

55402D SSU Expansion Subrack

Installation Guide

This document describes how to install expansion subracks that are part of the Symmetricom synchronization system for a telecommunications network. This system includes source clocks, receiver clocks, and network management software. This document consists of a chapter taken from the primary document for the 55400A synchronization supply unit (SSU) hardware, the *55400A System Manual*. The document has not been changed in any way. You will need to refer back to the system manual for information on:

- Installing the expansion subrack into the equipment rack
- Connecting -48 Vdc to the expansion subrack
Configuring and installing the output cards
- Performing the output card signal tests

This document applies to the 55402D expansion subrack you have received unless update information is included with the equipment.

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Install Expansion Subracks

Installation, cabling, verifying, and backdating

In This Document

This document describes how to install an expansion subrack on a system that is already in service. The topics include:

- General information
- Equipment rack recommendations
- Switch settings for expansion subrack communication cards
- Cabling information
- Installing the first expansion subrack
- Installing an additional subrack
- Replacing or removing an expansion subrack
- Using local craft terminal software and TL1 syntax to verify communication between master and expansion subracks
- Expansion subrack events
- Installing the adapter box on the “B” or “C” subrack

NOTE

See “In This Document” for a list of tasks to put an SSU expansion subrack into service.

Assumptions in these procedures

- Although the procedures show an 55402D expansion subrack being installed, replaced, or removed in a system with an 55401D master subrack, the procedures apply to the other subracks, as well.
- Typically, all SSU systems include a master subrack that contains two ITH clock cards. These procedures assume that your master subrack contains two ITH clock cards which makes it possible to install or remove an expansion subrack while the master subrack is in service.
- These procedures call out some steps that must only be performed on the standby side of the system to ensure that the active, online side is not disturbed.

Subracks Covered by the Procedures

These installation procedures apply to the following subrack configurations:

- 55401D
- 55402D
- 55401B with adapter box
- 55401C with adapter box
- 55402C with adapter box

NOTE

The adapter box is described in the backdating section of this document.

Expansion Subrack Connector Characteristics

There are two variations of expansion subracks that have been released. The differences relate to the characteristics of the connectors as summarized in the following table.

Table 1. Expansion subrack connectors

Connector	55402C	55402D
Outputs (80)	Grounded	Grounded
–48 Vdc	Locking	Locking
Expansion signals	Terminated	Terminated and shielded

NOTE

Refer to the chapter on specifications (chapter A3) for more details about the subracks including dimensions and power requirements.

Accessories, Tools, and Equipment

Accessories

An installation accessories kit will be supplied with the 55402D expansion subrack. It contains connectors that can be used for making connecting cables. The items in this kit are described in Table 2.

Table 2. Accessories supplied with 55402D expansion subrack

Accessory	Qty	Purpose	Part Number
Locking power connector	2	–48 Vdc power inputs	1251-5272
Spare 1A telecom fuse	1	Communication card	2110-1129
Spare 2A telecom fuse	1	Output cards	2110-1125
Spare 3A telecom fuse	1	ITH cards	2110-1000
Crimp lug terminal	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
Connector pins	8	Power connector	1251-2418

Two pairs of rack mounting flanges are also included for mounting the SSU into an EIA or ETSI rack.

Tools

Table 3 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 connectors.

Table 3. Tools needed to install 55402D expansion subrack

Tool	Purpose
Large Phillips or Pozidriv #2 screwdriver	Rack mounting screws
Molex Hand Crimping Tool (11-01-0084)	Power cables
7 mm nut driver	Frame ground stud on subrack front panel
Wire strippers	Making power cables
Diagonal cutters	Making power cables
ESD wrist strap	ESD protection when installing cards

Equipment

Table 4 describes the required equipment and where they are used.

Table 4. Equipment needed to qualify 55402D expansion subrack

Equipment	Purpose
Digital multimeter	Check voltage and cables for opens/shorts
HP 54603A general purpose oscilloscope, or equivalent	Check signal characteristics during qualification

Install the Expansion Subrack

The physical installation of the expansion subrack is the same as for the master subrack. For this reason, there are references back to the installation of the master subrack for rack positioning and power inputs.

Position in the Rack Cabinet

It is recommended that the master subrack be installed near the bottom of the rack cabinet and the expansion subrack be installed above it. See chapter B2 for drawings of three different equipment configurations showing master and expansion subracks. The recommended spacing between the equipment is shown as well.

With the master subrack near the bottom, the installation of the first expansion subrack above it simplifies the cabling between the subracks.

NOTE

Cable Length Limit: The following cable length limitation will determine how far from the master subrack any expansion subrack may be located:

The master subrack can drive the expansion signals through up to 8 meters of cable length. This means that if you were to take one cable from each pair of Expansion Signal cables used to connect the subracks together and lay them out end-to-end, the total cable length cannot exceed 8 meters.

For example, if you were connecting two expansion subracks to a master subrack and the first subrack was located 6m from the master subrack, the second expansion subrack should be no more than 2m away from the first.

Installing the expansion subrack

Follow the instructions in chapter C2, “Subrack Installation Procedure” to install the expansion subrack in the rack cabinet.

Connecting the –48 Vdc power inputs

Follow the procedures in chapter C2, “–48 Vdc Power Inputs” through “Connecting dc Power” to apply power to the expansion subrack.

Expansion Subrack Cabling

When a master and expansion subrack are cabled together, there are four cables that interconnect them. Two cables connect the Expansion Comm ports and two cables connect the Expansion Signal ports.

The following drawings show in diagram form how the cables are connected for single and multiple expansion subrack configurations.

Expansion Subrack Cable Kits

There are two cable kits required for an expansion subrack:

- Expansion Subrack Cable Kit
- Expansion Subrack Comm Return Kit

The first cable kit contains

- 1 expansion comm cable
- 2 expansion signal cables

All cables are the same length. An option number to the product specifies the desired length. Lengths of 2, 3, 4, 5, 6, 7, and 8 meters are available.

The second cable kit contains

- 1 expansion comm cable
- 2 connector terminators

The single cable is used to connect from the last (most-distant) expansion subrack back to the master subrack. An option number to the product specifies the desired length. Lengths of 2, 3, 4, 5, 6, 7, 8, 10, 13, and 18 meters are available.

NOTE

When determining the length of cable needed, be sure to take into account any distance in going from rack to rack via cable trays, etc. Do not route cables around motors, generators, or other equipment that produces electromagnetic fields.

Expansion Subrack Cable Diagrams

The drawings are to show only the cable connections between subracks. No effort is made to indicate the proper routing of cables. In all diagrams, the subrack connector designations from left to right are:

- Expansion Comm port (9-pin male connector)
- Expansion Comm port (9-pin female connector)
- Expansion Signal In (two 15-pin female connectors)
- Expansion Signal Out (two 15-pin female connectors)

Master with Single Expansion Subrack

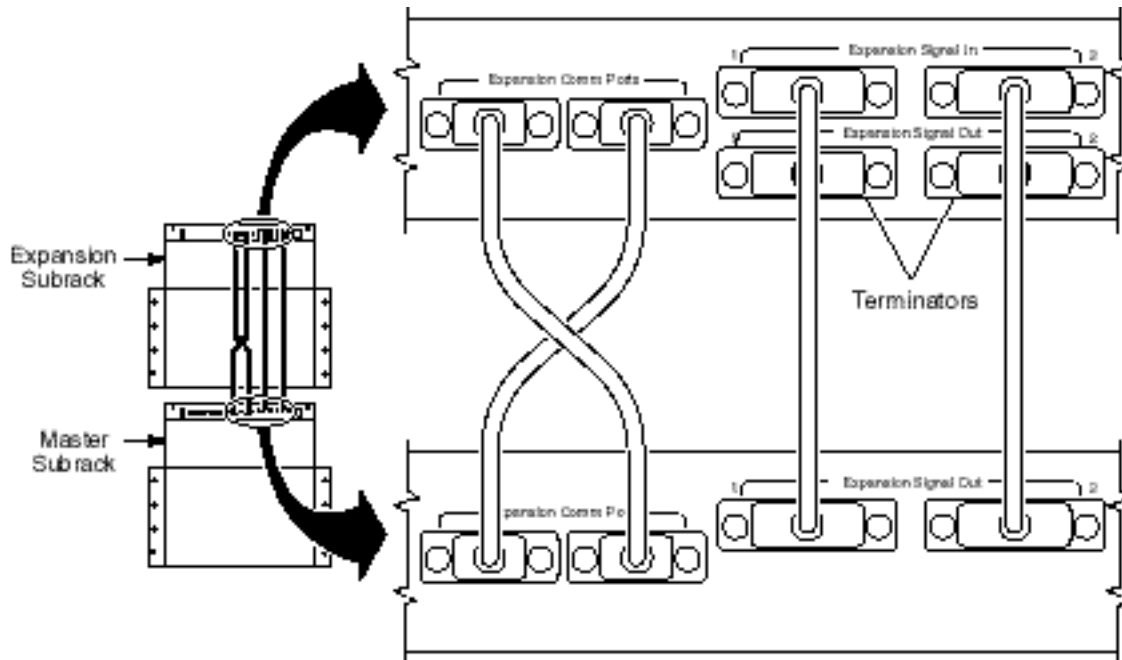


Figure 1. Cable diagram of master and one expansion subrack

NOTE

Two terminators plug into the unused Expansion Signal Out 1 and 2 connectors on the expansion subrack.

Master with Two Expansion Subracks

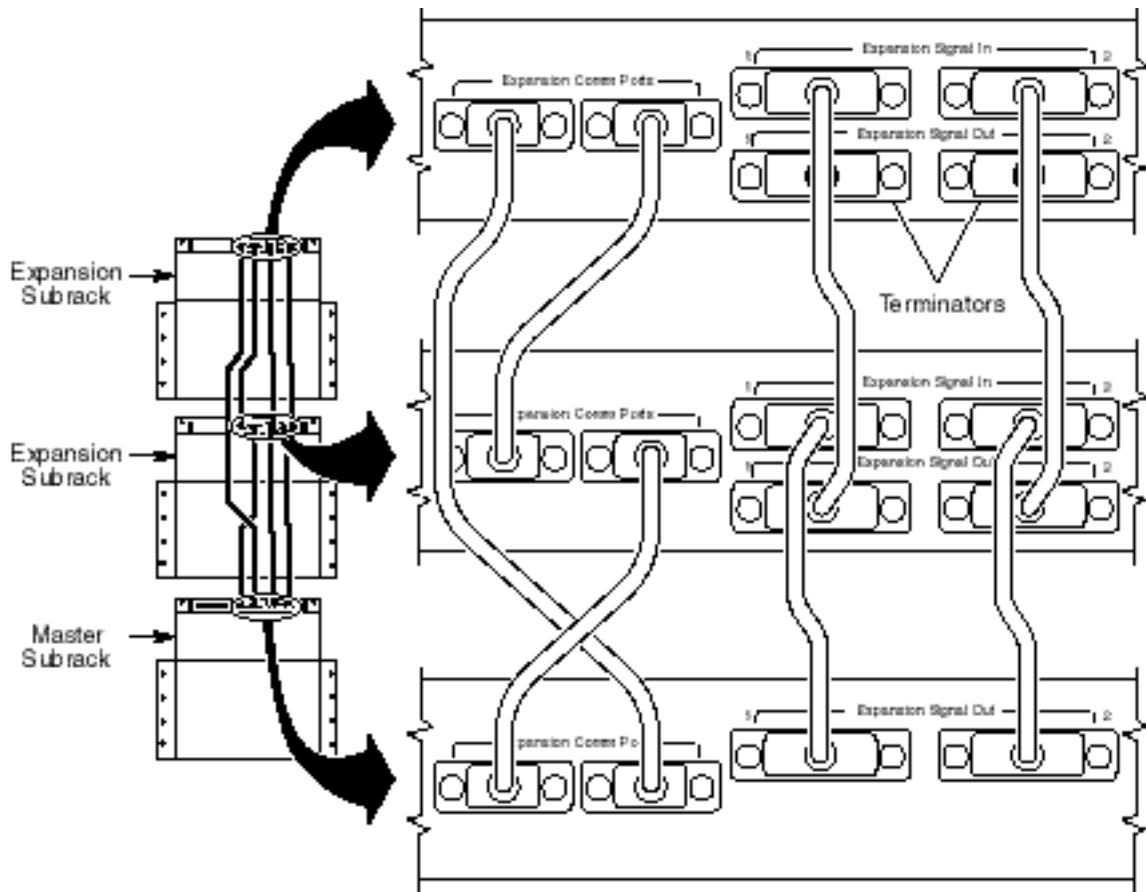


Figure 2. Cable diagram of master and two expansion subracks

NOTE

Two terminators plug into the unused Expansion Signal Out 1 and 2 connectors on the last expansion subrack.

Master with Three Expansion Subracks

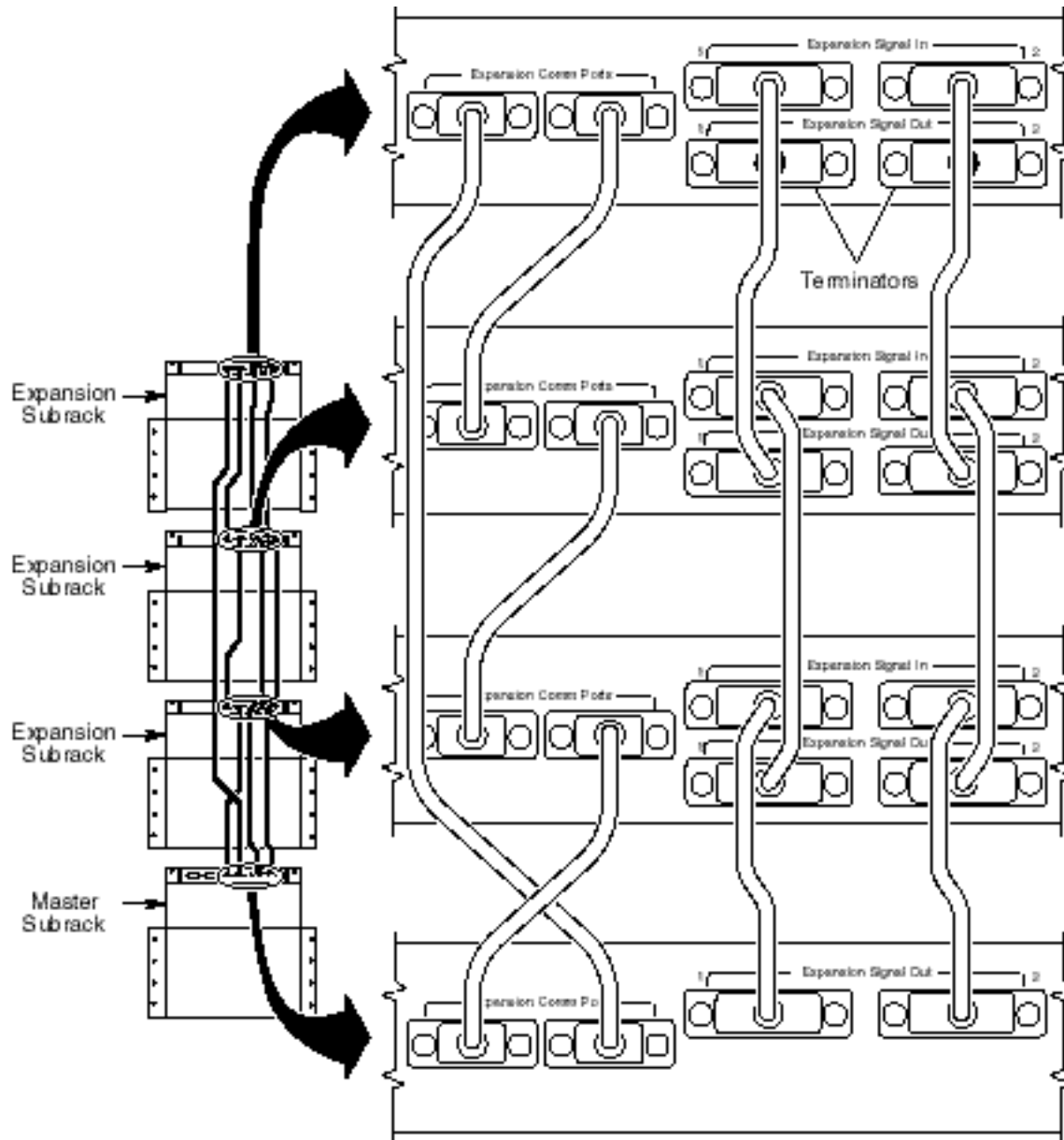


Figure 3. Cable diagram of master and three expansion subracks

NOTE

Two terminators plug into the unused Expansion Signal Out 1 and 2 connectors on the last expansion subrack.

Master with Four Expansion Subracks

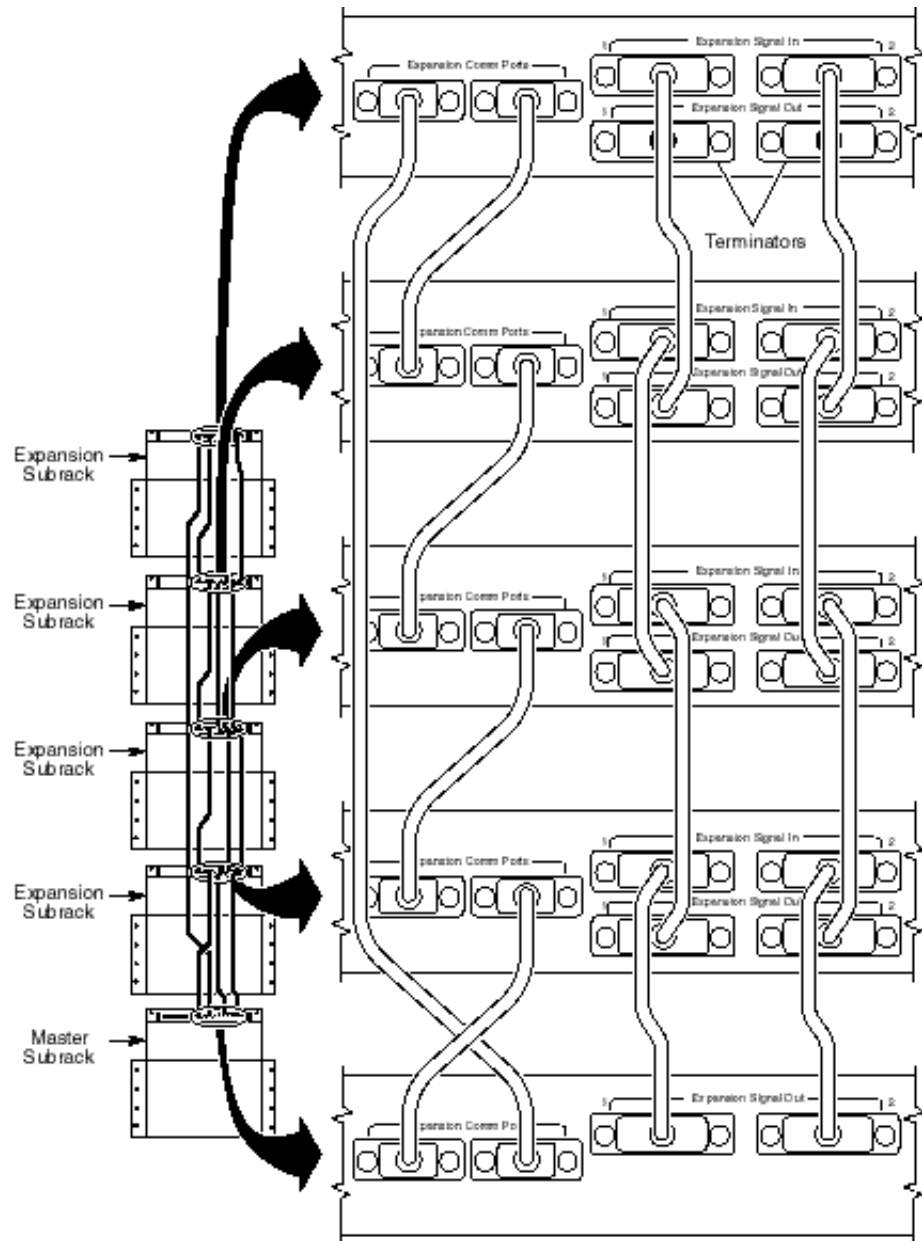


Figure 4. Cable diagram of master and four expansion subracks

NOTE

Two terminators plug into the unused Expansion Signal Out 1 and 2 connectors on the last expansion subrack.

Expansion Subrack Cards

The expansion subrack contains output cards for generating timing signals as well as the cards needed to maintain communication and synchronization with the master subrack and other expansion subracks. Each of the communication and synchronization cards has switch settings.

There are two types of expansion cards that handle the alarm management, the routing of synchronization signals, and communication with the master subrack:

- 55419A Expansion Synchronization Card
- 55443A Expansion Communications Card

55419A Expansion Synchronization Card

There are normally two synchronization cards in each expansion subrack to provide redundant operation. The function of these cards in the expansion subrack is similar to that of the ITH clock cards in the master subrack. See Table 5 for the card's switch settings.

Table 5. Expansion Sync Card Switch Setting

Switch	Bit	Parameter	Off	On (Default)
S4	1-7	Reserved	—	—
	8	Firmware Startup State	Force download mode	Verify firmware on startup

Switches S1, S2, S3, and S5 are not used.

55443A Expansion Communications Card

A single communications card is required in each expansion subrack. The function of this card is similar to the communication card in the master subrack. See Table 6 for the card's switch settings.

Table 6. Expansion Comm Card Switch Setting

Switch	Bit	Parameter	Off	On (Default)
S5	1	Firmware Startup State	Force download mode	Verify firmware on startup
	2-8	Reserved	—	—
S6	1	Single ITH operation	One ITH card in master subrack	Two ITH cards in master subrack
	2-4	Reserved	—	—

Switches S3 and S4 are not used.

Access Identifier for Multiple Subracks

An additional <aid> parameter in TL1 command strings is needed to identify the location of the output cards in multiple-subrack systems. The particular subrack must be identified in the command line to ensure that the correct card is configured or identified.

What follows is an example of how to interpret the access identifier for output cards in expansion subrack systems. Refer to the *55400A TL1 Programming Reference Manual* for more information on how to use and interpret access identifiers.

<aid> Parameter

The access identifier for multiple-subrack systems is in the form:

Sn-OUTx

Where *n* is the ID number of the subrack and *x* is the letter of the output card slots where the card, or pair of cards, is located. (When two output cards are installed as a protected pair, the command applies to both cards.)

Example Command

In this example, the command sets the output cards in slot C of the first expansion subrack to squelch their outputs when the master subrack goes into holdover mode.

```
ED-EQPT : : S1-OUTC:HP1 : : HLDACT=SQUELCH;
```

ID Number

The ID number of the subrack is set with a switch at the time the subrack is installed. Values can be 0, 1, 2, 3, or 4. The master subrack always takes the “0” value. The remaining numbers are used for the expansion subracks. In this case, the command is directed to the subrack with its ID number set to “1.”

Card Slot

The letter (A, B, C, D, or E) refers to the position in the subrack where the output card is located. The ten slots for output cards are divided into pairs with each pair of slots having a letter assigned using a label on the subrack itself.

Adding the First Expansion Subrack

NOTE

This procedure is written to allow the expansion subrack to be installed while the master subrack is in service.

Install the subrack and the cards

- a. Install the empty expansion subrack into the rack cabinet and apply -48 Vdc at power inputs A and B. Refer to chapter C2 for information on rack mounting and applying power to the subrack.
- b. Set the backplane switch on the expansion subrack to “1” (for the first expansion subrack). This step establishes the expansion subrack’s identification number. The switch is located near the upper left of the backplane behind where the expansion communications card will be installed. (See Figure 5.)

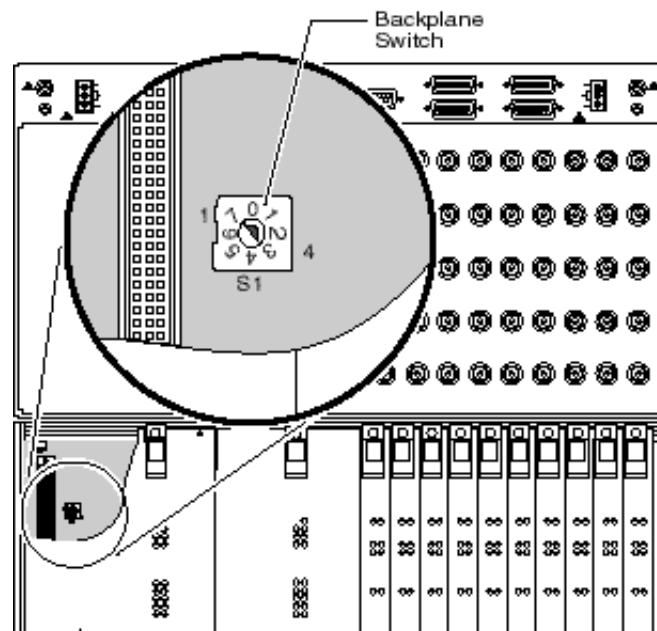
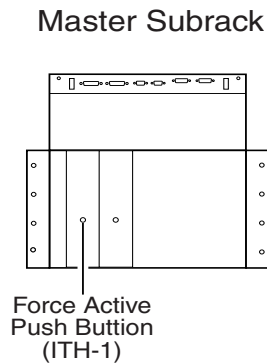


Figure 5. Expansion subrack backplane switch location

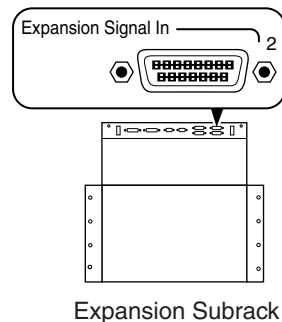
- c. Check the switch settings on the expansion synchronization cards, as described earlier in this document, and install the two cards into the expansion subrack. The cards go into the same slots in the expansion subrack that the ITH-1 and ITH-2 cards do in the master subrack. Ignore any alarms in the expansion subrack until the end of this procedure. Tighten the retaining screws.

- d. Configure and install the output cards that are part of this expansion subrack. Refer to chapter D2 for more on configuring the output cards. Tighten the retaining screws.
- e. On the master subrack, verify that no alarm conditions exist and take note of which ITH card is in the Active mode. (This is important so that at the end of this procedure the same ITH card can be returned to its role as the active ITH card.)
- f. On the master subrack, set the ITH-1 card to the Active mode by pressing the **Force Active** push button on this card.

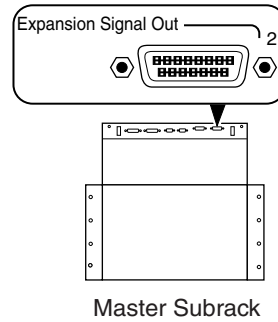


Connect the first expansion signal cable

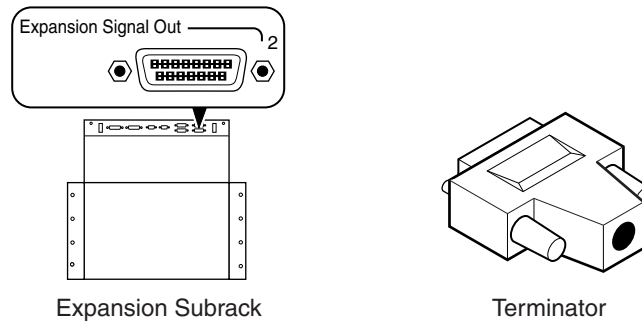
- a. Take one of the expansion signal cables (15-wire) and connect one end to the expansion subrack at the **Expansion Signal In—2** connector. Tighten the cable connector in place.



- b. Connect the other end of the expansion signal cable to the master subrack at the **Expansion Signal Out—2** connector. Tighten the cable connector in place.



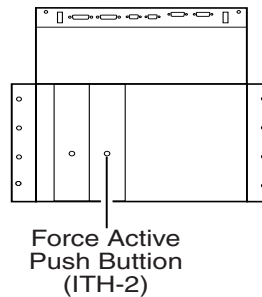
- c. Plug one of the connector terminators into the expansion subrack at the open **Expansion Signal Out—2** connector.



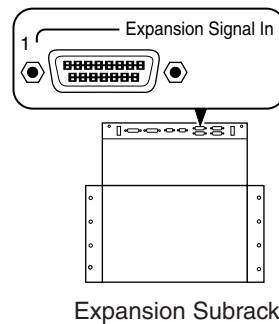
Connect the second expansion signal cable

- a. In the expansion subrack, verify that the 55419A expansion sync card in slot “ITH-2” is in the active mode by observing that the **Active** LED is on.
- b. In the master subrack, set the ITH-2 card to the active mode by pressing the **Force Active** push button on this card.

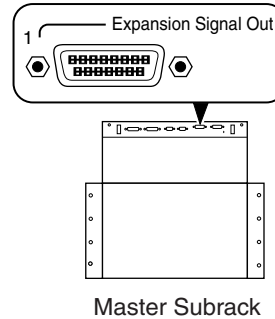
Master Subrack



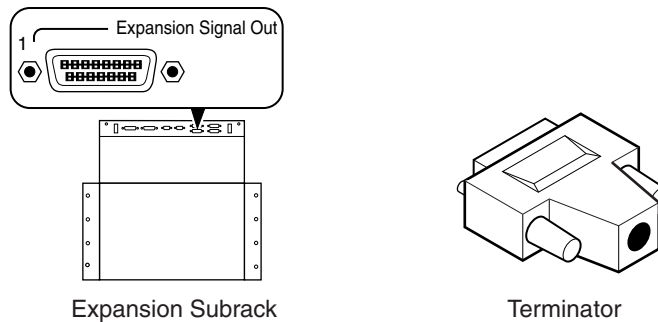
- c. Take the second expansion signal cable (15-wire) and connect one end to the expansion subrack at the **Expansion Signal In—1** connector. Tighten the cable connector in place.



- d. Connect the other end of the expansion signal cable to the master subrack at the **Expansion Signal Out—1** connector. Tighten the cable connector in place.



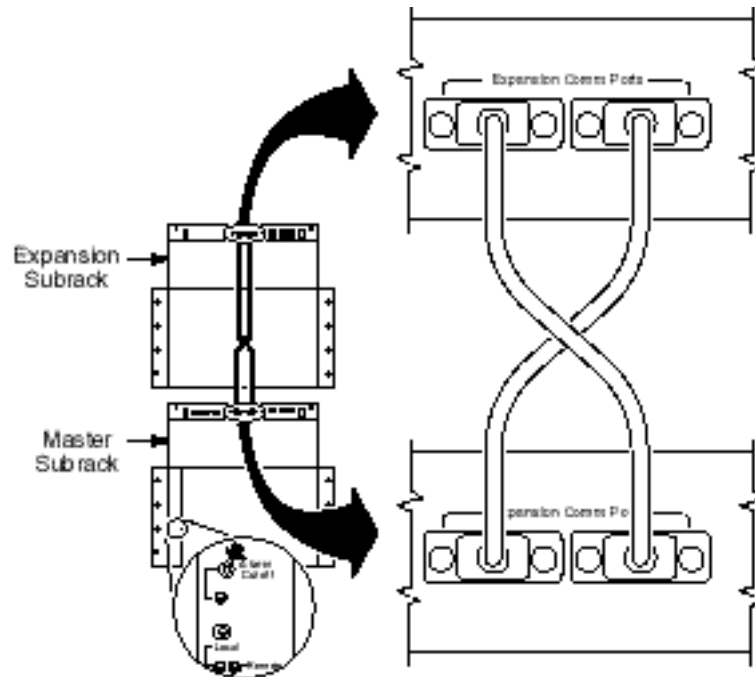
- e. Plug the second connector terminator into the expansion subrack at the open **Expansion Signal Out—1** connector.



- f. In the expansion subrack, verify that the 55419A expansion sync card in slot “ITH-1” is in the standby mode by observing that the **Standby LED** is on.
- g. Set the ITH card that was the active master at the beginning of the procedure to the active mode again by pressing the **Force Active** push button on that ITH card. This step ensures that the ITH card that was the active master at the start of this installation is again in that same role.

Connect the expansion communication cables

- a. Configure and install the 55443A expansion communications card into the left-most slot of the expansion subrack. Tighten the retaining screws.
- b. Take one of the expansion comm cables (9-wire) and connect between the expansion and master subrack at the Expansion Comm Port connectors. Tighten the cable in place using the securing posts.
- c. Install the second expansion comm cable between the expansion and master subrack. Tighten the cable in place.
- d. On the master subrack, press the **Alarm Cutoff** push button several times to clear all alarms. If alarms still remain, review this installation procedure before continuing.



- e. Perform the communication test procedure that is included later in this document under “Verify Communication Between Subracks.”

Expansion Subrack Events

The system is constantly monitoring itself for the presence of alarm conditions. After adding or removing an expansion subrack, check to ensure that no expansion-related events are being reported. As described later in this document, the check can be accomplished using TL1 commands or a management software application from Symmetricom.

Send the following TL1 command to the master subrack and verify that no expansion subrack events are active:

```
RTRV-NETTYPE-ALL:::ABC1;
```

Expansion Event Descriptions

A brief explanation of the expansion subrack events is given here. These events are described in more detail in chapter A5.

IMCNCDN — (No IMC communication downward) In a multiple-subrack system, the communications link is a loop supporting communications in two directions: up and down. This event indicates that there is a break in the downward direction. Check expansion comm port cabling from the right-side port. (Minor alarm)

IMNCUP — (No IMC communication upward) In a multiple-subrack system, the communications link is a loop supporting communications in two directions: up and down. This event indicates that there is a break in the upward direction. Check expansion comm port cabling from the left-side port. (Minor alarm)

RACKDUP — (Duplicate subrack number) This event occurs in a multiple-subrack system when two, or more, subracks have their backplane switch set to the same value. It is extremely important that each of the subracks have different switch settings and that the master subrack always has its backplane switch set to the “0” position. The backplane switch is located behind the communications card.

NOTE

It is a good idea to maintain a record of the assigned subrack numbers and their location in the communications loop. This information can help diagnose a communications problem.

After correcting a problem of duplicate subrack numbers, execute the RTRV-COND-TSG and RTRV-NETTYPE-ALL commands to verify that the system has corrected its internal inventories of card modules. If reports of missing output cards continue, the RMV-EQPT command can be used to correct the actual inventory by deleting cards from the existing inventory of cards. (Major alarm)

RACKOOR — (Subrack number out of range) This event occurs when a subrack backplane switch has been set to a number outside the established range. The allowable settings are: 0, 1, 2, 3, 4. The master subrack must always be set to “0”. The backplane switch is located behind the communications card. (Major alarm)

NOTE

It is a good idea to maintain a record of the assigned subrack numbers and their location in the communications loop. This information can help diagnose a communications problem.

ITHNC DN — (No ITH communication downward) In a multiple-subrack system, the ITH communications link is a loop supporting communications in two directions: up and down. This event indicates that there is a break in the downward direction. Check expansion comm port cabling from the right-side port. (Minor alarm by default, can be modified)

ITHNC UP — (No ITH communication upward) In a multiple-subrack system, the ITH communications link is a loop supporting communications in two directions: up and down. This event indicates that there is a break in the upward direction. Check expansion comm port cabling from the left-side port. (Minor alarm by default, can be modified)

SRINVMM — (Subrack inventory mismatch) This event is generated by the IMC/NIMC and indicates that the subrack inventories maintained separately by the IMC/NIMC and ITH cards in the master subrack do not agree. (Major alarm)

NOTE

Alarm LED Behavior with Expansion Subracks: An alarm occurring in an expansion subrack is indicated with an alarm LED on the failed card, an alarm-level indication (minor, major, or critical) on the Expansion Comm card in the expansion subrack containing the failed card, and an alarm-level indication on the IMC or NIMC in the master subrack.

Add Additional Expansion Subrack

NOTE

This procedure is written to allow the expansion subrack to be installed while the master subrack is in service.

Install the subrack and the cards

- a. Install the empty expansion subrack into the rack cabinet and apply –48 Vdc at power inputs A and B. Refer to chapter C2 for information on rack mounting and applying power to the subrack.
- b. Set the backplane switch on the new expansion subrack to one of the allowed numbers that is not being used. It is critical that each subrack has a different ID number. The master subrack must always be set to “0” and the expansion subracks can use numbers from 1 to 4. The switch is located near the upper left of the backplane behind where the expansion communications card will be installed.
- c. If you do not know what numbers are being used by other expansion subracks, either send the TL1 command: RTRV-NETTYPE-ALL:::ABC1 to identify the current subrack numbers or remove the communications card from each expansion subrack to check on the backplane switch setting. Set the backplane switch on the new expansion subrack to the next unused ID number. This step establishes the expansion subrack’s identification number.
- d. Check the switch settings on the expansion synchronization cards, as described earlier in this document, and install the two cards into the expansion subrack. The cards go into the same slots in the expansion subrack that the ITH-1 and ITH-2 cards do in the master subrack. Ignore any alarms in the expansion subrack until the end of this procedure. Tighten the retaining screws.
- e. Configure and install the output cards that are part of this expansion subrack. Refer to chapter D2 for more on configuring the output cards. Tighten the retaining screws.
- f. On the master subrack, verify that no alarm conditions exist and take note of which ITH card is in the Active mode. (This is important so that at the end of this procedure the same ITH card can be returned to its role as the active ITH card.)
- g. On the master subrack, set the ITH-1 card to the Active mode by pressing the **Force Active** push button on this card.

Connect the first expansion signal cable

- a. Take one of the expansion signal cables (15-wire) and connect one end to the new expansion subrack at the **Expansion Signal In—2** connector. Tighten the cable connector in place.
- b. Connect the other end of the expansion signal cable to the expansion subrack that is “upstream” from the one being installed at the **Expansion Signal Out—2** connector. Tighten the cable connector in place.
- c. Plug one of the connector terminators into the new expansion subrack at the open **Expansion Signal Out—2** connector. These terminators are not required for the master subrack.

Connect the second expansion signal cable

- a. In the new expansion subrack, verify that the 55419A expansion sync card in slot “ITH-2” is in the active mode by observing that the **Active** LED is on.
- b. In the master subrack, set the ITH-2 card to the active mode by pressing the **Force Active** push button on this card.
- c. Take the second expansion signal cable (15-wire) and connect one end to the new expansion subrack at the **Expansion Signal In—1** connector. Tighten the cable connector in place.
- d. Connect the other end of the expansion signal cable to the expansion subrack that is “upstream” from the one being installed at the **Expansion Signal Out—1** connector. Tighten the cable connector in place.
- e. Plug the second connector terminator into the new expansion subrack at the open **Expansion Signal Out—1** connector.
- f. In the new expansion subrack, verify that the 55419A expansion sync card in slot “ITH-1” is in the standby mode by observing that the **Standby** LED is on.
- g. Set the ITH card that was the active master at the beginning of the procedure to the active mode again by pressing the Force Active push button on that ITH card. This step ensures that the ITH card that was the active master at the start of this installation is again in that same role.

Connect the expansion communication cables

Overview: The expansion communication cables connect from the master subrack to the first expansion subrack, from that expansion subrack to the next expansion subrack, and finally from the last expansion subrack back to the master subrack.

- a. Configure and install the 55443A expansion communications card into the left-most slot of the expansion subrack. Tighten the retaining screws.

NOTE

The connectors on each expansion comm cable (9-pin) include a male and female gender type. This configuration reduces the chance of connecting cables incorrectly.

- b. Connect an expansion comm cable such that the cable from the male connector on the first expansion subrack connects to the next expansion subrack. Repeat this until all expansion subracks are connected.
- c. Connect an expansion comm cable from the male connector on the last expansion subrack to the female connector on the master subrack. Tighten all cables in place.
- d. On the master subrack, press the **Alarm Cutoff** push button several times to clear all alarms. If alarms still remain, review this installation procedure before continuing.
- e. Perform the communication test procedure that is included later in this document under “Verify Communication Between Subracks.”

Replace an Expansion Subrack

NOTE

This procedure is written to allow the expansion subrack to be replaced while the master subrack is in service.

Prepare to remove expansion subrack

- a. Ensure that the expansion subrack to be replaced is no longer providing synchronization signals for downstream equipment.
- b. Verify that no alarm conditions exist in the system.
- c. On the master subrack, take note of which ITH card is in the Active mode. (This is important so that at the end of this procedure, the same ITH card can be returned to its role as the active ITH card.)
- d. On the master subrack, set the ITH-1 card to the Active mode by pressing the **Force Active** push button on this card.

Remove the expansion subrack

- a. On the expansion subrack to be replaced, unplug the expansion signal cables at the **Expansion Signal In—2** and **Expansion Signal Out—2** connectors.
- b. On the master subrack, set the ITH-2 card to the Active mode by pressing the **Force Active** push button on this card.
- c. On the expansion subrack to be replaced, unplug the expansion signal cables at the **Expansion Signal In—1** and **Expansion Signal Out—1** connectors.
- d. On the expansion subrack to be replaced, unplug the expansion communication cables.
- e. Disconnect the power cables from the expansion subrack.
- f. Remove the expansion subrack from the rack cabinet.

Install the expansion subrack

- a. Install the replacement expansion subrack into the rack cabinet and apply -48 Vdc at power inputs A and B.
- b. Set the backplane switch on the replacement subrack to the same value as the subrack that was removed. The switch is located near the upper left of the backplane behind where the expansion communications card will be installed.
- c. Transfer the expansion synchronization cards into the replacement expansion subrack. Tighten the retaining screws.

- d. Transfer the output cards into the replacement expansion subrack. Tighten the retaining screws.

Connect the expansion signal cables

- a. Connect the expansion signal cables at the **Expansion Signal In—1** and **Expansion Signal Out—1** connectors. If the replaced expansion subrack had connector terminators attached, plug a connector terminator into the **Expansion Signal Out—1** connector.
- b. On the master subrack, set the ITH-1 card to the Active mode by pressing the **Force Active** push button on this card.
- c. Connect the expansion signal cables at the **Expansion Signal In—2** and **Expansion Signal Out—2** connectors. If the replaced expansion subrack had connector terminators attached, plug a connector terminator into the **Expansion Signal Out—2** connector.
- d. Set the ITH card that was the active master at the beginning of the procedure to the active mode again by pressing the **Force Active** push button on that ITH card. This step ensures that the ITH card that was the active master at the start of this replacement procedure is again in that same role.

Connect the expansion communication cables

- a. Transfer the expansion communications card into the left-most slot of the expansion subrack. Tighten the retaining screws.
- b. Connect the expansion communication cables as before.
- c. On the master subrack, press the Alarm Cutoff push button several times to clear all alarms. If alarms still remain, review this replacement procedure before continuing.
- d. Perform the communication test procedure that is included later in this document under “Verify Communication Between Subracks.”

Remove an Expansion Subrack

NOTE

This procedure is written to allow the expansion subrack to be removed while the master subrack is in service.

In a system with multiple expansion subracks, it is assumed that the expansion subrack most distant from the master subrack is removed from service.

Prepare to remove expansion subrack

- a. Ensure that the expansion subrack to be removed is no longer providing synchronization signals for downstream equipment.
- b. Verify that no alarm conditions exist in the system.
- c. On the master subrack, take note of which ITH card is in the Active mode. (This is important so that at the end of this procedure, the same ITH card can be returned to its role as the active ITH card.)
- d. On the master subrack, set the ITH-1 card to the Active mode by pressing the **Force Active** push button on this card.

Remove the expansion signal cables

- a. On the expansion subrack to be removed, unplug the expansion signal cable at the **Expansion Signal In—2** connector and the subrack to which it is connected. Remove the connector terminator from the **Expansion Signal Out—2** connector.
- b. On the last remaining expansion subrack, attach the connector terminator at the **Expansion Signal Out—2** connector. Ignore any alarm conditions for now.
- c. On the master subrack, set the ITH-2 card to the Active mode by pressing the **Force Active** push button on this card.
- d. On the expansion subrack to be removed, unplug the expansion signal cable at the **Expansion Signal In—1** connector and the subrack to which it is connected. Remove the connector terminator from the **Expansion Signal Out—1** connector.
- e. On the last remaining expansion subrack, attach the connector terminator at the **Expansion Signal Out—1** connector.
- f. Set the ITH card that was the active master at the beginning of the procedure to the active mode again by pressing the **Force Active** push button on that ITH card. This step ensures that the ITH card that was the active master at the start of this removal procedure is again in that same role.

Remove the expansion communication cables

- a.** Unplug the expansion communication cables from the expansion subrack to be removed.
- b.** If the only expansion subrack is being removed, jumper the Expansion Comm Port connectors on the master subrack together with a cable. This is done so that the master subrack can perform a new inventory of the remaining equipment.
- c.** If one or more expansion subracks remain, connect an expansion comm cable from the last expansion subrack to the master subrack.
- d.** After a short time (approximately 2 minutes), the system will complete a new inventory of the remaining equipment. For the system that now only consists of a master subrack, The jumper cable can now be removed.
- e.** On the master subrack, press the **Alarm Cutoff** push button several times to clear all alarms. If alarms still remain, review this removal procedure before continuing.
- f.** Perform the communication test procedure that is included later in this document under “Verify Communication Between Subracks.”

Verify Communication Between Subracks

NOTE

To verify communications between the master and expansion subracks and to check for alarm conditions, perform either procedure 1 or 2 described below.

Procedure 1—TL1 Commands

This procedure instructs you to send two TL1 commands to the master subrack that should return information about the pair of subracks indicating that the two subracks are able to communicate. The first command identifies the equipment installed in both the master and expansion subracks. The second command retrieves any active alarms.

- a.** Send the following command to the master subrack:

```
RTRV-NETYPE-ALL:::HP1;
```

- b.** The information returned will be similar to the following example response:

```
HPSSU 98-12-03 13:36:22
HP1 COMPLD
"TSG:Hewlett-Packard Company,HP55400,TSG
"S0,IMC:,HP55441,,R3833D
"S0,ITH1:,HP55411,,R3833D
"S0,ITH2:,HP55411,,R3833D
"S0-OUT1A:,HP55481"
"S0-OUT2A:,HP55481"
```

```
HPSSU 98-12-03 13:36:23
HP1 COMPLD
"TSG:Hewlett-Packard Company,HP55400,TSG
"S1,IMC:,HP55443,,R3833D
"S1,ITH1:,HP55419,,R3833D
"S1,ITH2:,HP55419,,R3833D
"S1-OUT1A:,HP55481"
"S1-OUT2A:,HP55481"
```

- c.** Send the following command to the master subrack:

```
RTRV-COND:::HP1;
```

This command retrieves both equipment and signal-related conditions from the system. The expansion subrack events are described earlier in this document.

- d.** Verify that no expansion subrack events are still active.

Procedure 2—Local Craft Terminal Software

This procedure uses the 55450A local craft terminal software as a tool for verifying communication between the master and the just installed expansion subrack.

Refer to the documentation in chapter A5 for information on connecting a computer to the Local Port of the master subrack.

- a.** Start the application, connect to the SSU, and go to the pull-down menu, SSU>Show HP55400A Status.
- b.** Observe that a status window is displayed for each SSU subrack that is part of the system. Verify that no alarms are active in the status windows.
- c.** Click on the status window of the master subrack (the status window is larger than the others and lists subrack events below the front panel representation).
- d.** Observe that all ITH or IMC/NIMC rack communication events have been cleared. Check the cabling between the subracks if alarms exist.

This completes the installation of the expansion subrack.

What is Next?

- 1** Perform the appropriate output card checks in chapter E2.

The equipment tests consist of:

- Output checks

- 2** Connect the outputs to network elements.

The last step is to connect the output signals to the network elements that require synchronization.

Backdating Information

NOTE

This section contains material that applies to versions of subracks prior to the 55401D and 55402D.

Systems with subracks before models 55401D and 55402D require the 55426A adapter box to support the use of expansion subracks. These subracks are:

- 55401B—uses 55426A Option 001 adapter box
- 55401C—uses 55426A adapter box
- 55402C—uses 55426A adapter box

If you are installing an 55402D expansion subrack into a system that contains an 55401B or 55401C master subrack, an adapter box will need to be installed only on the master subrack. Follow the procedure in this section to install the adapter box and then refer to “Adding the First Expansion Subrack” installation procedure earlier in this document.

Expansion Adapter Box

The synchronization supply unit requires the use of an adapter box on older subracks (before version “D”). The adapter box provides the correct termination for the expansion signal cabling that carries the synchronization signals between master and expansion subracks.

The installation procedure presented here shows how to install the box on the version “B” or “C” subracks. A master subrack that had been previously installed will require an adapter box when an expansion subrack is added for the first time.

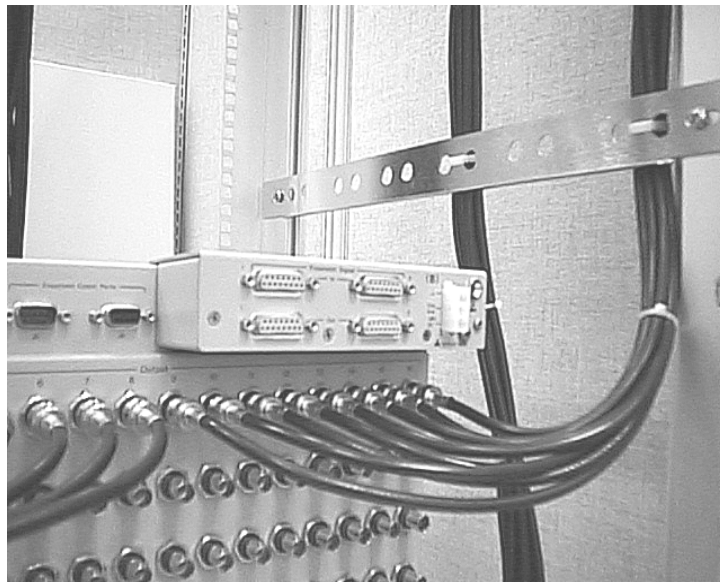


Figure 6. View of adapter box

There are two versions of the 55426A adapter box. The only difference is the type of power connector used on the adapter box:

- 55401B master subrack requires the 55426A Option 001 SSU expansion adapter box with a 4-pin press-on connector
- 55401C master subrack requires the 55426A SSU expansion adapter box with a Molex 3-pin locking connector
- 55402C expansion subrack requires the 55426A SSU expansion adapter box with a Molex 3-pin locking connector

Parts supplied with adapter boxes**Table 7. Adapter box supplied parts**

Quantity	Description
1	51 mm stand-off
1	screw and lock washer for stand-off
7	flat-head screws
1	pan-head screw and lock washer
2	spare nuts for rear panel

Tools required

- 5.5 mm nut driver
- 7 mm nut driver
- small Phillips or Pozidriv screwdriver
- large Phillips or Pozidriv screwdriver

System Firmware Requirements

If an expansion is being added to an older system that includes an 55401B or 55401C master subrack, ensure that the system firmware is revision 3724A, or later. In the master subrack, the communication card and the ITH clock cards all contain control firmware.

Check firmware revision

The firmware revision number can be checked one of the following ways:

1. Send a TL1 command using the 55450A local craft terminal software or a terminal emulation program connected to the local port of the communication card. The information retrieved will include the firmware revision at the end of the lines describing the IMC and ITH cards in the format Rxxxxx.

```
RTRV-NETTYPE-ALL: : :HP1;
```

2. Remove the communication card from the master subrack. The EEPROMs on the card will have a label indicating a firmware revision.
3. Review the system test data pack forms shipped with the master subrack from the factory. The firmware revision number is included on the system final configuration/shipping log form.

NOTE

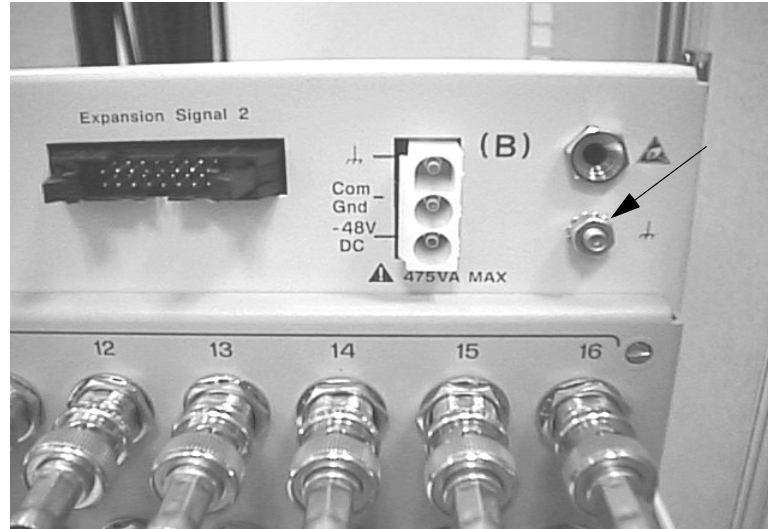
Methods 2 and 3 may not be valid if newer firmware has been downloaded to the EEPROMs without making a modification to the labels.

Firmware upgrade

If necessary, a newer version of the firmware for the master subrack can be installed. Contact Symmetricom for information about upgrading the firmware.

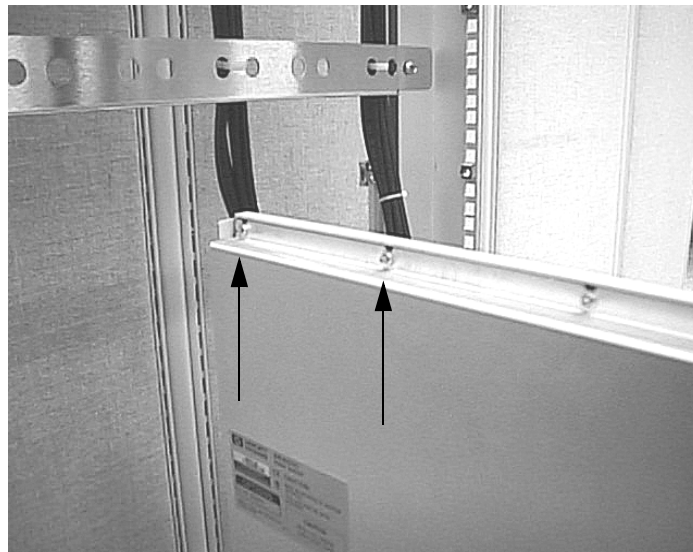
Install the adapter box

1. Remove nut on grounding stud



Using the 7 mm nut driver, remove the nut and star washer from the grounding stud shown in the picture above. Discard the nut and washer.

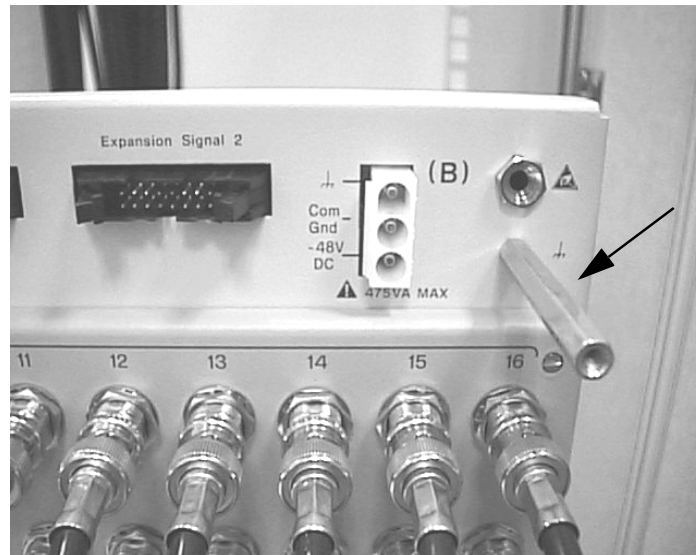
2. Loosen rear panel nuts



Using the 5.5 mm nut driver, loosen the two nuts on the subrack rear panel shown in the picture above.

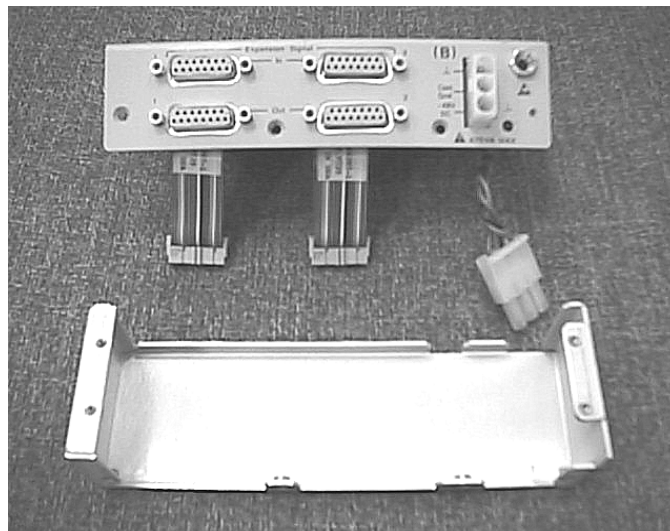
TIP: Use your fingers to loosen the nuts once they can be turned easily. Back off each nut only until it is flush with the end of the screw shaft. Extra nuts are included in the event the nuts are dropped.

3. Attach the stand-off



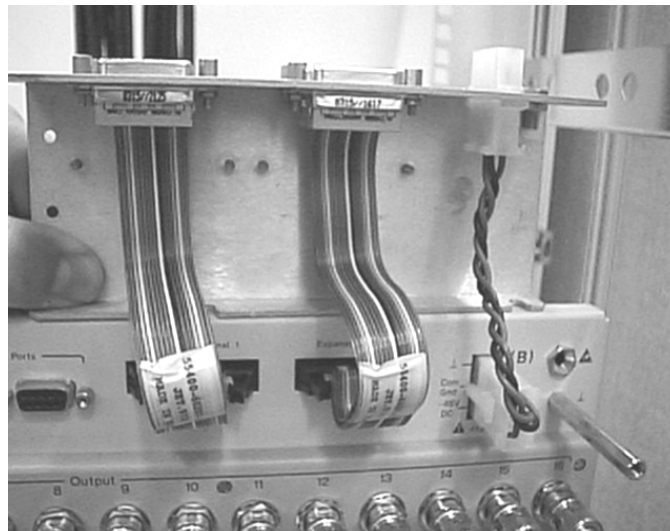
On the front panel, hand-tighten the stand-off to the grounding stud.

4. Disassemble adapter box



Remove the screws holding the two halves together.

5. Attach adapter box cables to the subrack



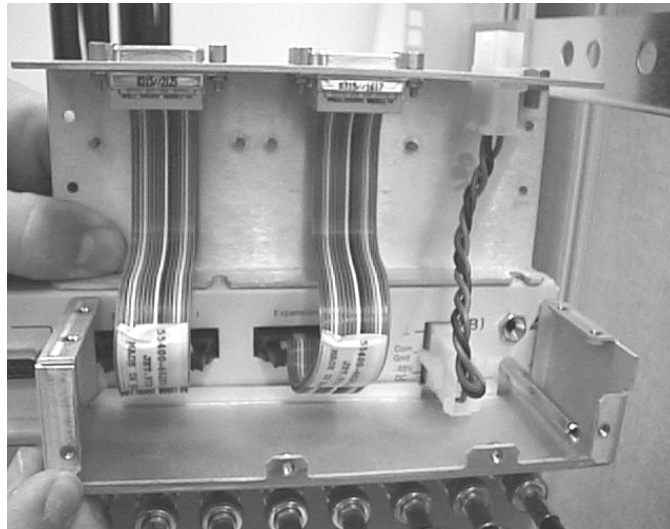
NOTE

For a system that is online, to perform this step it is necessary to remove the “B” side power cable from the subrack. Be aware that this action will cause a Major alarm to be generated by the SSU.

Position the top half of the adapter box above the subrack and connect the three cables as shown in the picture above: 2 expansion signal cables and 1 power cable.

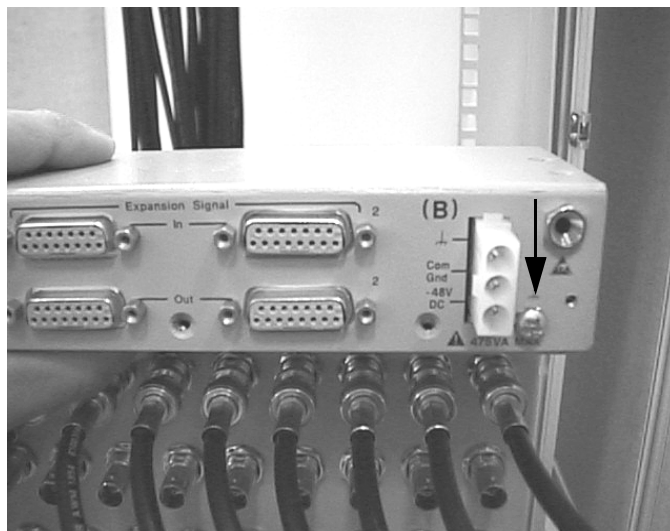
Make sure all three cables are locked securely in place.

6. Position adapter box for assembly



Set the bottom half of the adapter box on the ledge below the expansion signal and power connectors while holding the top half out of the way. (There are cutouts in the bottom piece to allow it to fit around the stand-off and power connector.)

7. Assemble and add screws



- a. Carefully hook the top half of the box over the top of the subrack at an angle so that the bend at the top fits between the loosened nuts and the rear panel as it is lowered into place.

- b. Close the top part of the box over the bottom half. Squeeze the top and bottom together so that the screw holes for both halves line up. Thread the stand-off screw and lock washer into place loosely as shown in the picture above.
- c. Thread the 8 remaining screws (7 flat-head and 1 pan-head with lock washer) into place loosely.
- d. Using the large Philips screwdriver, tighten the stand-off screw.
- e. Using the small Philips screwdriver, tighten the remaining screws.
- f. Re-connect the “B” side power supply to the connector on the adapter box.

NOTE

For a system that is online, clear the Major alarm by pressing the **Alarm Cutoff** push button.

Next Steps

Now that the adapter box is installed on the subracks that require it, review the rest of this document for information on installing the expansion subrack, cables, cards, and verifying correct operation of the expansion subracks after installation. Go to “Adding the First Expansion Subrack” installation procedure earlier in this document.

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