THE SHOP AND YOU!

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So, you need equipment for a show!

You might be working with a regional shop, a New York area shop, or a small garage-based vendor in your hometown. Your show might be for a four-wall rental with a large budget, or a small show where you are adding to an existing system. You may be a designer, associate or assistant, or have been hired to fulfill the production audio/sound supervisor position. In a larger show, various members of the sound team interact with the shop throughout the process; in a smaller show, it might just be you.

This document aims to guide you through the process of having a successful relationship with the shop. Talk to your production manager and sound team about who leads communication with the shop and when it is appropriate to contact them. Talk with your sound team about division of duties and responsibilities. We all have different experiences and methodologies. This changes from show to show. Of course, shops vary, teams vary, and the size of rental lists vary. The goal of this document is to be scalable to the scope of your project.

You may have questions - the sound community is willing to help. Reach out and ask. Talk to shops and experienced production audio people.

This document is living and ever-changing. Email info@tsdca.org if you have comments.

Many thanks to those who spent part of the Covid lockdown working on this document - including:

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1. Your Relationship With the Shop

Rental audio shops are the providers of equipment needed for many productions. They can provide entire system packages, or augment existing house packages. In smaller markets or for smaller shows, a shop will collect, assemble, test and pack all the equipment that you specify. In larger markets and for larger shows, it is up to the production to hire people to go to the shop and put together, test, and package the system. This is called "shop prep."

Shop staff varies, but there is often a person who takes your order and a separate person or department of people (often with many sub-departments) that assembles your equipment. Once your equipment list is confirmed, you may be given a new contact in the shop, a sales representative or project manager, who oversees your production.

If your show is sending a crew to the shop to assemble the rental package, when you arrive you are assigned a 'captain' or 'key', who works with you directly to make sure your equipment is delivered to you from the various places in the shop. The shop key will interface with the various departments to ensure there is a clear line of communication between your needs and the shop's needs. Much of the time, a shop will be at various stages of preparation for multiple shows, so your needs must be coordinated with the needs of the other productions.

Sometimes there are two payments that are negotiated between your production and the shop: a "prep fee" and a "rental fee."

- The prep fee covers the cost of gathering, testing, and shipping out your gear. It may also include a fee for setting aside space in the shop for your team to assemble the rental package. It does not include the cost of hiring your crew to actually do the shop prep.
- The rental fee covers the cost of the equipment rental for the duration of your production, and is often stated in terms of a weekly rate. Depending on the state or states that your production and shop are in, your fees and weekly rates may or may not be taxable. Be sure you're clear on whether quoted prices are all-inclusive or subject to additional fees.

2. Timetable

Time flies like an arrow, fruit flies like a banana.

The most common problems which arise when renting equipment are all related to time, and many of them can be addressed by simply starting early, communicating often, and keeping track of where you are in the process.

Major Broadway productions and large tours sometimes begin the process of communicating with the rental shop as much as a year before tech rehearsals. Some off-Broadway shows try to send equipment lists out for bid between three and five weeks before tech. Other shows with minimal needs have successfully gone through an entire shop prep in a single day. It is wise to discuss and agree upon an overall timetable with the management of your production as early as possible. If your show is doing a shop prep, consider having your equipment list well and truly finalized with the shop around two weeks before prep begins. If your show is not doing a prep, a good general date to aim for is three weeks before load in.

Within that structure, it can be difficult to be sure that you have enough time for each step and, crucially, enough time between the conclusion of one step and the beginning of the next. If your show will be renting several million dollars worth of sound equipment, the time between submitting the first draft and the final draft of your equipment list is going to be much longer than if your show will be renting a simple mixer and a few speakers.

If your show has a specific equipment need for which no substitutions will be acceptable, contact the rental shop absolutely as early as possible to discuss that equipment. The conversation can be along these lines:

> "Hello, my name is XXX and I am the [*sound designer/associate sound designer/production audio supervisor*] on [*name of show*]. I know we haven't started the bidding process yet, and nothing is set in stone, but this design requires a [*name of unique item*] from [*first day of load-in*] through [*closing date*] and I want to make sure that you have that available before we go any further."

Discuss your schedule with your contact at the shop as soon as possible once you know the dates for load-in, opening, and closing. Find out how much lead time your shop contact wants.

If your show will have a shop prep (discussed below), planning and preparation in advance are the keys to success.

3. The Bidding Process

The bidding process is a series of conversations between many people, including but not limited to the sound team, the rental shop, the local venue, the general manager or production manager.

For some shows, the producer solicits competitive bids from more than one shop in the hopes of getting the best price, or the best value. For other shows, there is either only one shop available, or the producer has already selected a shop preemptively.

The competitive bidding process can be stressful, and can often feel like a chicken-and-egg game; you can't finalize your equipment list until you know what shop you're using, your producer won't select a shop until all the shops have quoted a price, and the shops won't quote a price until you've given them an equipment list.

Generally speaking, the way it works is that you provide a document which clearly outlines the equipment needed for the physical execution of the system design, and the timeline in which those needs must be met. You give this document to either the management on your production, or the sound supervisor/production audio person. Then, that person sends the document off to various rental shops. There is then a series of conversations between your production and the shop representatives about budgets, expectations and feasibility. The shops may respond to your equipment list with a quote ("We can do that for $X"), they may respond by declining to bid ("We're slammed right now and cannot take on another show"), or they may ask you, directly or through management, to make changes to the list before they bid. For example, they may not have a particular item in your list, and may offer a substitution or ask you to offer a substitution. Another possibility is that the quotes all come back out of budget, and management will ask you to find ways to cut the overall cost. This back-and-forth can go for several rounds, so it's crucial to leave enough time. It's good to have the bidding process finished at least two weeks before your shop prep (if you have one) or at least three weeks before the first day of load in.

Even if your show is not employing a competitive bidding process, the creation of an equipment list is still a very important means of communicating your overall intentions for the design. It doesn't matter if your show is very small or very large, these guidelines will allow you to think about the information needed and how you can best communicate it.

3.1 The Initial Equipment List

This is where you figure out what you can afford and what is available. It is a way for your production manager, audio supervisor, or general manager to understand the scope of your needs. Don't forget to include items such as intercom, CCTV, dressing room monitors, etc. The degree to which these items are the responsibility of the sound designer vary from show to show, all the way from "not that much" to "utterly entirely."

- List all big ticket items that are of paramount importance and which your show can't do without.
    - Microphones
    - Wireless transmitters and receivers
    - Speakers
    - Amplifiers
    - Console
    - Playback
    - Networking
    - Intercom, CCTV, backstage monitoring, LittleLites, and other "support" equipment
- List any exact needs
    - Note what items can be substituted for something similar and what items need to be the exact thing you specify
    - Be prepared to make substitutions based on availability and cost
    - Specialty cable (Fiber, particularly long lengths, etc.)
- Indicate what items are *not* on the initial equipment list but which will be added later
    - Cable is often not specified on an initial equipment list because physical details of the venue may not yet be available.
    - Items relating to power distribution are often left out of the initial equipment list.
    - Hardware and rigging items are often left out because those specifics rely on information which has not yet been generated or developed (e.g. via a site visit and a discussion with other departments.)
    - For regional shops, cable order and rigging may need to be part of the initial equipment list for it to be fully accurate.
    - When in doubt, contact the shop.

3.2 Substitutions and Changes

Once the initial equipment list is accepted by both the shop and by the production manager/general manager/whoever-handles-the-money-in-your-production, the list can start to undergo revisions as more information becomes available.

- Specific rigging
    - Unique needs that are not standard equipment
    - Custom built rigging solutions
    - Truss, winches, chain hoists
    - Staging - platforms (ie, typically for outdoor spaces)
- Cable order
    - All the cables that you will need to support your system
    - Cable bundles - there can be union rules about who builds bundles; check with your shop.
    - More details on cable can be found in section 5.

In addition to the filling out of details, changes to the equipment list can occur for a variety of reasons. The design might change, the shop might not have a specific piece of equipment, etc. Having a method of tracking changes to the equipment list over time is key to a successful bidding process.

Some equipment substitutions are direct replacements, such as replacing one dynamic microphone with another. Other substitutions can have broad consequences. For example, switching a system of active loudspeakers to passive speakers means adding amplifiers, which means adding one or more racks to house those amplifiers, which means finding a location in the theater where the amp racks can live. It also means swapping out all the cabling running to the speakers from PowerCon + XLR to NL4.

As changes happen, you should provide for your team:

- A list of the changes (adds/subtractions/changes)
- A corrected bid/updated list with changes highlighted or otherwise called out
- All documents must include the DATE of the changes and WHO made these changes.

It is crucial that all substitutions be approved by the designer (or associate, if applicable), and it is likewise crucial that bid lists state this fact clearly.

3.3 The Bid List Structure

A good bid list has a coversheet, an equipment list for the show, an equipment list for the production period, and a list of perishables (a.k.a. expendables, a.k.a. consumables.)

The production period begins with the first day of load in and ends with the last day which any kind of tech-table-supported work is being done in the theater. During this time, additional equipment is needed to support tech rehearsals, tech tables and other supplemental business. That equipment is no longer needed once rehearsals are over, and so it can be returned to the shop, thus saving money and storage space.

3.3.1 Coversheet

Your coversheet is a place to outline your expectations of the shop. Important information that must be adhered to should be included on the coversheet.

- Production information
    - Title of show
    - Producer
    - Venue and its address
    - Rehearsal space and its address (if there is one)
    - List of who should be included in replies to this document
- Production specific dates including:
    - Date of the original document
    - Date of the current revision
        - Current revision date should also be in the file name
    - Start date for shop prep (if there is one.)
    - Start date for load-in (the day that sound equipment should begin arriving at the venue.)
    - Last day of production period/freeze date
    - Opening performance
    - Closing performance
    - Date that sound equipment should be picked up
- Contact information
    - Designer
    - Associate designer
    - Production engineer, Production audio (if appropriate)
    - Production manager or associated contact
    - Technical supervisor (if appropriate)

    - Venue contact (if appropriate)
- Expectations of shop
    - What gear needs to be immediately available, if any
    - Number of crew that you'll bring to the shop for prep
    - Cable bundling expectations
    - Trucking
- Extenuating Circumstances
    - Specific rigging needs that are particularly costly
    - Items to be constructed
    - Technical questions for a particular department
    - Known limitations of size/scope/needs of particular equipment

3.3.2 Equipment list

Your equipment list is your opportunity to show every part of the sound system needed to execute your design. It is a document that combines your design choices and the needs of the production. While you may not be the person who is installing the equipment, you as the designer are responsible for ensuring that your design is executed on time, in budget, and to the expectations of the creative team as discussed. That may be as simple as securing one computer for playback or it may be as complex as a fully installed system.

It is common to break down your list in two ways:

1) Dates needed
2) Type of equipment

Equipment that is needed for the duration of the show run, is considered the "main order". This will be the bulk of your needs. It's all the stuff that is absolutely essential to have once the show opens.

Equipment that is only needed until opening (or until the show is finished teching) is considered the "production order".

These two lists then should be organized by categories of equipment.

Note on Specificity:

Be specific with your list, even if you would accept substitutions. Some shops might not have the exact model you specify, but they may have something comparable.

Adding a note describing parameters in addition to the exact model number can save time and energy (and therefore money.) It permits the shop to meet your needs without opening the door to needless communication back and forth over exact model numbers and irrelevant concerns. Defining your specific use can help the shop suggest substitutions.

If you are unsure of what is available, contact the shop.

3.3.3 Suggested equipment list categories

- Wired microphones
- Wireless microphones
    - Transmitter, receiver
    - Antenna distribution
    - Microphone Elements including color & connector type (these may be in the perishable area below)
- Playback equipment
    - Computers with accessories
        - Operating System
        - Software licenses needed
        - IP address information
        - KVM needs
        - It can be helpful to list the intended use of the computer, i.e.: “General purpose”, “QLab”, “Console control”, etc.
- Network switches
- Power distribution
- Console and related equipment
    - Specialty processing cards
    - Remote stage boxes (or remote preamps)
    - Be sure to specify the version of firmware needed on the console and all components directly attached to the console. It's also OK to write something like 'Console and all console cards and boxes must be updated to the most recent firmware as of XXX date."
- Amplifiers
- Speakers
    - Speaker processing
    - Rigging hardware
- Microphone stands and accessories
    - Indicate height and type of stand (ie, round base or tripod)

- Intercom and accessories
- CCTV monitoring
    - Cameras
    - Camera mounting hardware
    - Lenses
    - Video distribution hardware
    - Monitors (screens)

3.4 Perishable or Expendable items

This list may vary depending on where you are working - discuss with your shop and production manager. Tieline and tape may be the responsibility of production manager, production audio person, or someone else. These may also be purchased through your rental shop.

You should include any major items that are not typically rented. These often include:

- Microphone elements worn by actors
- Headphones (varies by shop, ask!)
- In-Ear monitors
- Small, practical speakers
- Batteries - rechargeable or otherwise

For larger shows, the production is responsible for providing all tools and equipment needed to assemble the system. This list should be a discussion with the design team, the production audio person, and the production manager. Always confirm with the PM before you make the final order.

Things you may need include:

- Supplies needed during shop prep
    - Electrical tape
    - Clear tape
    - Scissors
    - Zip ties
    - Printer
    - Labels for cables
- Tools needed during load in
- Supplies needed on regular basis for run of show

4. Other Paperwork

There are many types of paperwork needed for your show. You can see a more complete list HERE. Much of this paperwork is not directly relevant to the shop; the shop doesn't need to see a ground plan or section, for example. The exact list of documents that the shop will want is contingent upon both the complexity of your show and the complexity of your shop process. All rentals need an equipment list. Other necessary paperwork could include:

- Rack drawings
    - Indicate what gear is in each rack
    - Indicate connections to/from places
    - Indicate signal flow within each rack
- Cable schedules
- Specific signal flow diagrams to demonstrate needs in unique situations
- Computer networking needs or IP address scheme
- Specific software or firmware needs
- House or local venue wireless equipment that needs to be coordinated with any rental wireless equipment

If you're doing a shop prep, there is other paperwork you'll need to bring with you. You can find a checklist of those documents in Appendix A.

5. Frequency Coordination

We rely on the shops for frequency coordination!

When using wireless frequencies, it can be a daunting task to coordinate across all of the wireless inventory, and update the coordination as the RF environment and location change. Frequency coordination is the process of making sure that all of the wireless equipment that is needed for a production can function together without interference from other wireless equipment or from outside sources, such as digital television. This interference can be in the form of dropouts, humms, buzzes and can be present all the time or momentarily. Depending on the shop, frequency coordination may be included, or is able to be added to the shop request. If you are unsure, check with the shop! They often have technology to assist with coordination and troubleshooting.

To make coordination easier, it is often best practice to use the same, or similar equipment from the same manufacturer for each wireless need when possible. For example, the same gear for actor mics, the same or a second for IEMs, a third for communication, etc. Doing this eliminates the need to account for many differences between manufactures. It is also important to keep frequency ranges in mind when spec'ing equipment. Some shops will automatically make sure your equipment is in a large range, while at others it may be important to ask for specific numbers of frequencies in each range. The ranges of the frequencies will differ between manufacturers (another good reason to stick with the same one!).

In order to do a proper frequency coordination the shop will need a few pieces of information. These include:

- Location of venue, often the zip code, but sometimes street address is important
- All wireless equipment, including anything not on the shop order such as house wireless equipment, personal wireless, house radios, equipment from other rental sources
- If the production is moving venues during the run, a list of venues with their location and dates of performances. The shop may not give you a frequency list for every venue right away. This may be sent when you are closer to that date.
- If you are able to get into the venue ahead of time and able to take a frequency scan, this will help the shop know the current RF environment and possibly provide a more accurate coordination.
- Any spare frequencies you would like to be added incase issues come up

Sometimes the initial coordination will work with no problems, congratulations! Other times it may be necessary to reach out to the shop with problematic frequencies and/or ask for an updated coordination.

6. Cable Order

The interconnection cable for your show is a vital component that is often overlooked. While it may seem like you just need a few pieces of common cable to make your show happen, it adds up quickly. Knowing the quantity and length of each type of cable you have available is an important aspect of being prepared for any changes that may arise. Having a method for tracking, tallying, and labeling each cable in your system is key to a successful shop prep. Include spares - in individual lines and in mults (described below).

Opinions and methods vary greatly. Because each person has their own methodology, styles, formats, and workflows can be very different. Clearly defining who on your team will be responsible for cable management is critical. In New York City, it is common to use a specially made database to organize cable. There are various custom-built databases that sort, organize, tally, and label cables. However you choose to organize your cable, there is certain information that must be conveyed to a shop in order to ensure you get what you need.

Cable substitutions require special care and attention because they can have unintended consequences. For example, if you've specified some quantity of NL4 cable but the shop only has NL2 cable available, you need to figure out whether that will change the total quantity or not. If you plan to use both pairs of wires in the NL4 (e.g. if your speakers are biamplified) then you'll need double the number of NL2 cables as well as 2xNL2 socket-to-NL4 plug adapters. If you were only using one pair, a straight swap is probably fine. Another kind of issue that can arise is the question of weight and storage space. If you've specified a 6-pair mult but the shop only has 12-pair mults available, that's no problem in terms of getting the job done, but the mult is going to weigh much more and take up much more space. Issues such as these are very important to keep in mind.

For the largest productions, you'll need many different cable types.

6.1 Multicable

Multicable, or "mult" for short (or sometimes called a "snake"), is several individual wires contained within a single outer jacket, in which those individual wires all carry signals which remain physically separate. Mults are often referred to by the number of pairs of wires and, therefore, the number of audio signals available. A mult can refer to any collection of wires in a single jacket although in casual discussion, "mult" usually only refers to multicables which carry balanced line level or mic level signals.

Commonly available mult sizes at New York theater shops are 3, 6, 9, 12, and 19 pair. At each end, the mult "breaks out" into a batch of connectors, one for each individual signal within the mult. These "break outs" are often detachable at each end to make installation and changes easier. The detachable ends are referred to as "tails", "fan-outs" or "break-outs", and the body of the mult, the thick cable part, is referred to as the "trunk" of the cable.

Tails look like a number of short cables with individual connectors on one end, gathered together into a single large connector at the other end. The large connector is typically a Wireworks G-block connector, which is rectangular and uses latches on the sides of the connector to lock to the trunk . This is common in New York Theater shops…other shops may use other manufacturers products such as Whirlwind, MASS etc. Please see Appendix B for more discussion on mult connectors.

The G-Block connector comes in several sizes, two of which are in common use in theater. 3-pair and 6-pair mults use the smallest size, which is referred to as "1G." Mults with more than 6 pairs use the larger "3G" version. The two sizes look similar, but cannot connect to each other. You need to know which size G-Block connector each mult in your show will use so that you can make correctly sized labels. Please see Appendix C for pictures of G-blocks.

G-block trunks have a plug end and a socket end. Needless to say, this means that G-block trunks can be run the wrong way in the theater if you're not careful enough about labeling. It is impossible to overstate the importance of taking time and care to make sure everything is as you need it. Re-running a 250' bundle that includes two mults, some BNC, and some power cabling is nobody's idea of a fun time.

When ordering mult, you typically specify the trunks and ends separately. For the trunks, note the number of signal pairs and length. For tails or boxes, note the number and type of connections. A little variation is acceptable, but you need to include all the crucial information:

- 6-pair, 25'
- 19-pair mult @ 150'

When referring to a set of tails as either plugs or sockets, always refer to the breakout end, not the mult connector end. That is, a "6-pair XLR plug" tail has six XLR plugs (pin end) and a 1G socket (receptacle end.) On an equipment list, you might list it like this:

- 6-pair G1-socket/XLR-plug tails
- 9-pair G3-socket/TRS-plug tails

Take caution, for *here be dragons:* on XLR tails, the orientation of the G-block connector is always opposite that of the XLR. XLR plug tails always have G-block sockets, and XLR socket tail always have G-block plugs. However, ¼" TRS tails are generally always plugs, so to make a TRS mult, you need one set of TRS-plug tails with a G-block socket, and one set of TRS-plug tails with a G-block plug. This requires extra care both when writing up your list, and also when discussing, preparing, and labeling the mult.

6.2 Stage Boxes and Rackmount Panels

A stage box is an enclosure which has a number of connectors mounted in neat rows, usually on the front or rear of the box. In general, they have...

- One G-Block connector to connect to a trunk, or two G-Block connectors; one to connect "upstream" and one to connect "downstream."
- A number of XLR or TRS connectors.

Stage boxes are:

- Ideal for bands, or other places that can spread out a bit.
- Sometimes 19" wide with rackmount ears so they can be mounted in an equipment rack.

Rack-mounted panels are like a combination of a stagebox and a tailset. They are typically used for combining signals from many locations into a single mult. Many have "loop-thru" connections for allowing the combined signals to be distributed (or split) to many places.

Rackmount panels are ideal for:

- Combining page mic and program feeds from tech/calling location into one SM mult
- Com splits
- Monitor splits
- Patch plates into equipment racks
- Any place you need easy access to interconnections

6.3 Clips and Ears

One of the things that takes a surprising amount of time and energy on a show that uses G-block mults is the arrangement of the latching mechanisms that lock G-block connectors together. This becomes particularly important when working on a tour which may need many different configurations available due to house equipment.

There is no standard between shops. It's up to you to be aware of how your shop generally arranges latches, and to note any cases in which your show requires something different. Bring up the topic of mult latches in your initial shop conversation. This is an easy thing to forget to do, which can lead to an unexpected crunch of work at the last minute if it's not considered and anticipated.

Spare latch parts can be added to your order, and are generally considered a consumable.

First, there are two styles of latches for G-block connectors: BLS latches, which are casually referred to as "clips and ears" or "Broadway-style latches", and A-latches which have no cute nickname. Latches of one type cannot interconnect with latches of the other.

- **BLS latches** consist of a pair of floppy "clips" on either side of one connector and a pair of rigid "ears" on the sides of the opposite connector.
- **A-latches** consist of a pair of rigid spring-loaded "wings" that protrude in front of either side of one connector and have very little side-to-side mobility. The wings latch onto the edges of the opposite connector.

BLS latches require more side-to-side clearance to operate, but take up less space overall. A-latches don't require any manual operation at all; just jam the connector in and they lock, but they stick out from the front of the connector and snag on things when the mult is not connected.

Some shops use BLS latches, some use A-latches. To ask why is to pursue the unknowable; just know that this is true, and it's unfortunately your problem to tackle.

Quite separate from the question of which style of latch you'll use is the fact that clips, ears, and wings can each be attached to either end of any G-block connection. In a BLS latch shop, for example, it's typical to see ears on panel-mounted connectors and clips on mult trunks, but it's not always done that way.

You can find examples of G-block latch arrangements in Appendix C.

6.4 Rackmounts/frames

A custom configured plate, commonly known as a "Steck" panel. Steck panels are a system by which you can mount a multitude of different connector types into a standardized frame. Items which might be stekked might be mult tails, XLR connectors, RJ45 connectors, BNC

connectors, MIDI connectors, and more customized things like VGA, HDMI, or USB connector.

There are two types of "steck" systems that are commonly used: the classic stek frame which is 1rack unit (RU) tall and has four slots in which you can mount panels containing connectors, and "Middle Atlantic" frames which are 2RU tall and provide 5 slots for similar types of connectors. Masque and SA utilize both types of frames. PRG only uses the Middle Atlantic style.

1U versions of these have four “bays” to mount panels holding one, two, or three connectors each. These are not commercial products, and you cannot find or buy them anywhere.

2U versions of these, most commonly Middle Atlantic’s line of UCP series modular panels, look like miniature horizontal rack rails onto which you can mount plates that hold anywhere from one to six connectors.

6.5 Bundles

A bundle is a collection of single cables and/or Mults with the same origin and destination that are connected along their length, usually using friction tape. Generally the cables in a bundle are the same length, although there may be exceptions if you need cable to break off at a certain point. Bundles allow for many cables that take the same path to be put in place at once. The physical act of bundling is often done by the shop, but sometimes it is not. Ask your shop if they will be making bundles for you, and whether the shop or the production will be providing the friction tape.

When looking to bundle cables together you need to indicate the type, number, and length of each cable and which end of each cable goes on which end of the bundle. That way someone can easily collect the cables, label them, and bundle them together correctly.

The process of indicating which ends go together is called “flagging”. Usually this is as simple as placing brightly colored pieces of gaff tape on each cable with similar origins. This is important because not every single cable will be the exact same length. Knowing that all of the cables start or end together means that you can plan for extra length on one side.

When collecting cables to be bundled together, a bundle sheet which clearly defines the cable type, origin/destination and purpose is utilized. This sheet can then be used by whomever is bundling the cables together to ensure they are doing so properly. In some cases, the bundling is handled by the shop staff, and sometimes by the show specific crew. Having a clear, one-sheet document (per bundle) that shows which cables are in each

bundle is vital in this process. Be sure to ask the shop who will be responsible for the execution of bundling. This often happens first in a shop prep - discussed next.

7. The Shop Prep Process

For some shows, specifically in New York, having a shop prep is a known part of the process. Shop prep is designed to save yourself time in the theater. The shop is a better and more efficient place to work as you confirm your signal flow and troubleshoot. Often tasks are faster and cheaper in the shop.

This is when you assemble as much of the system as possible on the floor of the sound shop and test all the equipment together before bringing it to the theater. This may include but is not limited to assembling racks, programming consoles, labelling, and bundling cable. Because space is often limited in theaters, we utilize the time in the shop to sort, organize, plan, and prepare for load in. Know that often shops are unionized, and when you are working there you are a guest. Respect any work or union rules. If you are unsure, ask.

Talk to your production manager, general manager, and the shop so that you can understand if a shop prep is needed, and if so, how much time and labor will be allocated. Because shop prep can be a cost that is not always budgeted, have the conversation early and be prepared to show how you will use the time to ensure a smooth load-in.

In the larger New York area shops, you will often be assigned a "show zone" which is the designated prep area for working on your production. All gear, cable, and personnel will need to fit within your zone, and during busy shop times, the space can be limited. Shops also can fit only so many productions on the floor at once, so scheduling the prep with the Shop staff will be critical for both space and workflow.

Shop preps are often led and scheduled by the production audio position. For more information on this vital role, please see the TSDCA's page on professions.

- Shop preps can vary in length depending on the size of the show.
- Understand that the shop may have schedule issues; be flexible regarding when the shops can get certain equipment to you. Communication is key.
- Make a schedule for your time in the shop:
    - This is specific to your show. If you need time to program a console, then you may want to ask for it to be available on the first day.

The following is an example ten-day shop build schedule appropriate for a small to medium off-Broadway musical. This is one way to do it; there are many others. A more complex or larger show would likely need more time. A show without any sound reinforcement would need rather less time. This is not a one-size-fits-all affair; tasks and days may overlap.

- Day 1 – Collect and label all cable and tails. Build bundles.
- Day 2 & 3 – Assemble playback system, intercom and CCTV systems, and main system I/O, and continue work from day 1.
- Day 4 – Build FOH racks, RF racks, orchestra racks.
- Day 5-7 – Pull gear for and assemble racks or packages for the SM position, SM office, Conductor, LX operator, other stationary com and/or CCTV positions, all tech tables, FOH, Ampland
- Day 8-10 – TESTING. Com, CCTV, main system inputs and outputs.
- Day 10 – Packing. Keep it tidy!

8. Labeling and Cable Codes

Even the simplest of shows can require a lot of cable, and often a lot of different kinds of cable, to carry signals of all kinds to every corner of the venue. In almost any production, it behooves you to thoroughly label all cables in your system uniquely to facilitate correct installation and to ease problem solving. Each cable should be labelled uniquely.

A good label clearly explains the use of the cable, won't come off accidentally even when the cable is handled roughly during load in, and can be cleanly removed by the shop when the cable is returned after the show closes.

The following is one of the most common approaches to labeling.

8.1 The Label Sandwich

The standard technique in NYC for affixing labels to cable ends is a three layer sandwich:

1. Wrap some good quality vinyl electrical tape all the way around the connector, making sure to stay back from the edge of the connector where it will seat into a socket or latch into another cable.
2. Affix a handwritten or printed label on top of the electrical tape so that most of the writing is visible from a typical viewing angle when the cable is plugged in (consider right angled cables and cables which twist to lock; the label should be legible when the cable is "in action.")
3. Wrap good quality transparent tape all the way around the connector again, covering the label and the electrical tape. Avoid direct contact with the transparent tape with the connector so that the label is easily removable.

The electrical tape provides a clean, smooth surface for the label to adhere to while also preventing label adhesive from gumming up the connector. The clear tape prevents scuffing and other minor damage to the label. The whole sandwich is difficult to scrape off accidentally, but relatively easy to remove deliberately. Also, this particular sandwich tastes awful.

It is discouraged to use "flag" type labels, which wrap around the cable and stick out at a perpendicular angle, as these are much more easily damaged in typical use, and create an untidy and difficult to read situation when applied to lots of cables plugged into a patch bay or stage box.

It is discouraged to apply any sort of label to the cable jacket itself as this is more difficult to read and more difficult to remove. When labeling a cable that has no connector, obviously, labeling the cable jacket is unavoidable, and is better than nothing. This is common practice for ethernet, midi and other cables without barrel style connectors. Always make sure that when you affix a label to a cable connector that it sits far enough back that it will not interfere with plugging the cable in fully. Many a sound system has been disrupted by a high impedance air gap as a result of an improperly placed label.

Use standard size electrical tape which is highly UV resistant, rated for use outdoors in extreme temperatures, and which has high quality adhesive. Avoid electrical tape which lacks any of those qualities. Generally speaking, the best electrical tape is slightly thicker and slightly stretchier than others.

[1¾" x ½"] printer return address labels or ½"/12mm tape for label-making machines are good for nearly all cable types and single connectors.

[2⅝" x 1"] printer address labels or 1"/24mm tape for label-making machines, are good for larger multicable connectors or blank panels on equipment racks.

Use standard size transparent tape which is highly UV resistant and which will not crack or yellow when exposed to the elements. Generally speaking, the best transparent tape is slightly thicker and completely clear. If you can clearly see the color and markings on the core of the roll through all the layers of tape, that's a promising indicator of quality.

8.2 Labeling Methods for Individual Cables and Mult Tails

Labels should include two pieces of information at minimum: text describing the connector being labeled (to help ensure that the right label goes on the right connector) signal being carried (description), and an indication of where to plug the cable in (patch). The description should be the same on both ends of the cable, but the patch should, clearly, be different.

For example, consider an XLR cable which will run between a bass guitar DI box and the orchestra stage box. A minimal way to label that cable would be:

Bass Gtr Socket @ Bass DI	Bass Gtr Plug @ Orch Mult ch. 12

(The box on the left represents the label for one end of the cable, and the box on the right represents the label for the other end.)

Another simple example is a BNC cable which connects a video camera to a video distribution hub:

Confetti Cam BNC @ Flyrail	Confetti Cam BNC @ Grid video distro

In the case of cables long enough that both ends cannot be seen at once, it can be useful to add the length, or length and type, to the label:

Bass Gtr Socket @ Bass DI 100' XLR-3	Bass Gtr Plug @ Orch/12 100' XLR-3

Confetti Cam BNC @Flyrail 250' RG6	Confetti Cam BNC @ Grid vid 250' RG6

The exact typography choices are, of course, highly flexible and should be modified to suit the needs of the occasion. The essential requirement is legibility and quick intuitive reference.

8.3 Labeling Methods for Mults

For mults with permanently attached tails or break-out boxes, make sure each has a distinct name, and connectors are labelled at both ends of the mult. For mults which have removable tails or boxes, both ends of the mult trunk and every connector on the tails or boxes that mate with the trunk should receive their own labels. These labels should follow a similar format as individual cable, though slightly more information is required. Labels should include:

- Abbreviated name of multcable (if abbreviations are being used)
- Name or description of multicable
- Indication of where to plug the cable in (patch point)

The abbreviation, name, and description should be the same on both ends of the cable, but the patch should, clearly, be different.

Additional information, such as the type of cable, length of run, and bundle membership can also be included on the label.

For example, a minimal way to label a multicable would be:

Center Cluster Socket @ Cluster	**Center Cluster** Plug @ Amp Rack 1

If additional information is desired, it can be filled in. The following example shows a coded abbreviation for the mult, the number of signal pairs in the mult, the length, and the bundle that the mult is part of:

cFOH **FOH Com** Socket @ Com Rack 19p - 200’ *FOH Com Bundle*	***cFOH*** **FOH Com** Plug @ SM Rack 19p - 200’ *FOH Com Bundle*

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8.4 Labeling Codes - One Approach, that some love and others actively despise...but for reference:

The challenge: we need the label to fit on the connector. How can we abbreviate but still be clear? The most important thing is that the labels are clear to the end user - the stagehand. They may be working in low light, or they may be colorblind or wear prescription lenses, so clear, large, legible fonts are essential.

If you can be clear on a label without a code - that would be great. DRUMS for the drum mult. SMCom for Stage management intercom.

But if you need to create a system for labelling - most importantly - be consistent. You should not need to refer to a code book to decipher it - but rather should know immediately where that cable goes when you look at a label.

There are different methodologies.

Some guy codified a cable labeling convention for his students that had been used for a while by associate designers in our industry. Under this system, cables are named by combining three "codes":

- A code for the ***type*** of signal the cable carries,
- A code for the ***location*** in the theater where the cable terminates,
- An optional ***modifier***.

The savvy reader will note that most cables terminate in two different places in the theater. In this convention, cables are named for the end which is pointing *away* from the mix position or sound booth.

Example cable types:

- **a** signals to or within the amp room/area
- **b** signals to/from the band
- **c** (inter)com
- **d** digital audio (AVB, Dante, MADI, etc.)
- **f** FOH interconnects
- **i** inputs (audio signals which feed into the console.)
- **k** KVM
- **m** microphone (used when you want to differentiate from other inputs.)
- **n** network

- **o** output (audio signals which feed out from the console.)
- **p** power
- **s** speaker
- **v** video
- **z** cables which deliberately have no specific purpose at the time of drafting.

Example locations:

- **BR** balcony rail
- **CC** center cluster
- **D** delay ring/line
- **DSL** downstage left
- **DSR** downstage right
- **MHL** mid house left
- **FF** front fill
- **FR** fly rail
- **G** grid
- **U** underbalcony

It is recommended that any cable run downstage of the proscenium be labeled using House directions (HL/HR), whereas any cable run upstage of the proscenium be labeled using Stage directions (SL/SR). Additional location nomenclature should coincide with terminology utilized by other departments (i.e. Electrics, Ladders) and/or venue (i.e. Boxes, Orchestra, and Balcony) to avoid confusion.

Modifiers are where this system can become unwieldy. Great restraint is recommended here. Consider using only the following modifiers:

- **s** spare
- **x** extension
- **t** tech (a cable used only during tech rehearsals.)
- **#** use numbers when there are multiple otherwise identical cables.

In practice, this method allows a relatively large amount of information in a relatively small amount of space via a fairly readable code. Some examples:

bOP1 band mult #1 going to the orchestra pit.

cSMt intercom to the stage manager's desk during tech.

sDSL speaker cable feeding signal to the speakers which are downstage left.

kLX KVM to the lighting desk.

oAR2 the second of two mults which bring outputs from the console to the amplifier room.

If you are using a shorthand system, it is highly recommended that the coding of a single cable never exceed a total combination of four numbers and letters. Complicated nomenclature for speaker cables is often the most problematic to abbreviate and tends to require additional shorthand. A good way to think about it is this: if it takes more time to decode the shorthand than to trace the cable, consider simplifying the shorthand system.

A universal cable code system is much like communism: an excellent idea in principle but ultimately no such system can be both easy to understand and sufficiently flexible for all needs.

8.6 Length Codes

Quite separate from the above is another category of cable labeling: length labels. Each shop has its own system of color-coding cable lengths. Most shops use a single specific color for the most common lengths of cable, and some shops combine colors for very long or unusual lengths. Length labels are generally found on both ends of a cable, and take many physical forms.

It is thoroughly frowned upon to deliberately remove length labels.

Appendix A: Checklist for Day 1 of Shop Prep

Starting your first shop prep for a large production can be very daunting. Knowing that you have all the information available to share is the best way to be prepared. This is a list of paperwork that should be available to you and your team to start a four-wall rental shop prep in NYC.

- System flow diagrams
    - Audio signal
    - Network
    - MIDI
    - Intercom
    - CCTV
- Rack drawings
    - Indicate what gear is in each rack
    - Indicate connections to/from places
    - Indicate signal flow within each rack
- Cable paperwork needed to start a shop prep
    - Bundle summary
        - Names of all bundles
        - What is in each bundle
        - Origin
        - Destination
        - Length
    - Bundle sheet per bundle
        - Total number of cables in bundle
        - Breakdown of each cable in bundle
        - Origin/ Destination
        - Tail details for mults in the bundle
        - Flagged end
            - Which ends need to line up together
            - Do all the cables need to land evenly at a cluster?
            - Do all the cables need to land evenly together at the rack?
    - Tail Summary
        - Lists all the tails needed for all mults
    - Printed labels for:
        - Individual connectors on mult tails (small labels)
        - 1 G-block connectors on mult tail (large labels)
        - 1 G-block connectors on mult trunks (large labels)
        - 3 G-block connectors on mult tails (large labels)
        - 3 G-block connectors on mult trunks (large labels)
        - Loose cable labels (small size) for items such as:
            - EtherCon cable

        - Cat-5 cable
        - Microphones
        - XLR cable
    - Loose cable labels (large labels) for item such as:
        - NL2, NL4, NL8
        - Power (various NEMA connectors)
        - Amplifier labels
        - Speaker labels

Appendix B: Glossary of Terms

Bundle vs Loose vs Spare

Bundles are batches of individual cables which all have a common physical pathway in the theater and which are therefore bundled together in advance. This makes it easy to deploy the cables at the theater, and it also makes it easy to be sure that none of the individual cables are accidentally (or "accidentally") repurposed by an impatient technician during load-in. Bundling is typically done using friction tape which adheres to itself very well, but does not adhere very much to anything else (other than dust and sand, mysteriously.) An example of the usefulness of bundles is for tech tables; the stage manager's table might need power, a mult for com, maybe some XLR for page and VOG mics, and cables for CCTV monitoring and/or networking. All these cables need to be run out to the SM's tech table as simply as possible, so you bundle them all together so they can be handled as a single unit.

Loose cables are cables which are not bundled together.

Spare cables are ones which do not have a defined purpose.

Combination or "combo" cable

This refers to a cable that is really one PowerCon and two XLR cables bundled together inside a single cable jacket that's about the diameter of a single NL-4 cable.

Alternative varieties exist, so it is important to specify whether you need one or two signal (XLR) cables.

Mult or Multicable

A mult, short for multicable, is a bundle of individual wires contained within a single outer jacket, in which those individual wires all carry signals which remain physically separate. These are often referred to as a "snake." In a sense, an NL4 cable is a simple mult, since it contains two pairs of wires that carry separate signals (often for a biamplified speaker.) The most stereotypical example of a mult is the thick-as-your-wrist monster which runs between the stage and the mix position in a concert venue. On the stage side, the mult terminates in a large box containing a large number of XLR sockets that individual microphones can be plugged into. On the FOH side, the mult terminates in a tail with XLR plugs that can be plugged into the console.

For mults with detachable ends, the cable that contains all the little wires is called the trunk. The detachable ends come in many flavors; tails have a single large connector which plugs into the trunk and then multiple individual short cables for

each channel of the mult. Stage boxes and rack-mount boxes are rigid in shape, but are not fundamentally different.

The most common mult connectors in the theater audio world are:

- The G-block connector, which is rectangular and which uses latches on the sides of the connector to lock together.
- The MASS connector and its baby siblings, the W1 and W2, which are circular and which screw together to lock.
- The Socapex connector (which many people inexplicably refer to as a "socco" connector) which is also round and screws together to lock.
- The Elco/EDAC connector which is rectangular and has a locking pin in the middle which screws in.
- The DB-25 connector which looks like a printer cable from the 1980s and locks using two little screws on the sides.

Stek or Stek panel

A configurable rack-mount panel into which can be mounted connectors of all kinds. The word itself is a holdover from a now non-existent brand name and has no exact meaning.

1U versions of these have four "bays" to mount panels holding one, two, or three connectors each. 2U versions of these, most commonly Middle Atlantic's line of UCP series modular panels, look like miniature horizontal rack rails onto which you can mount plates that hold anywhere from one to six connectors.

Tagging or Flagging

Labeling the ends of cables which are to be bundled together so that whoever is making the bundle knows which ends go with which.

Sometimes this is just slang for labeling in general.

Tail

A disconnectable, modular adapter which connects to a multicable trunk and provides individual connectors for each channel (or "pair" or "line") in the multicable. These usually look like several short cables with, e.g., XLR connectors on one end, and the other ends all bunch together into a single large connector which plugs into the multicable trunk.

Sometimes referred to as a "fan-out" or, less often, "fan-in."

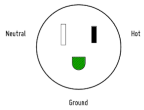
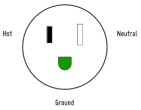
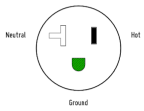
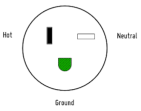
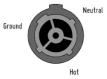
Squid adaptor

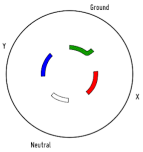
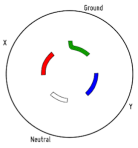
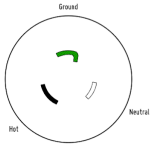
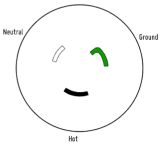
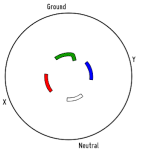
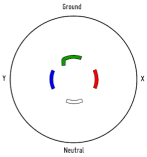
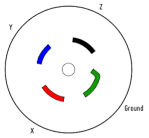
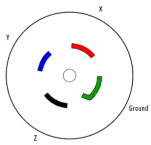
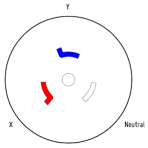
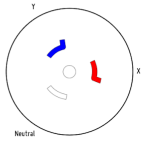
An (often deliberately) imprecise term for any adapter which has one connector on one end, and multiple connectors on the other end.

Appendix C: Image Gallery

C.1 Shop Prep In Action

C.2 Power connectors

	Socket	Plug
NEMA 5-15 120V, 15A Single leg hot		
NEMA 5-20 120V, 20A Single leg hot		
PowerCon blue 120V, 20A Single leg hot	 *Load*	 *Line*
PowerCon grey 120V, 20A Single leg hot	 *Line*	 *Load*
PowerCon TRUE1 120V, 20A Single leg hot	 *Load*	 *Line*

	Socket	Plug
NEMA L14-20 120V/240V, 20A Single-phase, two leg hot		
NEMA L5-30 120V, 30A Single leg hot		
NEMA L14-30 120V/240V, 30A Single-phase, two leg hot		
NEMA L21-30 120V/208V, 30A Three-phase hot		
CS6364/CS6365 120V/240V, 50A Single-phase, two leg hot, ground on edge (!?) (not commonly used)		

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Appendix D: Suggested Language

D.1 For Initial Bids

“This bid list is preliminary but is accurate to the best current knowledge. Any substitution requests using available shop stock is welcome however must be made to the designer in writing and may not be implemented until the designer approves such changes. Once the bid has been approved, there will be no substitutions allowed. It is the responsibility of the shop/hire company to outline to the General Manager the perishable-versus-rental items, and any one-time costs, such as trucking.”

The following is a preliminary sound equipment list for "<SHOW NAME>" at <THEATER>, sound design by <DESIGNER> and produced by <PRODUCER>. Production Sound is <PRODUCTION SOUND>

Dates:

Shop Order Finalized: <DATE>

Shop Prep: <DATE>

Load In: <DATE>

Tech: <DATE> - <DATE>

First Performance: <DATE>

Current Closing: <DATE>

Possible Extension: <DATE>

The cable order submitted with this equipment list is a preliminary list and for bidding purposes only. A final cable list will be submitted after the bid has been awarded. **Do not** pull from this list.

Equipment may not be substituted without written consent of the Sound Designer. Please direct questions and substitutions to <DESIGNER> (<DESIGNER EMAIL>) and <ASSOCIATE> (<ASSOCIATE EMAIL>).

Please include trucking for Associate Designer and Production Engineer's workboxes and tools to the shop for prep.

Video Lenses may need to change based on venue.

- All computers must be silent running
- All CAT5e, and CAT6 cables (including jumpers and ethercon) must be shielded twisted pair.
- All ethernet cables (CAT5e/CAT6, including jumpers) must be qualified for Gigabit usage prior to delivery (even if purchased new) using a Fluke CableIQ Qualification Tester, or better.
- All software and drivers must be installed and tested before delivery to the prep zone.
- All cables and components must be checked and tested before delivery to the prep zone. - All computer monitors must be tested for compatibility with the KVM matrix prior to prep.

Please include the following onsite technical support:

- 2 days, RF technician in theater: pre-dry tech and first day of cast onstage
- 3 days minimum, Robin Whittaker, Outboard UK, to certify TiMax 2 system,Tracker system, and all components
- 2 days, ClearCom Freespeak technician in the theater for the first day of dry tech and first day of cast onstage

Thank you,

<DESIGNER> and <ASSOCIATE>