—
	3	Critical Alarm combined with Major	Combined	Not combined
	4–8	Undefined	—	—

Table 16. HP 55441A IMC Card Switch Configurations

Switch	Bit	Configuration Parameter	Off	On (Default)
S3	1–2	Local port data rate	See Table 16A for details.	
	3	Local port handshake	HW Handshake	No Handshake
	4–5	Remote port data rate	See Table 16B for details.	
	6	Remote port handshaking	HW Handshake	No Handshake
	7	Local port echo	No echo	Echo On
	8	Remote port echo	No echo	Echo On
S4	1	Password required	Disable security	Enable security
	2	IMC startup state	Switches override non-volatile memory values.	Switches do not override non-volatile memory values.
	3	Force enable local port	Force local port to enabled state even if disabled by TL1 command.	Normal operation. Do not override TL1 disable.
	4–8	Reserved	(invalid selection)	(always On)
S5	1	Firmware Download	Force download mode.	Verify downloaded code.
	2	Reserved	—	—
	3	Critical Alarm combined with Major	Combined	Not combined
	4–8	Reserved	—	—

Table 16A. Local Port Data Rate

Data Rate	S3–2	S3–1
9600	ON	ON
1200	ON	OFF
2400	OFF	ON
19200	OFF	OFF

Table 16B. Remote Port Data Rate

Data Rate	S3–5	S3–4
9600	ON	ON
1200	ON	OFF
2400	OFF	ON
19200	OFF	OFF

12. CONCLUSION

12.1. This completes the site preparation tasks for the HP 55400A Network Synchronization Unit.

12.2. It is recommended that you perform as many of the site preparation tasks as you can before installing the NSU. This will help simplify the installation tasks.

12.3. When ready, refer to chapter 4, "Installation," in the *HP 55400A User's Manual*. This chapter describes the unpacking, inspection, and installation of the HP 55400A NSU.