

Telex[®]

VOICE COMMUNICATIONS INTERCOM SYSTEMS

SYSTEM APPLICATIONS

- CHURCH
- SCHOOL
- THEATER
- STUDIO
- INDUSTRIAL
- MILITARY

For more information, please contact:
Telex Communications, Inc.
12000 Aldrich Avenue South
Burnsville, MN 55337

Tel: (800) 392-3497

Fax: (800) 392-0498

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CUSTOMER SUPPORT

Technical questions should be directed to:

Customer Service Department
RTS/Telex,
12000 Portland Avenue South
Burnsville, MN 55337 U.S.A.
Telephone: (800) 392-3497
Fax: (800) 323-0498

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Audiocom One Channel System

This system represents the most basic PL (Party-Line) intercom system possible. Conceptually, it is the “leaping-off-point” for all other designs.

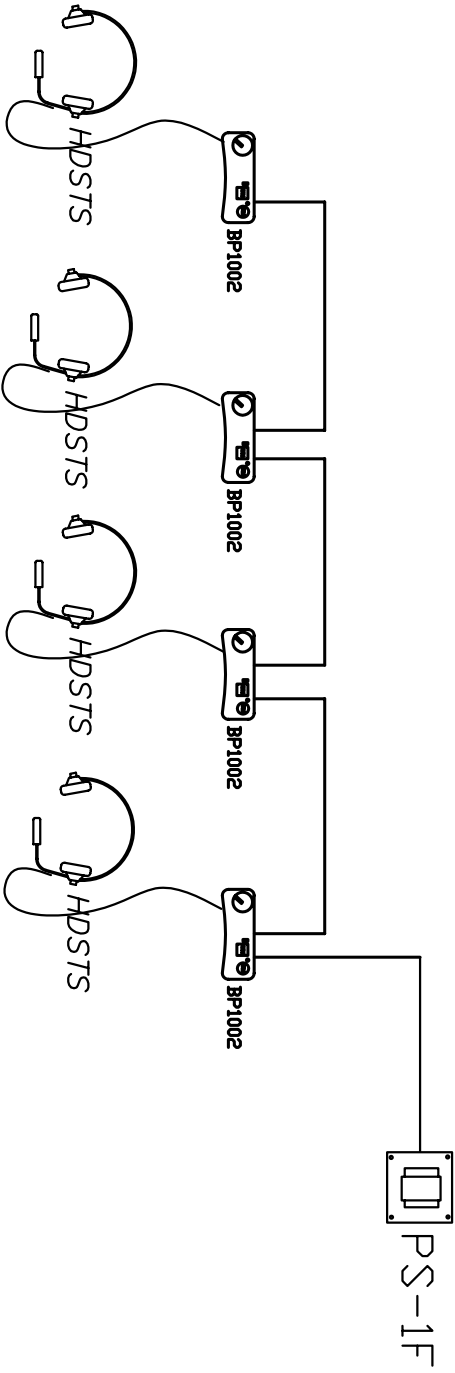
The number of users is limited only by the power supply capabilities (see the chart at the end of the manual for specifics). This example shows four BP-1002 single channel belt packs “daisy-chained” together with 3-pin XLR cables to a PS-1F Power Supply. The belt packs could also be connected together using a splitter, such as a model TW5W in lieu of (or in addition to) daisy-chaining.

Also, there are no Master Stations, Speaker Stations, or Multi-channel User Stations. All the belt packs are on the same channel; and as long as the headset is worn properly and the talk buttons are pressed ON, communication is assured.

This is a very cost effective solution for low-budget applications, which do not demand more advanced (and subsequently more complex) capabilities.

This system could find application in a small church or auditorium, along football sidelines for smaller schools, or industrial environments. With suitable noise canceling headsets, the system will work very well in a noisy environment.

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DRAWN BY		TELEX COMMUNICATIONS INC. 12000 PORTLAND AVE. SOUTH BURNSVILLE, MN 55337		
SIZE	FSCM NO.	DWG NO.	AUDIODCM 1 CHANNEL SYSTEM	
A		1 CANNEL SYSTEM.DWG	REV	A
SCALE	N/A	SHEET	1	OF 1

Two-Channel System with Single Channel Beltpacks

This system is basically no different from the One-Channel system described earlier.

It is easiest to think of two SEPARATE intercom systems, sharing a common Power Supply (PS-2001L).

All the beltpacks on Channel 1 are on a single Party Line, and similar to the One Channel system mentioned earlier, the limitation on the number users is dependent on the current capacity of the power supply. The same considerations discussed earlier for wiring options (TW5W and/or daisy-chaining) also apply.

All beltpacks on Channel 2 are on their own SEAPARATE Party-Line, with the same characteristics.

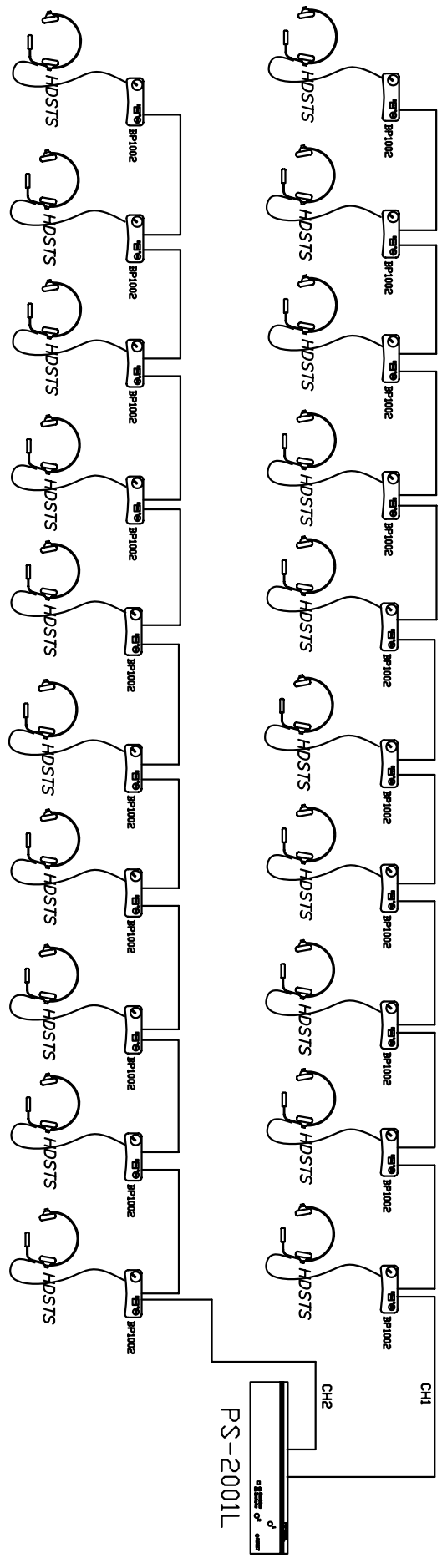
The system, as presented, has NO ability for users on Channel 1 to communicate in ANY WAY with the users on channel 2.

Typical applications would be facilities where two independent events happen simultaneously, where there is NO interaction required. For example, two small television studios (community TV) in the same building, 2 small auditoriums in a community college, etc.

One advantage to the facility of such a system is since the wiring all comes to a common point (the PS-2001L), wiring changes to join the two conferences are not difficult, for those rare instances where this might be required.

Another advantage is the beltpacks and headsets are all common to both facilities, so sharing and changing numbers of beltpacks between studios is easily accomplished.

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AUDDICDM
 2 CHANNEL SYSTEM

DRAWN BY		SIZE		FSCM NO.		DWG NO.		REV	
		A				2 CANNEL SYSTEM.DWG		A	
SCALE		N/A						SHEET 1 OF 1	

Two Channel System with Two Channel Belt Packs

This system is designed to allow all beltpacks to CHOOSE between EITHER of two channels.

Like the previous examples, there is no Master Station. No station has the ability to simultaneously speak or listen to BOTH channels.

The differences between this and the two previous systems are substantial in a couple of respects. Communications are LESS assured. For example, if a user on Channel one wishes to speak to another user, it is possible the second user is not wearing a headset or the second user is on a different channel and will not hear the first user.

The BP-1002 beltpacks provide each user the opportunity to select which channel of communication they wish to participate on.

Another difference is the cabling. The first two systems use standard XLR-3 cable, where this system requires the use of less common XLR-6 cables between beltpacks. The Junction Block shown (JB-2) converts the two single channel XLR-3 connections from the PS-2001L into a single XLR-6 connector. 6-pin daisy chain cables and splitters are now required.

In some applications, it may be better to have CERTAIN users fixed to one channel or another by connecting BP-1002 single channel beltpacks directly to the XLR connections prior to the JB-2 for the required channel. Examples of this will be seen in the next systems.

It is easiest to think of these beltpacks as two SEPARATE intercom systems sharing a common Power Supply (PS-2001L).

All the beltpacks on Channel 1 are on a single Party-Line, and like the one channel system, presented earlier, the limitation on the number of users is dependent on the current capacity of the power supply. The same considerations discussed earlier for wiring options (TW5W and/or daisy-chaining) also apply.

All the beltpacks on Channel 2 are likewise on their own SEPARATE Party-Line with the same characteristics.

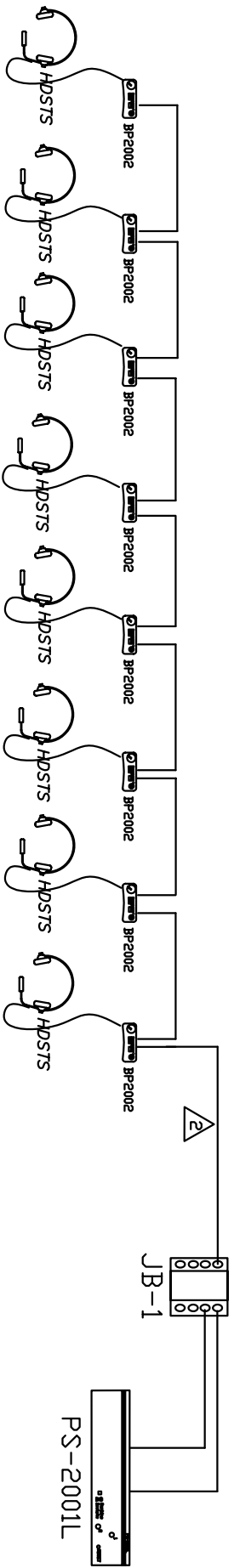
The system, as presented, has NO ability for users on Channel 1 to communicate in ANY WAY with the users on Channel 2.

Typical applications would be facilities where two independent events happen simultaneously, where there is NO interaction required. For example, two small television studios (community TV) in the same building, to small auditoriums in a community college, etc.

One advantage to the facility of such a system is the wiring all comes to a common point (the PS-2001L), wiring changes to join the two conferences are not difficult, for those rare instances where this may be required.

Another advantage is the beltpacks and headsets are all common to both facilities, so sharing equipment and changing numbers of beltpacks between studios is easily accomplished.

REVISIONS				
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SIZE	FSCM NO.	DWG NO.	REV
A		BP2002 SYS.DWG	A
SCALE	N/A	SHEET	1 OF 1
AUDIODCDM		2 CHANNEL BP2002 SYSTEM	

Audiocom Small Church - 2 Channel

First of all, "Audiocom" is misleading, as this system also has Radiocom Wireless Intercom equipment. "Church" may also be misleading, as it is but one of hundreds of possible venues for such a system.

This system differs from the earlier systems in a number of ways:

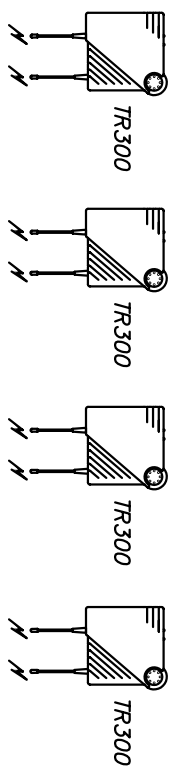
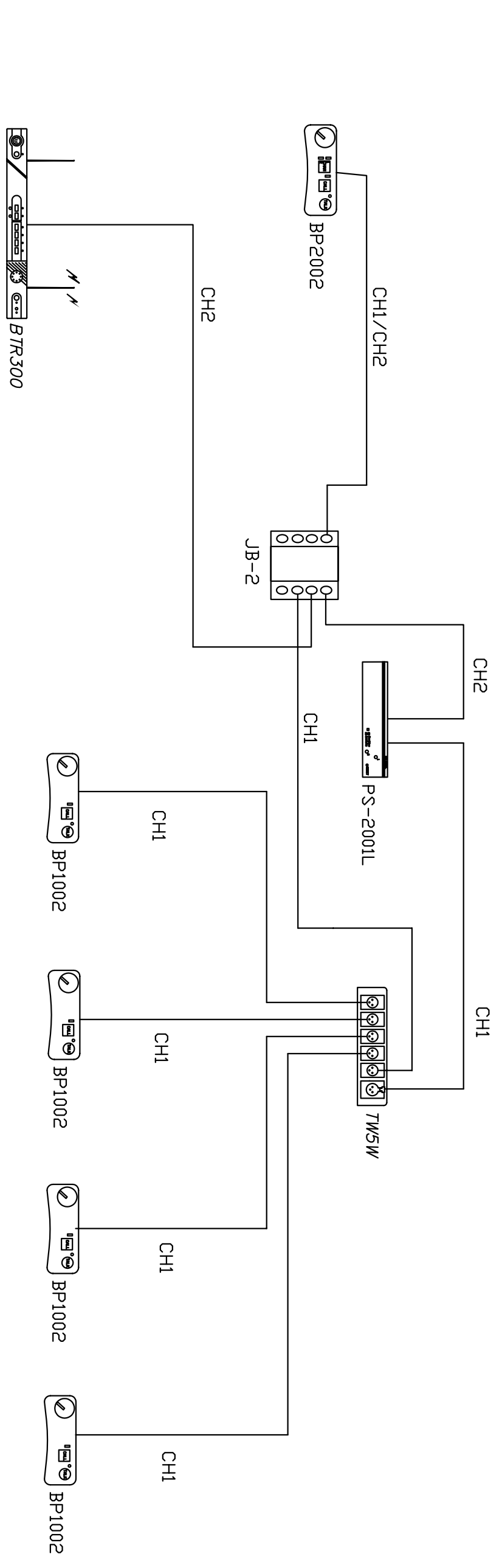
First, it has a mixture of BP-1002 and BP-2002 1 and 2-channel beltacks, along with a single channel. This allows some users to be permanently assigned to a single channel for the sake of simplicity, while allowing a "power user" to choose between either of two channels.

Second, the system has a wireless component in the form of the BTR-300 system, which provides (as shown) 4 wireless beltacks (can be bought with 1, 2, 3, or 4 beltacks per base). These wireless beltacks give those users great freedom of movement (typically more than 100 yards).

Note, in this example, the wireless beltacks (TR-300 units) are on channel 2, while the BP-1002 beltacks are on channel 1. There is NO communication possible between the group of TR-300 beltacks and the group of BP-1002 beltacks. The only user that can CHOOSE which group to talk to is the person on the BP-2002.

The typical application for a system of this type is where the BP-2002 2 channel station is typically working with ONE of two independent groups or activities which have different requirements and are likely NOT happening simultaneously. An example of this setup may be seen in an auditorium where the BP-1002 units are used during stage-based performances of plays, while the wireless beltacks are used during musical performances where the performers move around.

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SIZE	FSCM NO.	DWG NO.	REV
A		SMCHURCH.DWG	A
SCALE N/A		SHEET 1 OF 1	
AUDIODCM SMALL CHURCH, 2 CHANNEL			

Audiocom Two Channel Production System

This system represents the first in this group that is specifically designed for and capable of supporting a single event where certain users need to regularly speak with two separate conferences (party lines) either separately or simultaneously.

This system also provides IFB (Interrupted Fold Back) feeds to talent. IFB is used to describe the method by which a director communicates with on-air talent during a program. When you see the reporter in the studio with an unobtrusive earpiece, that earpiece is doing “double duty”. Normally, the talent is hearing the same program that you, the viewer, hear at home...a “fold back” of the studio signal. At times, the director needs to communicate with the talent to tell them “You have ten seconds, wrap it up NOW”. The director does that by interrupting the normal fold back signal, hence the term “Interrupted Fold Back”. This is a one-way communication where the talent is “listen only” which is a capability provided by the IFB-1000 beltpacks.

In the example shown, each of four different reporters has their own channel of IFB, so the director may choose to speak to any, all or a combination of the reporters at any time. The EMS-4001 Expansion Master Station provides this functionality.

Another part of the system is a fairly conventional 2-channel system, as described earlier, consisting of the BP-1002 beltpacks. New to this diagram is the inclusion of the WP-3 wall plates, which allow the individual beltpacks to plug in where convenient, without concerns about daisy-chaining connections. A typical production facility may have many more WP-3 “drops” than they have corresponding beltpacks, just as a house is likely has many unused AC outlets.

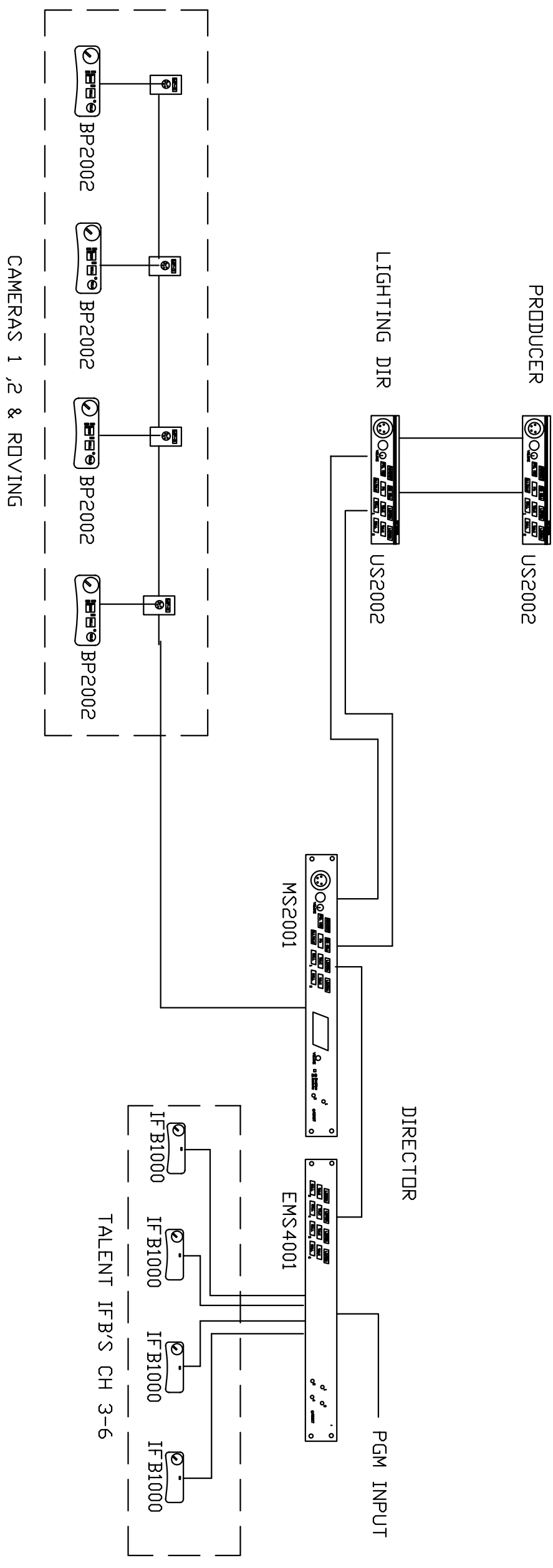
Three units are introduced in this diagram:

US-2002: The US-2002 User Station allows the operator to talk and/or listen to either or both of the two channels at any time. It overcomes the limitations of a 2-channel beltpack (such as the BP-2002) which allows the user to talk and/or listen to ONLY one of two channels at any time.

MS-2002: The MS-2002 Master Station provides the functionality of a 2-channel power supply (same as the PS-2001L, described earlier), along with the functionality of a 2-channel user station, which allows the director to (among other functions) speak to either channel 1, channel 2 or both.

EMS-4001: The EMS-4001 Expansion Master Station provides an additional four channels of power and a four channel user station in one package, so by combining the MS-2002 and the EMS-4001 in one location. By doing this, the director will have a 6-channel master station with complete access to any or all six channels at any time with separate abilities to listen and or talk to any/all channels.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



DRAWN BY		SIZE		FSCM NO.		DWG NO.		REV	
		A				2CHTV.DWG		A	
SCALE		N/A						SHEET 1 OF 1	
TELEX COMMUNICATIONS INC. 12000 PORTLAND AVE. SOUTH BURNSVILLE, MN 55337				AUDIODCM 2 CHANNEL PRODUCTION SYSTEM					

Audiocom Two Channel Mixed System

This system introduces two new concepts and capabilities from the previous examples.

A Master Station (MS-2002) has been added, which combines three functions in one convenient package. The MS-2002 combines a 2-channel power supply (same as the PS-2001L), a 2-channel user station capable of simultaneous talk/listen on either or both channels, and a built-in speaker.

In this example, the two available channels are routed to three different types of users. At the top of the diagram, the two channels are both fed through WP-3 wall plates to BP-2002 belt packs, giving users access to either channel.

The channel 2 signal from the MS-2002 is fed to a TW5W splitter which makes the signal available to five different paths, three of which are used in this example.

Path 1 goes to four wall plates, WP-1 where they connect directly to BP-1002 single-channel belt packs. As the diagram shows, the daisy chaining for these belt packs is handled by the permanent wiring "behind" the wall plates. This method allows any belt pack to be connected or disconnected WITHOUT breaking the chain.

Path 2 goes directly to the WM-1002 wall mount station with headset.

Path 3 goes directly to a WM-1002 wall mount station.

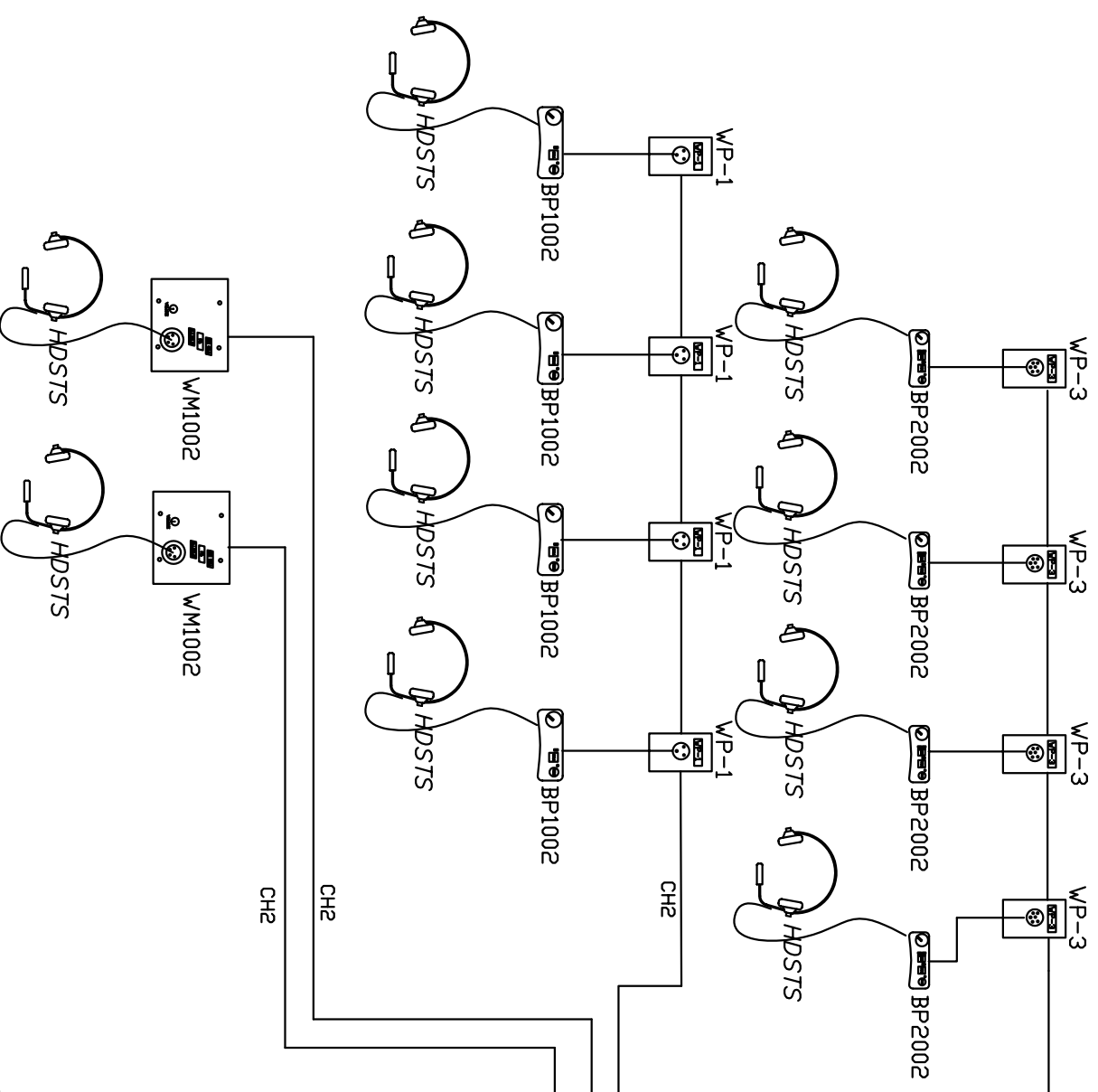
From an operational view, the following communications are possible.

For events where the Master Station is not manned, the BP-1002 and WM-1002 stations will always be in contact with each other - they can be used for independent operation. The BP-2002 units can choose to operate on channel 2, where they would then be an integral part of the BP-1002 and WM-1002 conference for a larger event. If the BP-2002 belt packs needed to communicate separately among themselves, either for a moment or an entire event, they would simply switch to channel 1 (but for that time, they would be out of contact with the BP-1002 and WM-1002 stations which are restricted to channel 2 only).

By adding the User Station portion of the MS-2002 to the mix by manning it, there is now a great deal of coordination which can occur. For starters, the operator at the MS-2002 can communicate with any of the other stations, independently or simultaneously. Unlike the BP-2002 units, the MS-2002 does not need to CHOOSE between the two channels, it can also choose BOTH either for talk or listen. The operator may choose to listen to BOTH channels, even while talking with only one of the channels. In that case, (presuming the BP-2002 units have selected channel 1) the operator could be working on channel 1 with the BP-2002, and still hear a request from the channel 2 BP-2002s and WM-1002 or even relay a request for one (or more) of the BP-2002 belt packs to switch to channel 2 to work with the BP-1002 and WM-1002 units. So, we now have a system that can be operated as two standalone systems, as one large system or as a semi-related system with intercommunications possible between systems.

This type of system would be a good basis for a multi-purpose facility, such as found in a community TV facility with two smaller studios, that can function as one, or at a convention center with divisible conference areas.

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DRAWN BY		TELEX COMMUNICATIONS INC. 12000 PORTLAND AVE. SOUTH BURNSVILLE, MN 55337	
SIZE	FSCM NO.	DWG NO.	REV
A		2CHMIXED.DWG	A
SCALE	N/A	SHEET 1 OF 1	
2 CHANNEL MIXED SYSTEM		AUDIOCDM	

Audiocom 2 Channel Conference System

This system, unlike the previous systems, can be said to “put all power in the hands of the people”. In it, each station has the full ability to choose to talk or listen to any channel at any time in any combination.

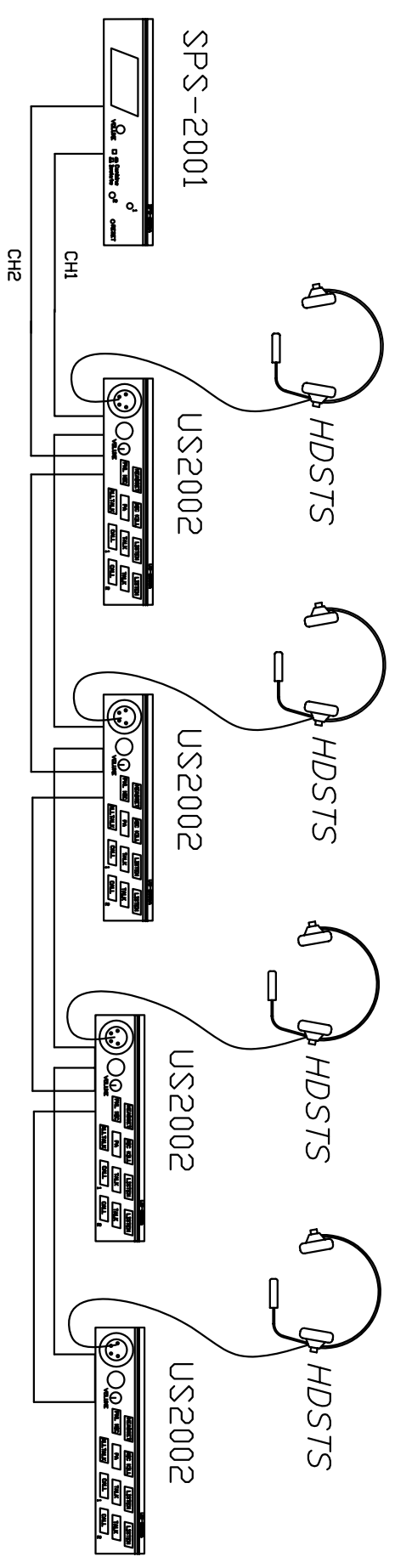
To quote a line from the 2002 movie, Spider-Man, “With great power. comes great responsibility”. Each user must take the appropriate action to listen to the appropriate channel for the task they are engaged in.

To start at the beginning, a SPS-2001 provides both power and loudspeaker for “headset free” monitoring. In practical applications, it would be located next to one of the US-2002 units. In this setup, you can see the flexibility of the Audiocom modular approach. Mounting a SPS-2001 next to a US-2002 results in a unit functionally equivalent to a MS-2002. “Why then”, you say, “not simply install a MS-2002?”. The answer is that the initial installation may have been made without a speaker, and the modular design allows one to be added later without discarding the existing US-2002 or playing for additional functionality that is not required.

So, we have three identical user stations, with headsets, which can each assign themselves to either or both of two separate channels of activity - in a small theater, these would be at the lighting board, sound board, and stage manager locations, where they could participate in sound and/or lighting cues.

The fourth station (with the SPS-2001) has the added ability to operate with headset or hands-free with the speaker in the SPS-2001 and an optional gooseneck microphone. This station might reside in the sound booth, where the operator cannot wear a headset and do their job of running sound.

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ZONE	REV	DESCRIPTION	DATE	APPROVED



TELEX COMMUNICATIONS INC. 12000 PORTLAND AVE. SOUTH BURNSVILLE, MN 55337		AUDIODCM		
2 CHANNEL CONFERENCE SYSTEM				
DRAWN BY	SIZE	FSCM NO.	DWG NO.	REV
	A		2CHCONF.DWG	A
SCALE	N/A			SHEET 1 OF 1

Audiocom Cath Lab System AND Audiocom Cath Lab 2 Systems

The two diagrams that follow show variations on the same theme. The differences highlight how EASILY Audiocom intercoms, with their extensive external connections and balanced audio capability, permit easy interfacing to convention professional audio products such as high quality speakers and microphones.

In a Cath Lab, there is a requirement for the people in the lab to be able to have total hands-free communication outside the room. In this case, they must have that communications capability throughout a small room.

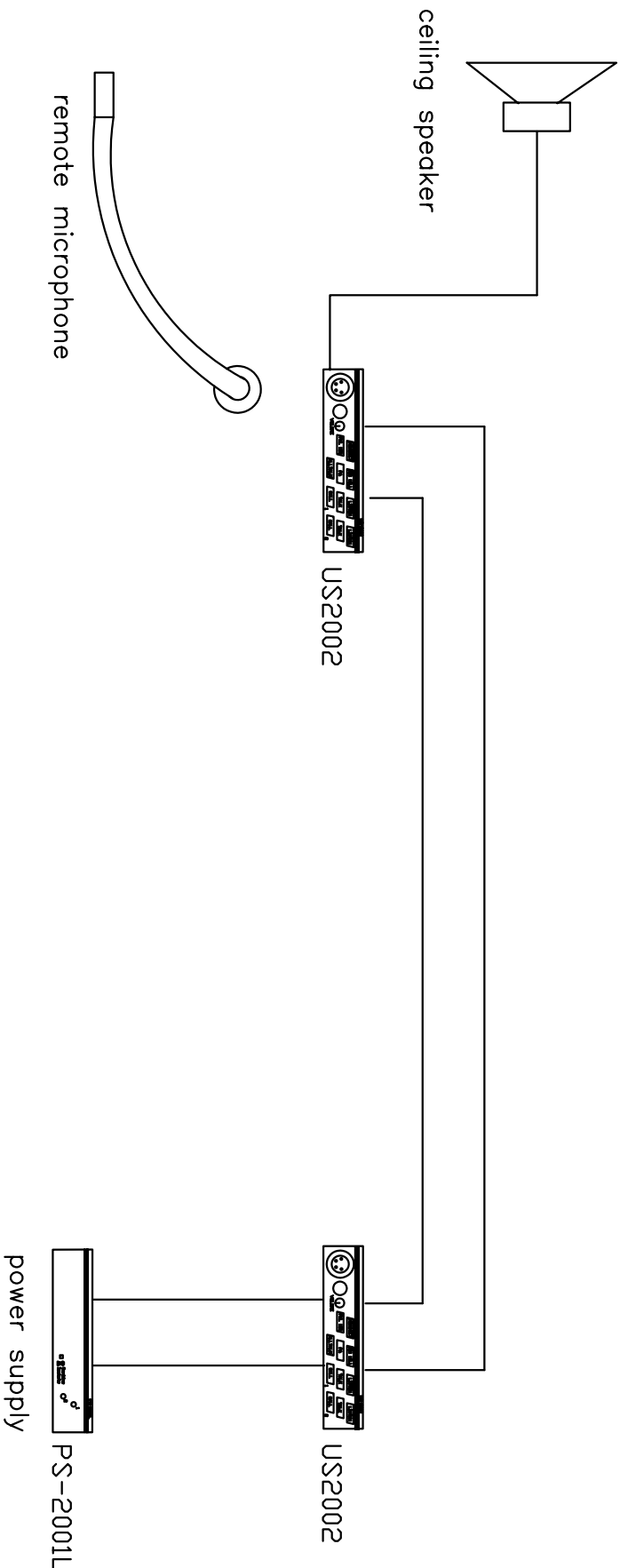
This is accomplished by using a ceiling speaker centrally located, fed from the US-2002. The ceiling speaker may or may not require an external amplifier, depending on the volume that is required.

Hands-free speaking in the Cath Lab is accomplished using an external microphone positioned to be as close as possible to the intended operating area for the person speaking.

Attention will have to be paid to sidetone adjustment for this type of installation to maximize listening volume while minimizing feedback. Conventional professional audio attention to location and patterns of the speaker and mic are essential.

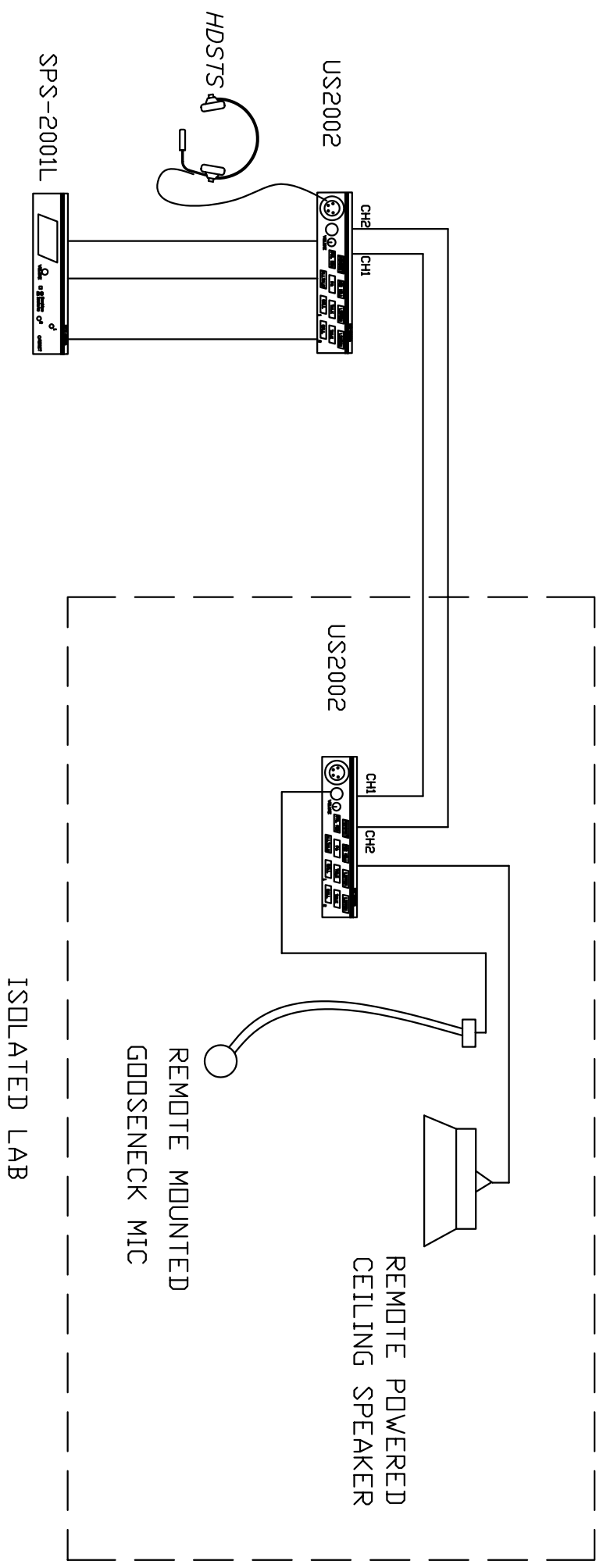
External to the Lab is the second US-2002, along with a separate PS-2001L. In this case, it is very likely that separate units are desired, so that the user station is as small and unobtrusive as possible, by locating the power supply in an out of the way location. Certainly an MS-2002 could work just as well, if size and location are not an issue. Typically, this external user station would use a headset to minimize feedback issues caused by audio coupling from causing feedback in the Lab.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



DRAWN BY		SIZE		FSCM NO.		DWG NO.		REV	
		A				CATHLAB.DWG		A	
		SCALE		N/A				SHEET 1 OF 1	
TELEX COMMUNICATIONS INC. 12000 PORTLAND AVE. SOUTH BURNSVILLE, MN 55337					AUDIOCDM CATH LAB SYSTEM				

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DRAWN BY		TELEX COMMUNICATIONS INC. 12000 PORTLAND AVE. SOUTH BURNSVILLE, MN 55337	
SIZE	FSCM NO.	DWG NO.	REV
A		CATHLAB2.DWG	A
SCALE	N/A	SHEET 1 OF 1	
AUDIICOM CATHLAB 2 SYSTEM			

Audiocom Small Fiber AND Large Fiber System

The following refers to both Small and Large Systems.

By now, you've seen all sorts of variations of Audiocom systems, all of which have relied on the TW or Party-Line concept. In all of these cases, if you were to examine the wiring between the units (for single channel), you would find a single balanced audio pair carries both sides of the conversation, talk and listen. The two signals are mixed together.

At any intercom station, the audio starts out as DISCRETE TALK and DISCRETE LISTEN. The "talk" comes into the intercom station from your mouth (a discrete source), into a microphone (another discrete source), and then listen audio comes out of the intercom station via a speaker or earpiece in a headset (another discrete source) into the ears of the listener.

Once inside the intercom system, however, "the egg gets scrambled" - talk from an intercom station gets impressed onto the same pair of wires that other intercom station "talks" have been impressed upon, so that on the pair of wires are signals that contain (from the point of view of any INDIVIDUAL user) both talk and listen.

At any individual intercom station, since we have access to the locally generated "talk" signal, we can "invert and mix" or null the local talk signal "out" of the combined talk and listen, thus controlling how much of our OWN voice we hear (sidetone adjust).

But, at any other point where we "tap into" the intercom line, it becomes much more of a challenge to "unscramble the egg". For example, if we want to connect to external devices where we can have separate talk and listen signals a special device is required - a "hybrid"- or in Telex intercom speak, a "System to System Adapter", such as the SSA-324 or SSA-424.

The SSA units connect to a TW or Party-Line intercom line ("yes, even those made by other companies, such as ClearCom") and allow external audio to be taken from the intercom (listen) and presented to the intercom (talk). This is not as simple as it sounds, because unlike a closed system, the phase relationships, echoes, etc. may vary and make simple nulling very difficult.

Why would we want to separate the talk and listen from a TW intercom system? We want to separate the talk and listen from a TW intercom system when we need to connect to a system which is NOT an intercom that cannot function with combined bi-directional talk and listen signals. A good example of this is a fiber optic cable. Typically, MOST fiber optic cables transmit signals in only one direction.

Say you have two intercom systems a mile apart connected with fiber optic cable (a very common occurrence on campuses), any you want to interconnect them. Consider what must happen: the talk from system 1 (the combination of all its locally generated conversations) must be presented to the fiber optic interface equipment to be sent to the remote intercom system. The remote system also must have its talk signal sent BACK to the first intercom

system. At each end, the local signal and the remote signal are combined, so that each user at either location can hear the complete conversation, locally and remotely. But, the merged local and remote talk signals are now “scrambled” together, so when the combined signal is sent back from either location, the original signal is included, and **FEEDBACK!!!!** happens.

The job of the SSA “hybrid” is to remove the remote signal as much as possible before sending it back down the line, which reduces the potential for feedback when two systems are tied together.

The effectiveness of the hybrid in separating signals is referred to as “nulling”. Telex offers two different models of SSA units providing different degrees and methods of nulling.

The SSA-324 is a cost effective hybrid (which is analog) and accomplishes its nulling through manual adjustment by the user listening to the results and turning the adjustments. The SSA-424 accomplishes its nulling automatically, utilizing DSP, and is more effective, but comes at a higher cost.

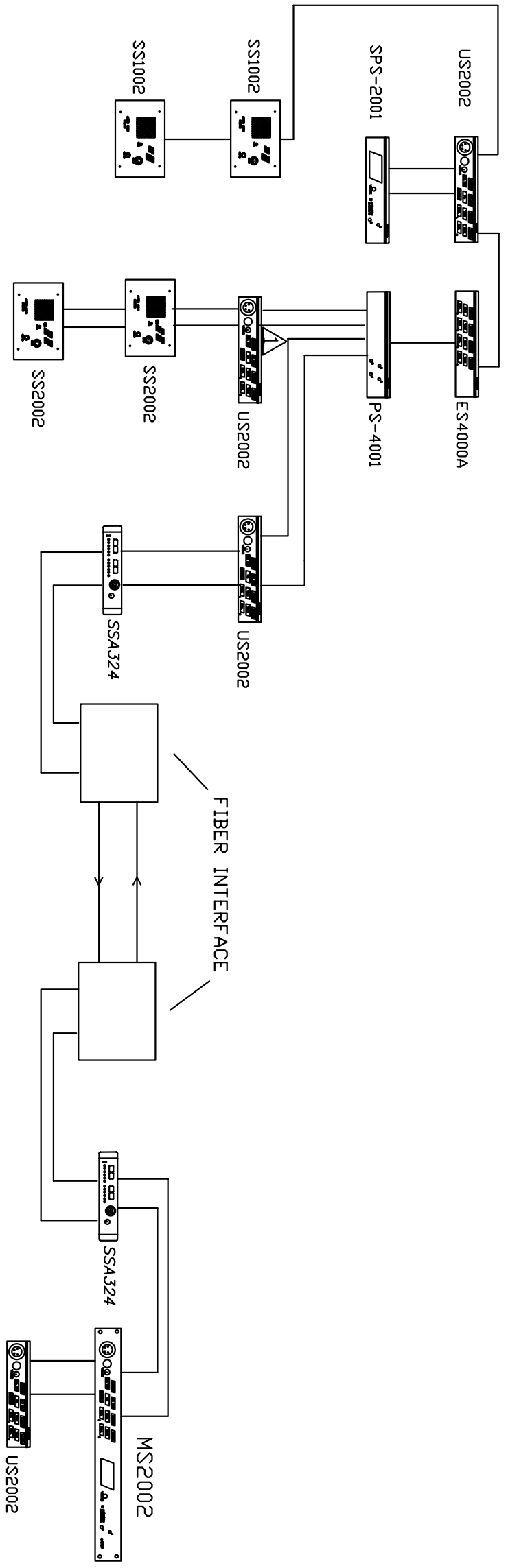
Looking at the Small System diagram, everything to the right of the right-hand SSA, and everything above and to the left of the left-hand SSA is somewhat immaterial. What is worth noting is the equipment and technique we would use to get one channel (or more) of one intercom system across fiber to one channel (or more) of a second intercom system, effectively making a single large intercom system.

What you see on the Small System diagram is TWO channels of intercom audio being sent in each direction (as SSA units are two channels). The fiber interfaces take the two channels off audio going in one direction, multiplexes them into a single signal, and transmits it down one fiber in one direction to the other location. The other end does the same, and each end then receives a signal, and then “de-multiplexes” it back into two discrete intercom channels and sends it on to the SSA to be re-converted into a TW signal, combining the talk and listen.

The Large System diagram shows an intercom system using a separate fiber for each channel... not because it is required for a large system, but just to show a different means of achieving the same goal.

The general principal of using an SSA to connect to a fiber can also be applied in the same way to interface to ANY uni-directional transmission medium, such as a radio or microwave, a corporate data system (LAN) or a dedicated “4-wire circuit”.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

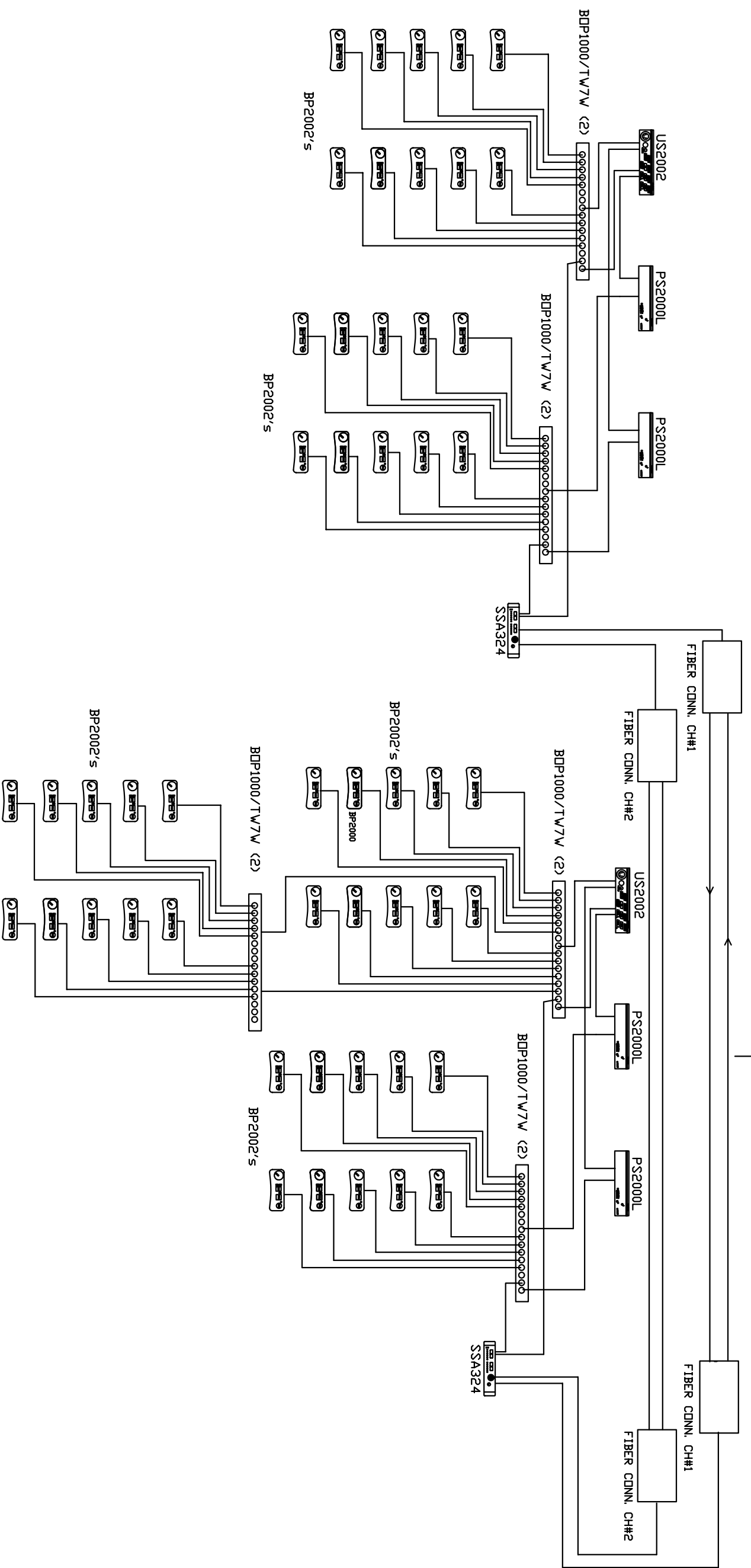


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AUDIDCOM
 SMALL FIBER SYSTEM

DRAWN BY		SIZE	FSCM NO.	DWG NO.	REV
		A		FIBER SYS 2.DWG	A
SCALE		N/A	SHEET 1 OF 1		

REVISIONS				
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AUDIICDM
 LARGE FIBER SYSTEM

DRAWN BY		SIZE		FSCM NO.		DWG NO.		REV	
		A				FIBER.DWG		A	
SCALE		N/A		SHEET		1		OF 1	

Audiocom Large 6 Channel Master Station System

This system continues to embody concepts and options shown in earlier systems. At the heart of the system is a group of components that make up a six channel master station, in a compact 2 RU factor.

As discussed earlier, the same configuration could also be built by using a MS-2002 in place of the US-2002/SPS-2001 combination, and an EMS-4001 in place of the ES-4000/PS-4001.

The net effect is the ability to support six powered channels of intercom with the ability to speak or listen to any or all from the central master station.

In this example, the top group shows two separate channels of intercom going to two separate "chains" of BP-1002 single channel beltpacks. These appear as channels 1 and 2 on the master station.

The middle section shows a chain of BP-2002, 2 channel beltpacks connected to channels three and four of the Master Station.

Warning!!! - The labels on the BP-2002s refer to channel 1 or channel 2 - while in this configuration, when the beltpacks select channel 1, they are in reality (from the perspective of the Master Station) selecting channel 3.

The bottom section is similar to the middle section, with the difference that "local channels 1 and 2" are "system channels 5 and 6" respectively.

As in earlier systems, these larger, more capable, more flexible systems require greater care and knowledge in administering and operating.

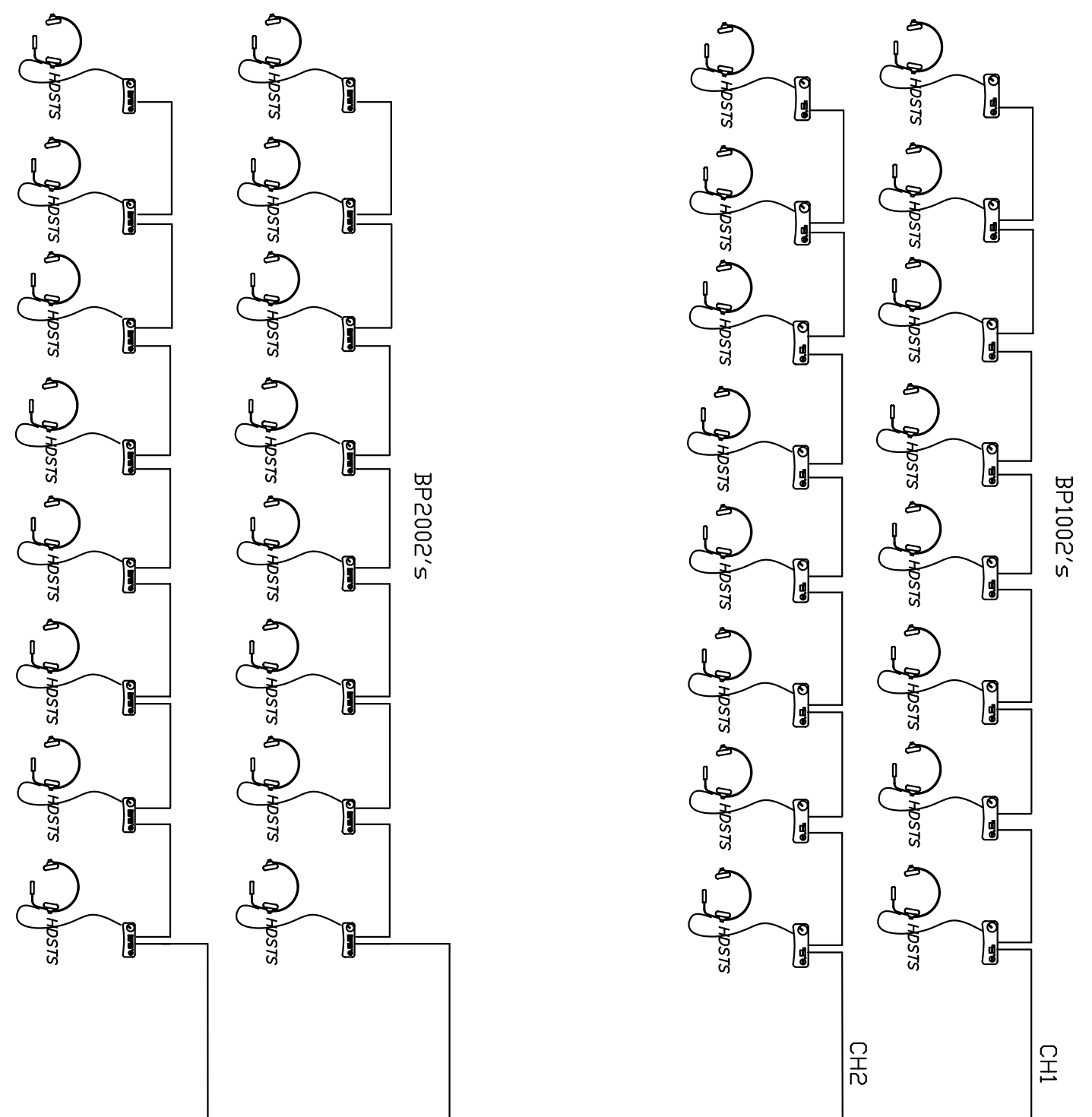
Note the following limitations of this complex system:

The top chain of BP-1002s assigned to channel 1 can ONLY communicate with each other or the Master Station. The applies to the BP1-1002s assigned to channel 2.

The BP-2002s in the middle can only communicate with other BP-2002s in THEIR OWN CHAIN, which have the same channel (channel 1 or channel 2) selected, or the Master Station.

The bottom chain of BP-2002 have the same limitations and capabilities as the middle group.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



DRAWN BY		SIZE		FSCM NO.		DWG NO.		REV	
		A				6CHMASTER.DWG		A	
		SCALE		N/A				SHEET 1 OF 1	
TELEX COMMUNICATIONS INC. 12000 PORTLAND AVE. SOUTH BURNSVILLE, MN 55337					AUDIOCDM LARGE 6 CH MASTER STATION SYSTEM				

Audiocom 6 Channel IC-6SX System Using Source Assignment Panels

All the previous systems, regardless of complexity, have had one thing in common. With small exceptions, they have been hardwired into a specific configuration, which either enforces or limits the variety of configurations.

In the real world, needs for intercom systems are rarely so predictable, particularly once we begin looking at systems in facilities which do any variety of functions.

This system shows an IC-6SX Source Assignment Panel.

Very simply, the IC-6SX is a 6 IN by 12 OUT routing switch (albeit a completely passive one) - not much different from a jackfield. With this panel, six channels of intercom from a master station can be assigned to any of 12 output lines. Those output lines can go to almost any type or group of intercom stations, from single channel beltpacks to multi-channel user stations.

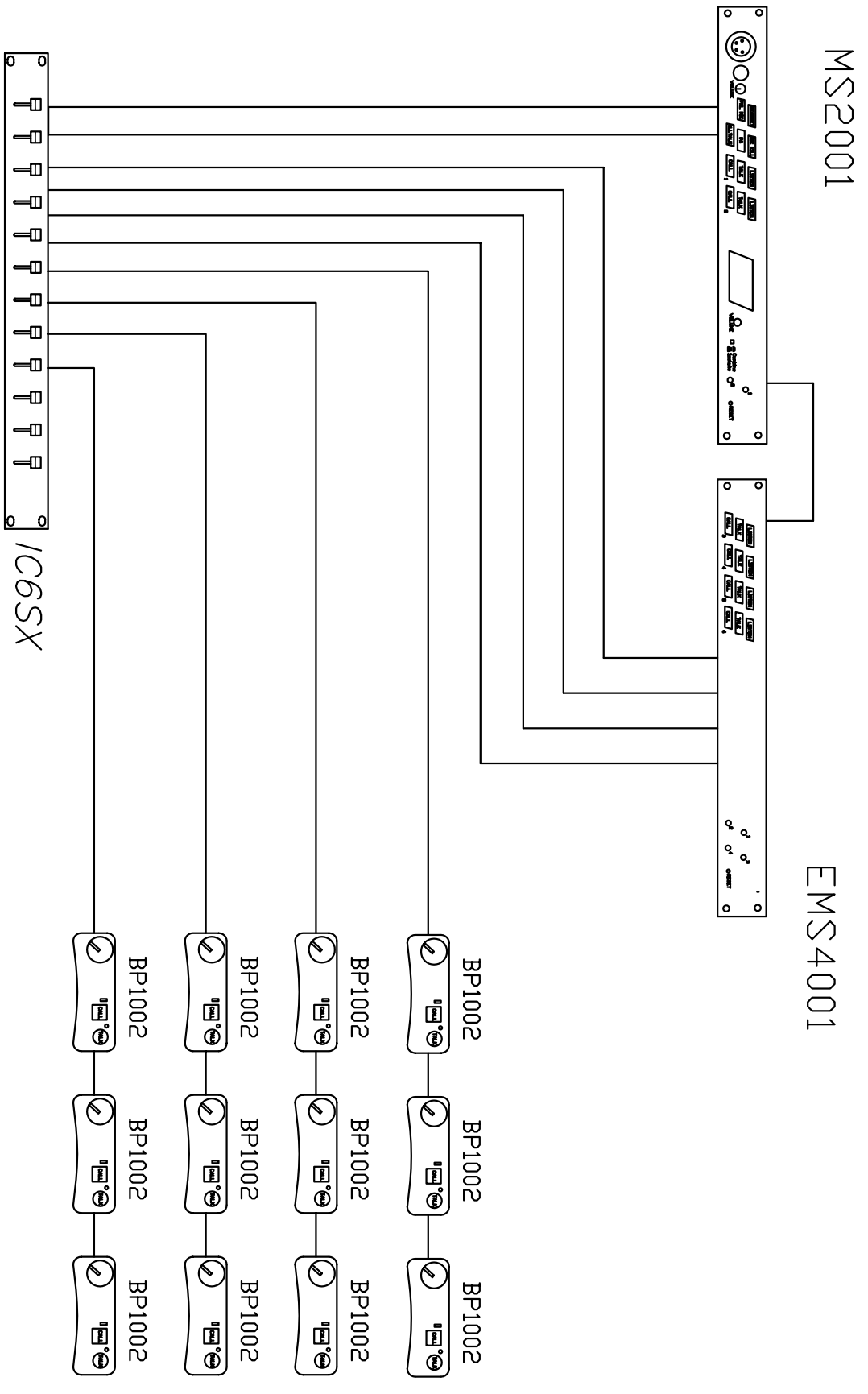
By the simple action, a person can slide switches on the IC-6SX to different positions and combine or isolate any intercom stations in any combination.

On one day there may be (as shown in the diagram) six separate groups of beltpacks doing six separate tasks on six separate channels. With the simple slide of switches, an operator can re-configure the system into three groups of four, or a group of ten, and a second group of two. Moving beltpacks from one conference to another becomes very easy.

By placing the IC-6SX physically close to the master station, the central operator can receive verbal change requests from any of the intercom users, implement those changes, and then confirm verbally what has been done.

The concepts in this drawing can be applied to ANY TW (Party-Line) intercom system to add in a degree of flexibility. The key is to remember the Spiderman quote used earlier, "With great power comes great responsibility". Unlike a basic system, in which multiple groups of single channel user stations are permanently assigned to each other, the degree of certainty of who will hear, when a person picks up a headset and speaks, in a system is MUCH LESS.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



DRAWN BY		SIZE		FSCM NO.		DWG NO.		REV	
		A				SAP.DWG		A	
		SCALE		N/A		SHEET 1 OF 1			
TELEX COMMUNICATIONS INC. 12000 PORTLAND AVE. SOUTH BURNSVILLE, MN 55337					AUDIIDCDM MULTI CHANNEL SAP SYSTEM				

6 Channel Master Station for Church

This is an actual example of a system installed in a large church.

That is NOT to say it is THE system for large churches, only that it embodies the abilities required for the specific design.

As can be noted from the labels on the drawing “Producer Position”, “Lighting Position”, “Video Position”, and the number and assignment of belt packs, we can deduce the following:

There are three operating positions, as named above.

The Church communications are used primarily in the production of television programming, so this diagram could be very applicable to a small, function-dedicated television studio in any facility.

The Producer is the “owner” of the 6-channel Master Station and has access to all six channels. He or she can talk and listen to anyone at anytime.

Two channels (channels 1&2) go only to the video position and four belt packs. The purpose of this is to allow the video position to communicate privately with the Producer (for example, on channel 1), while channel 2 also goes to the four belt packs (like Cameras) with whom the Producer and Video Position can both communicate.

The Producer also has access to channels 3, 4, 5, and 6 which are routed as follows:

Channel 3 goes to the lighting position, again for private communications between the producer and the lighting position.

Channel 4 goes to the Audio position, also for private communications between the producer and the audio person.

Channel 5 PRIMARILY goes to the lighting position and via a breakout panel also feeds the four WP-1 wall plates, connected to four BP-1002 belt packs, presumably at follow spots, lighting board, and stage manager locations - The lighting position and producer can speak and listen at will to these belt packs. There is also a “cross connect” to the audio position, so the audio operator also has access to this channel.

Channel 6 PRIMARILY goes to the audio position and a single belt pack, presumably at a boom microphone, or at an audio board. A “cross connect” allows the lighting position to join in; the Producer (as always) has unfettered access to all positions.

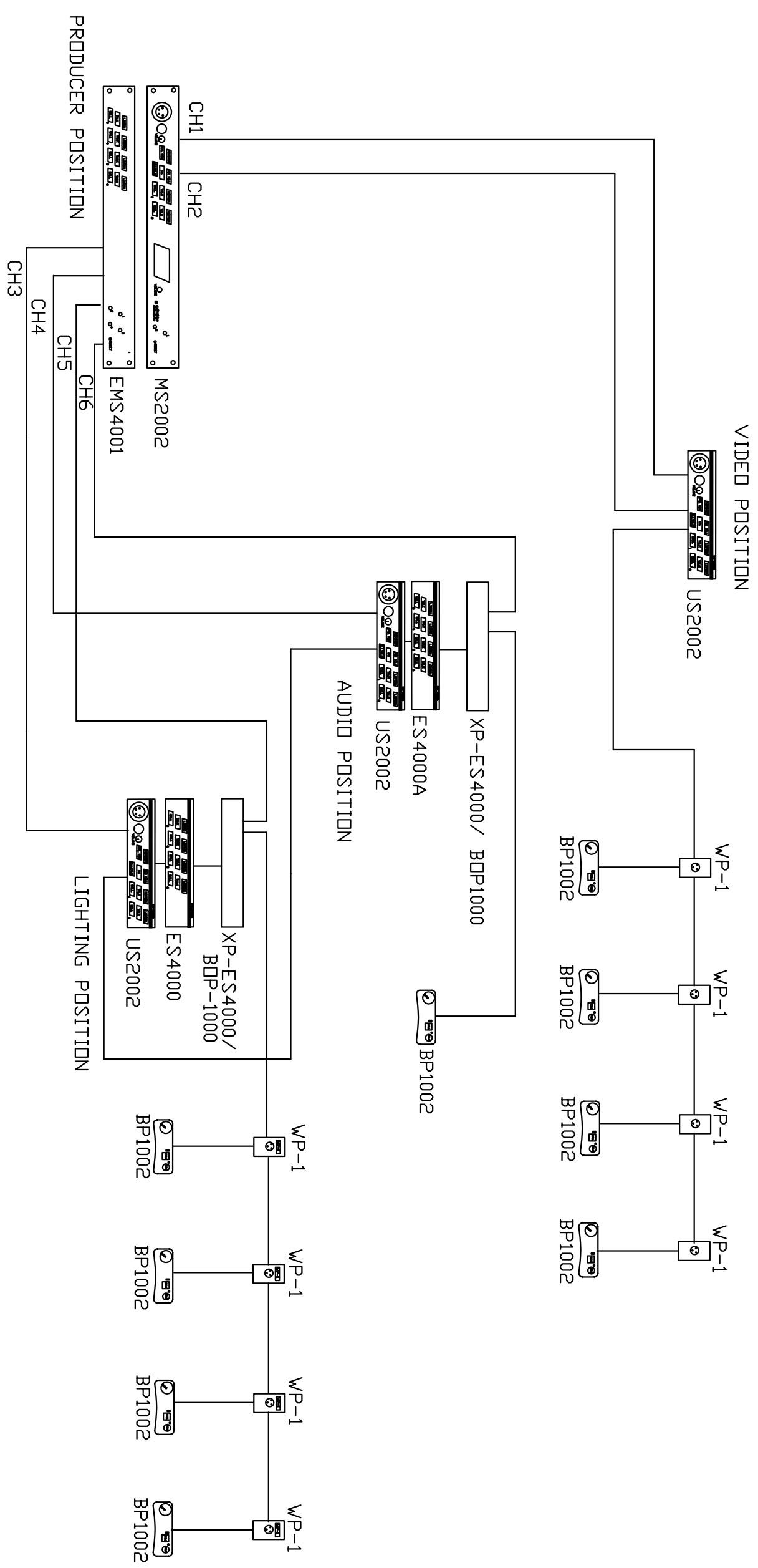
In this particular example, the 6 channels are fixed and very closely defined based on to whom and how they are connected.

Channel 1	Private Comms between Producer and Video
Channel 2	Video Party-Line
Channel 3	Private Comms between Producer and Lighting
Channel 4	Private Comms between Producer and Audio
Channel 5	Lighting Party-Line
Channel 6	Audio Party-Line

This fixed relationship is IDEAL for a facility in which there are NOT resident hi-tech operators. The panels can be permanently labeled as to which channel is which, the confusion is kept to an absolute minimum and functionality is assured by the hardwired nature of the system.

One final bit of “good design practice” should be noted. The audio and lighting positions have unused channels present on their keypanels - at ANY point in the future, if desired, additional channels can be added for their exclusive use, or to extend channels 1 and 2 from the video position to them is a simple matter of wiring. No major equipment additions are required.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



TELEX COMMUNICATIONS INC.
 12000 PORTLAND AVE. SOUTH
 BURNSVILLE, MN 55337

6 CH MASTER STATION SYSTEM
 FOR CHURCH

DRAWN BY		SIZE		FSCM NO.		DWG NO.		REV	
		A				6 CH CHURCH.DWG		A	
SCALE		N/A						SHEET 1 OF 1	

Audiocom 10-Channel User Station System

This system is quite Uncomplex compared to some of the earlier system setups.

Its main function is to illustrate that Party-Line systems can grow to respectable sizes and that Party-Line systems based on Audiocom Modular Products can grow well beyond 12 channels.

This system uses the following units to build a 10-Channel Master Station

SPS-2001 US-2002 ES-4000A(2) PS-4001(2)

This results in a 3 RU 10-Channel Master Station at the heart of the system.

From left to right on the diagram, we see the following:

One of the first TWO channels is fed to single channel SS-1002 Speaker Stations.

The second of the first TWO channels is not used at this time.

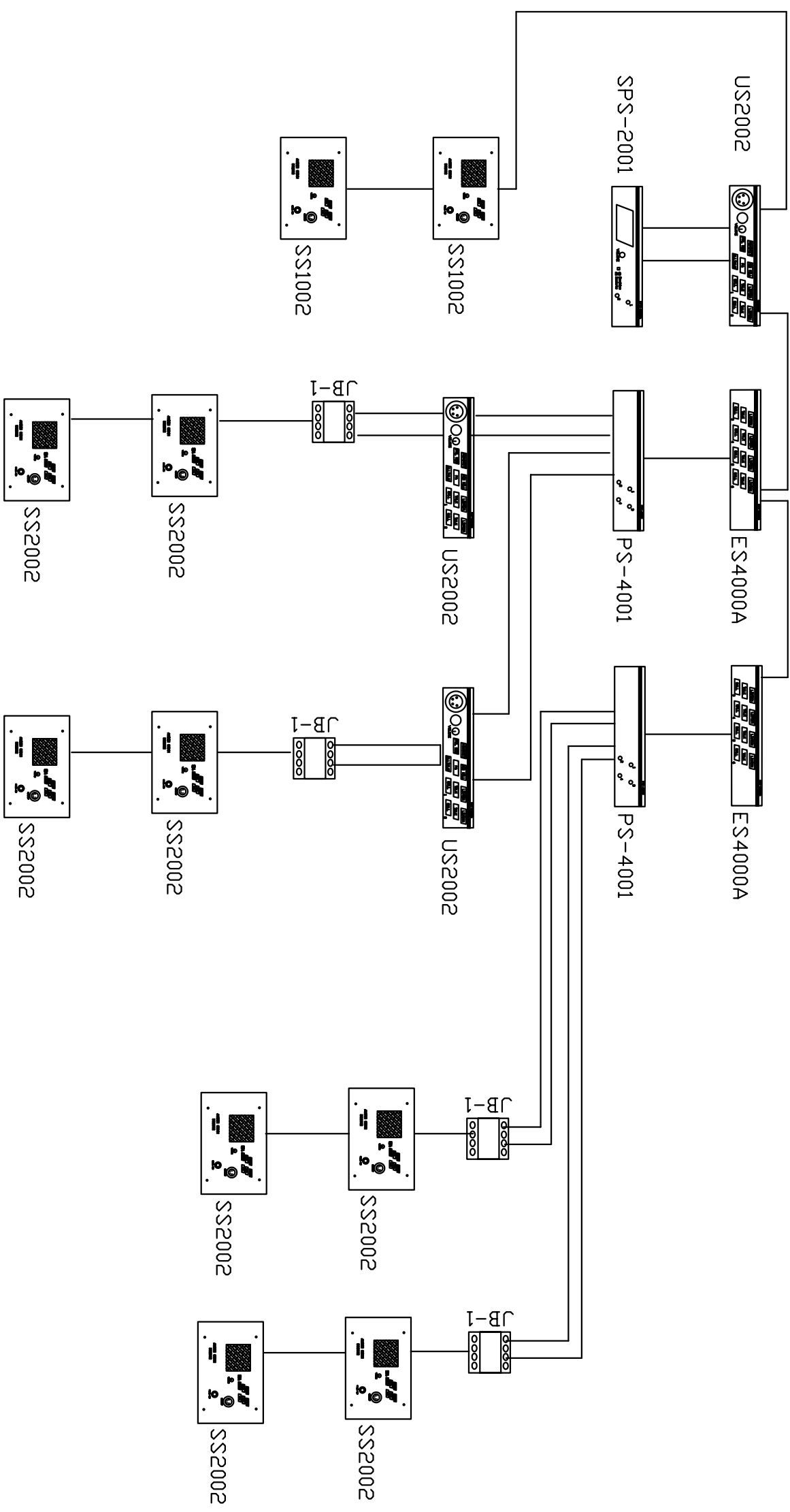
Channels three and four are fed to a US-2002 User Station, which can then speak or listen to either of these channels, as well as via a JB-1 Junction Box (which combines the two channels of XLR-3 connectors into a single XLR-6 style connector) to feed a pair of TWO CHANNEL Speaker Stations, the SS-2002s.

Channels 5 and 6 have an identical set-up to channels 3 and 4.

Channels 7 and 8 do NOT feed to US-2002 User Stations, but instead go only to SS-2002 by the JB-1 junction box, and then on to a pair of SS-2002 2-channel speaker stations, allowing those speaker stations to work with one another and also communicate with the Master Station.

Channels 9 and 10 have an identical set-up to channels 7 and 8.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



DRAWN BY		SIZE		FSCM NO.		DWG NO.		REV	
		A				10 CH SYS.DWG		A	
SCALE N/A								SHEET 1 OF 1	
TELEX COMMUNICATIONS INC. 12000 PORTLAND AVE. SOUTH BURNSVILLE, MN 55337					AUDIODOC 10 CHANNEL USER STATION SYSTEM				

RadioCom™ Single Channel Systems

700 Series UHF and 300 Series VHF Wireless Intercom

The wireless intercom examples shown, represent a basic system. They are single channel intercom systems and are shown independent of any wired intercom system. These systems can also be linked with Audiocom or RTS PL (Party-Line) intercom systems or with RTS Matrix intercom systems.

Up to four TR beltpack transceivers can be used with the BTR base station with full duplex communications. All TR beltpacks will share a single audio channel with the BTR base station.

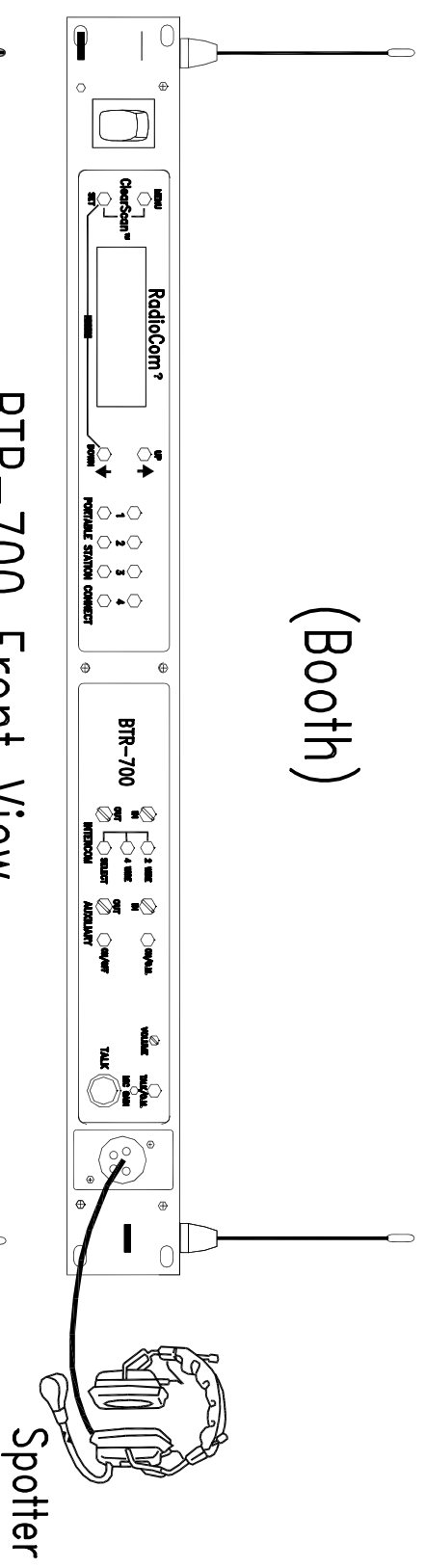
Both of these systems offer a cost effective solution for budget-minded applications that do not demand more complex capabilities. The 300 series intercom is provided on fixed frequencies while the 700 series is frequency-agile in 18 MHz bands.

The systems shown in these examples are marked for a High School Football application, however, these stand-alone systems can be applied to churches, schools, auditoriums, or industrial applications.

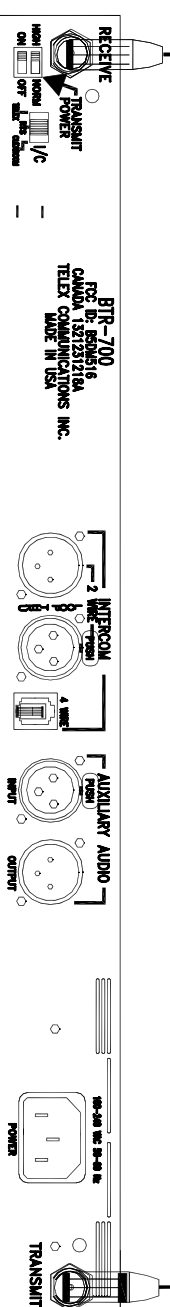
RadioCom™

700 Series High School

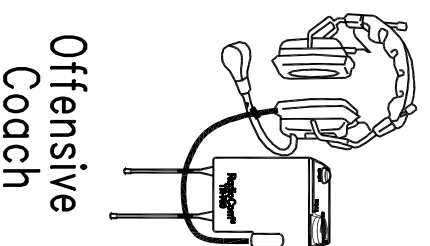
(Both)



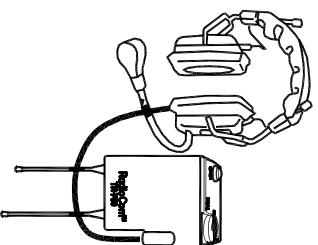
BTR-700 Front View



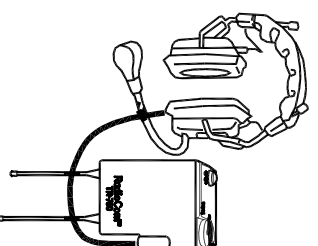
BTR-700 Rear View



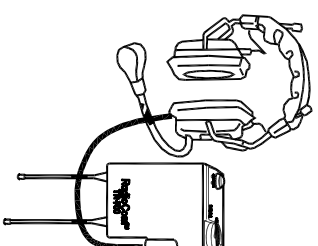
Offensive Coach



Head Coach



Defensive Coach

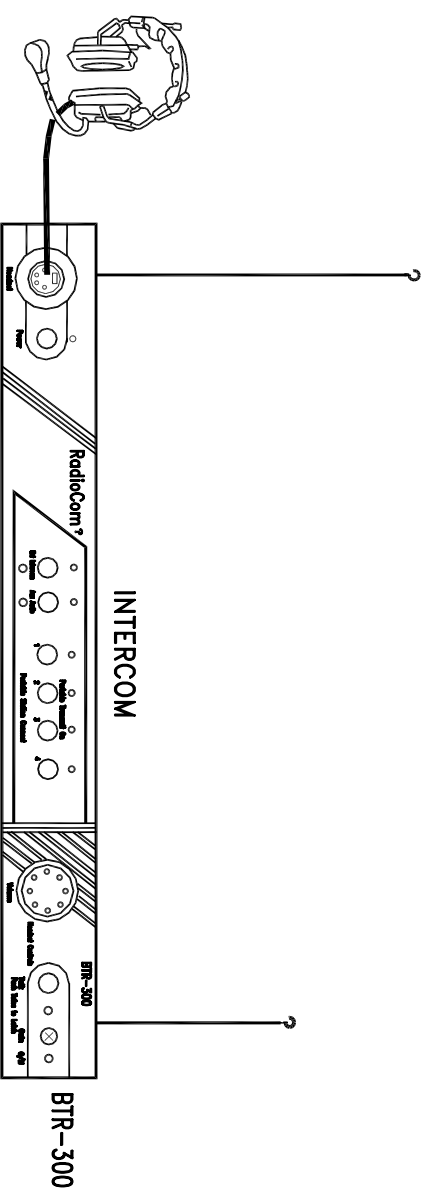


Coach

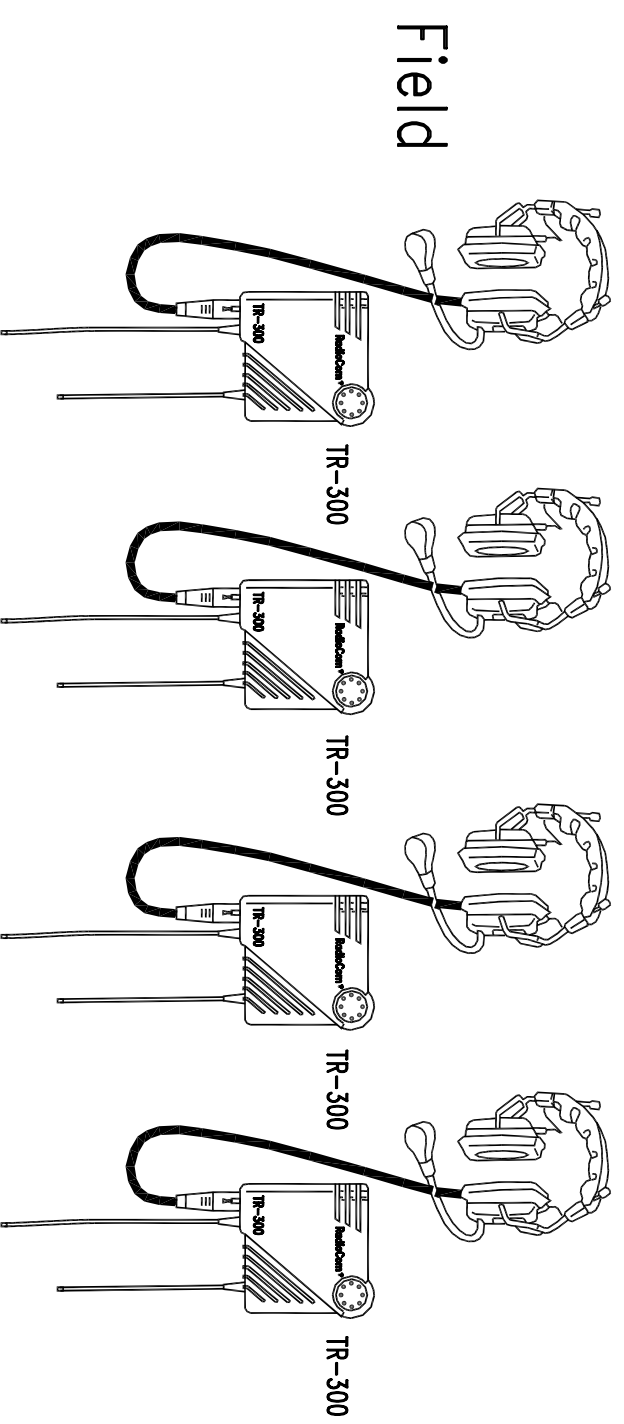
TR-700s

(Field)

RadioCom™ 300 Series High School



Booth



Field

RadioCom™ Two Channel Systems

800 Series UHF Wireless Intercom

The BTR-800 system adds a second audio channel providing communications to either audio channel “A” or audio channel “B”. Like the 300 and 700 series wireless intercom systems, the 800 series can be used as a stand-alone system or can be linked with Party-Line or Matrix wired intercoms.

A further example of the 800 series wireless intercom system documents an interface with an Audiocom PL intercom. The example shows two BP-2002 two-channel belt packs and two BP-1002 single-channel belt packs daisy-chained together with XLR cables to a US-2002 User Station and a PS-2001L Power Supply. The PL intercom is connected in series with a BTR-800 wireless intercom base station with four wireless belt packs.

The wireless belt packs shown, provide the user the ability to select which audio channel to communicate with. Up to four belt packs can operate with a BTR-800 in full duplex. The TR-800 provides communications with either audio channel “A” or audio channel “B”. You can listen or talk back to either audio channel, but not both at the same time.

Also shown, is the TR-825. The TR-825 can provide communication with audio channel “A” or audio channel “B” or a mix of audio channels “A” & “B”. When the TR-825 is configured with a 5-pin XLR connector for operation with a Binaural (stereo) headset, the audio will be ‘split’ where you receive audio channel “A” in your left ear cup and audio channel “B” in your right ear cup. You can listen or talk back to either audio channel independently or simultaneously.

An advantage of the BTR-800 is you can configure different belt packs to operate with your system. You can operate TR-825s, for those users who need to talk back and listen on two audio channels simultaneously, or TR-800s for simple two channel operation. You can also operate the TR-700 single channel belt pack with the BTR-800 for those user who only need access to one audio channel. Additionally, the BTR-800 can accommodate multiple belt packs operating in push-to-transmit mode.

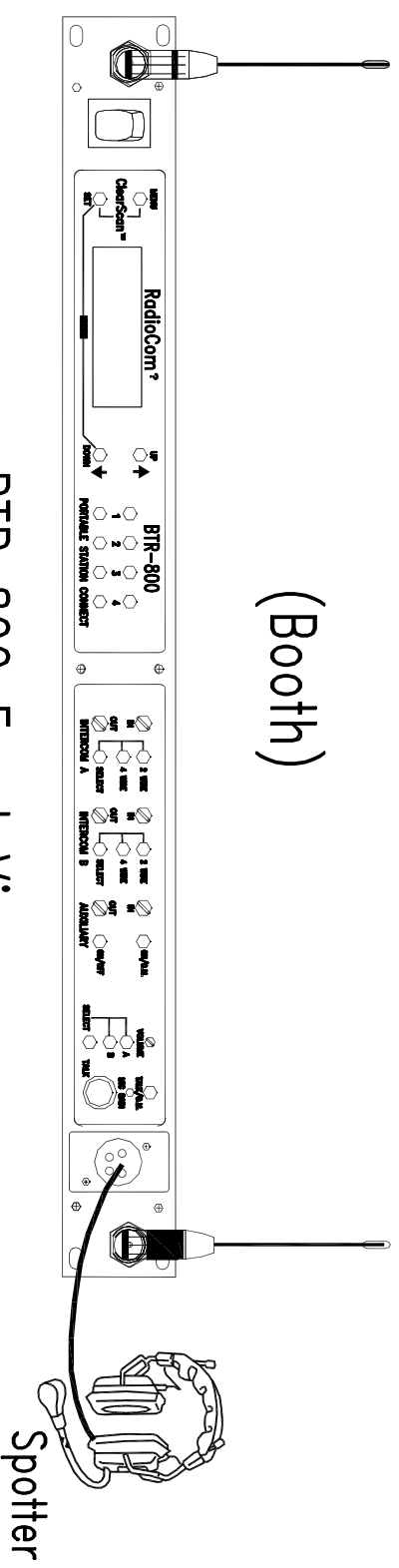
The 800 series wireless intercom is frequency agile in 18 MHz bands and is provided with 36 pre-programmed frequency groups for easy selection and operation.

Like the 700 and 300 series wireless intercom systems, the 800 system can be configured for high school or small college football applications, as well as be configured for churches, schools, auditoriums, or industrial environments.

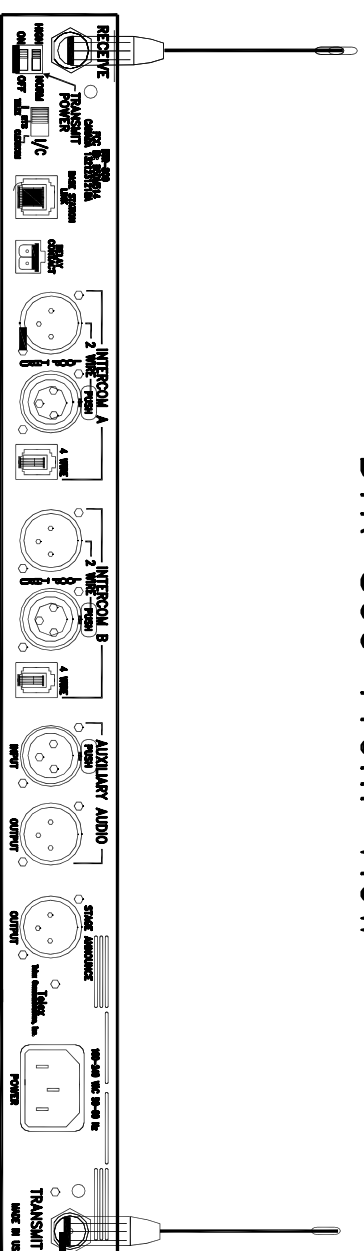
RadioCom™

800 Series High School

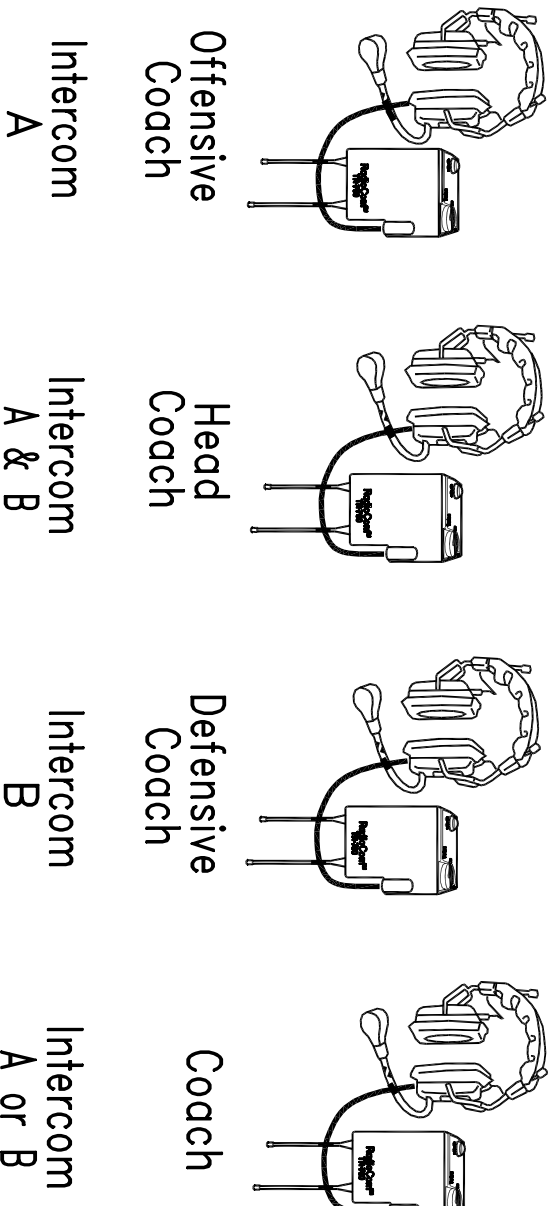
(Booth)



BTR 800 Front View



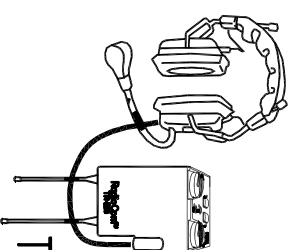
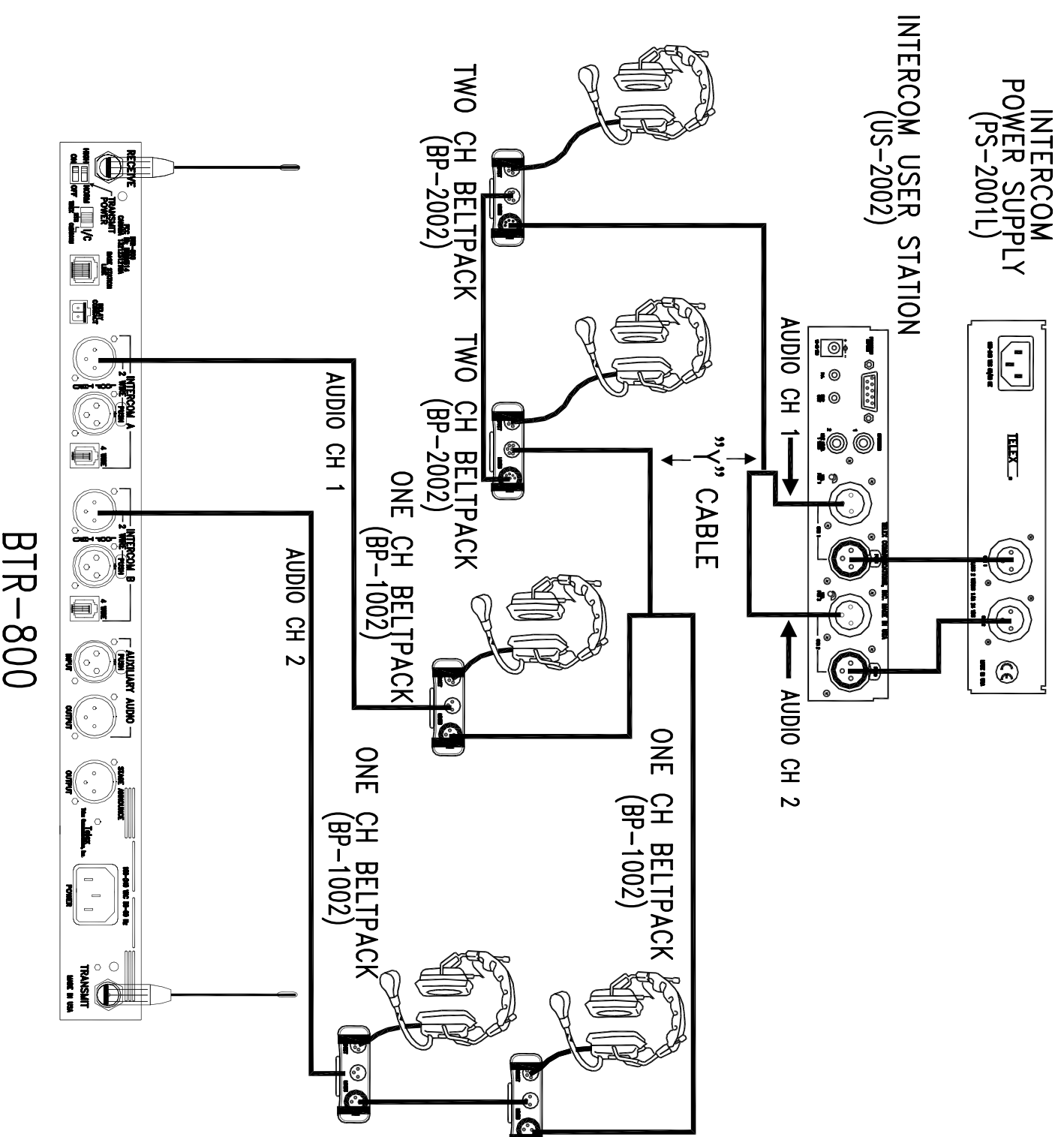
BTR-800 Rear View



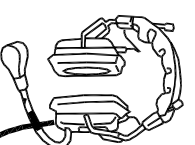
TR-800s

(Field)

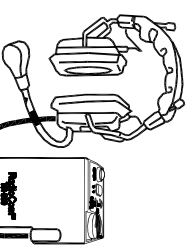
RadioCom™ 800 Series Interface to AudioCom™ TW



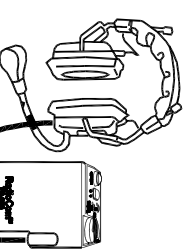
TR-825



TR-825



TR-800



TR-800

RadioCom™ Two Channel Systems

500 Series UHF and 600 Series Encrypted UHF Wireless Intercom

The 500 and 600 series offers the ultimate in wireless intercom expandability. These systems can be operated stand-alone or linked with PL or Matrix intercoms. The 500 and 600 series intercoms are unique in that each beltpack communicates with a matching base station (one to one) on two separate audio channels and are frequency-agile between two selectable frequencies. The 500 and 600 series can be expanded for up to 12 systems to be used simultaneously.

The 600 series includes a unique digital encryption process for those who need secure full-duplex communications. Over 65,000 code settings can be selected by means of switches that are located on the units.

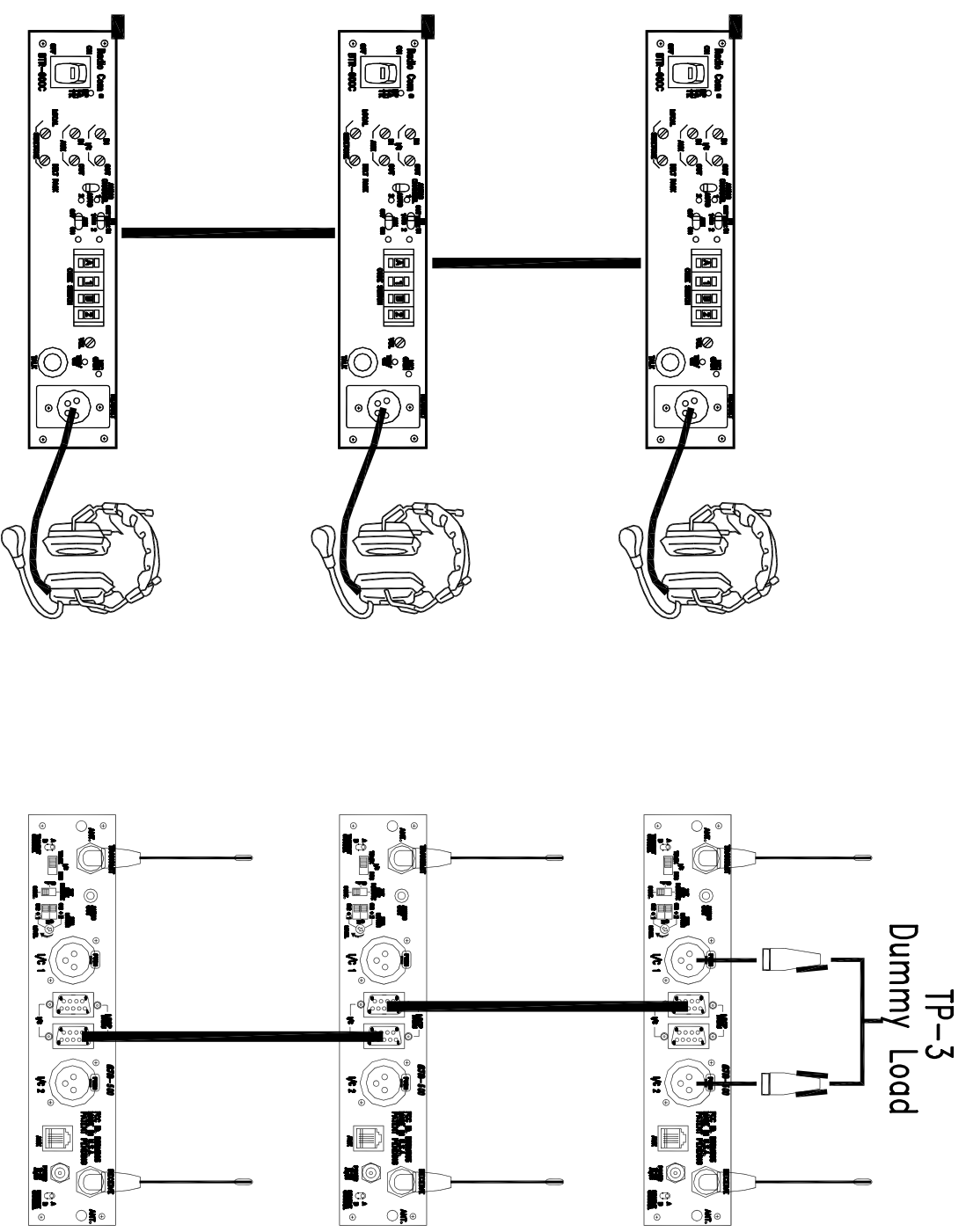
In the first example, the 600 series is shown as a High School Football stand-alone system. Typically, the BTR-600 base stations are located in the coaches booth with the TR-600 beltpacks worn by the coaches on the field.

The last example depicts a large college layout with seven coaches on wired intercom beltpacks, located in the coaches booth, and eight coaches on wireless beltpacks, located on the field. This system interfaces with four channels of Party-Line intercom. The BTR-600s interface with an AC-600. antennae splitter/combiner, to reduce the number of antennas required to one-transmit and one-receive. In this example, the ALP-600 bi-directional log periodic antenna is shown, which provides excellent coverage on a sideline.

Other applications for the 500 and 600 series intercom would be where one to one communications are critical, such as nuclear power generating plants or other industrial applications.

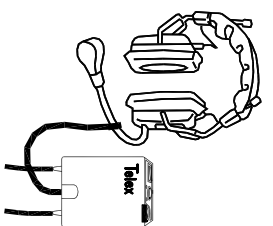
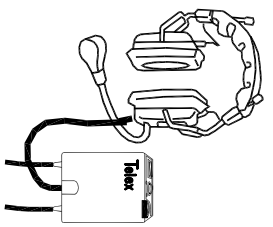
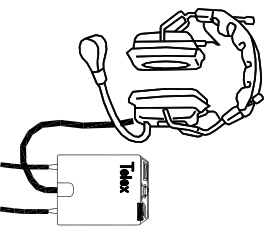
RadioCom™

500/600 SERIES – HIGH SCHOOL SYSTEM



BTR-600C Front View

BTR-600C Rear View



HEAD
COACH
BELTPACK
* 1 = MAIN
2 = MAIN DEF

COACH 1
OFFENSE
BELTPACK
1 = MAIN OFF

COACH 2
DEFENSE
BELTPACK
2 = MAIN DEF

Zeus / Audiocom Combo Intercom System

This system is COMPLETELY unlike any of the previous systems.

Whereas the previous systems had “at their heart” some form of an Audiocom Master Station, this system uses an RTS Zeus Matrix Intercom System.

This is intended as only a VERY BRIEF introduction to Matrix Intercom Systems, so we will keep our technical discussions to a minimum.

In broad concepts, TW or Party-Line Intercom systems are very similar to multiple extensions on the same telephone line; all participants hear the same conversation, and hear each other.

A Matrix Intercom System is much more like multiple telephones with separate telephone numbers connected through the telephone company. Each user has the option of deciding who and when they want to talk to, whether they want to talk privately or in conference, and whether they want to allow other parties to listen in.

The other feature of a Matrix System is hinted at by its other commonly used name “Four Wire”. Just as Party-Line intercoms are referred to as “TW” for two wire, this refers to how the audio is distributed. In TW or Party-Line systems, the talk and listen audios are scrambled together, sharing a common pair of wires. In a Matrix or Four Wire system, the talk from a given user is on one pair, and the listen is on a second pair.

As in a previous drawing, we had to interface TW intercom to fiber (fiber like Four Wire systems, having separate Talk and Listen paths), a Hybrid or System-to-System Adapter (SSA) is required to convert TW to Four Wire.

On the following diagram, you see when we connect a channel of TW to a channel of Four Wire we use an SSA.

In a matrix system (such as Zeus), the users connect to other users by pressing keys or buttons dedicated to those users (like speed dial buttons on a phone). Who those users are, whether they are individuals or conferences, or they function as IFBs, is a function of how the computer (inside Zeus) is programmed. This computer is programmed using a software program called AZedit (formerly known as ADAM-Edit), provided by Telex with each matrix intercom.

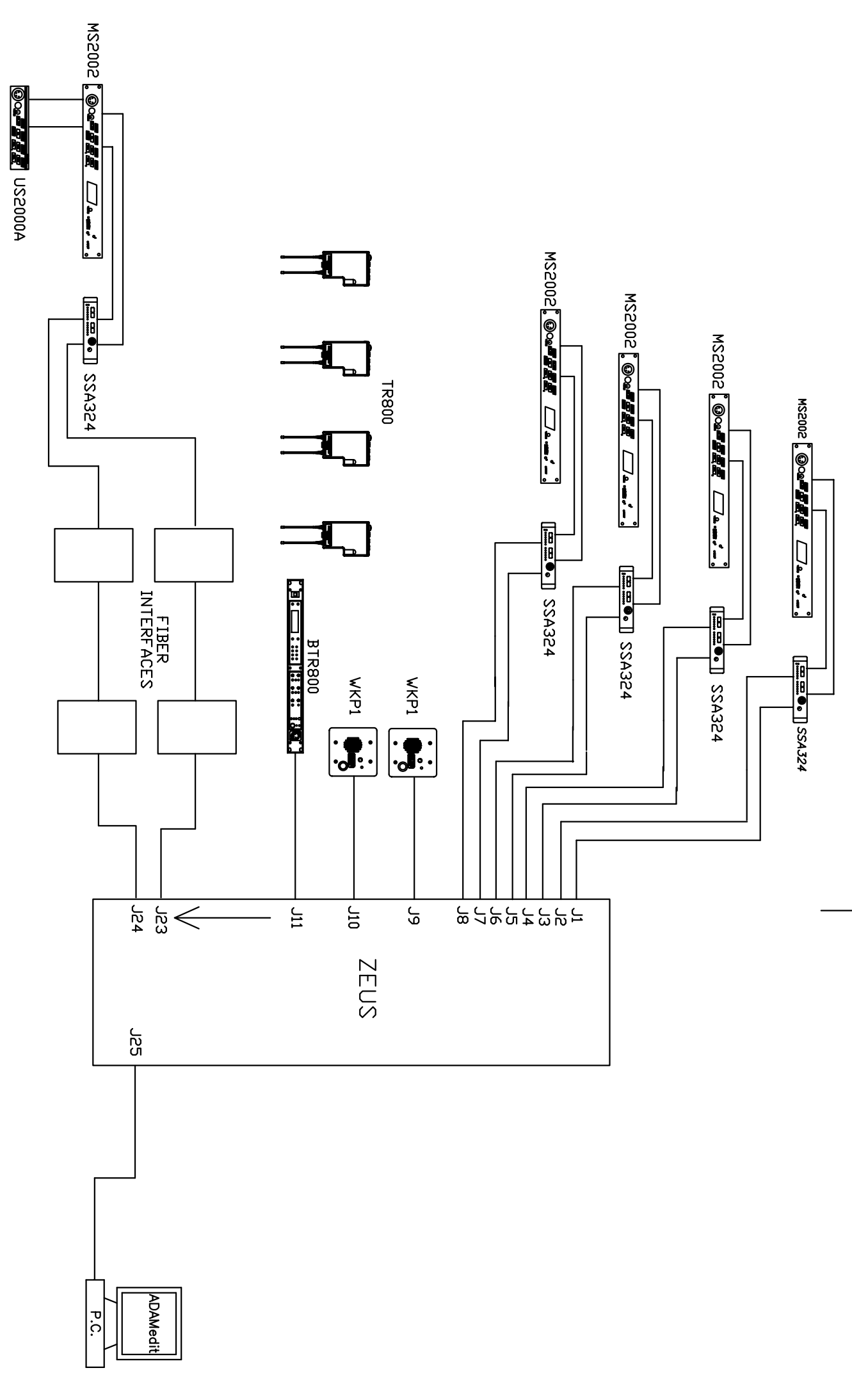
On the system drawing, J1 through J24 represent the 24 channels that Zeus can support. These 24 channels can correspond to 24 Matrix User Stations (key panels, such as the WKP-1 units pictured) or can be fed through SSA units to feed channels of Audiocom or other Party-Line systems. In the examples shown, a single channel from Zeus (for example, J1) goes through one channel of an SSA-324 to one channel of the MS-2002. In most real world applications, the MS-2002 would also feed a number of other TW user stations (i.e., beltpacks or wall stations), so the TW “side” of the system could function independently as a normal Party-Line system. The advantage, being able to connect and communicate with any of the other 23 channels that Zeus offers.

It is useful to think of Zeus as a routing switcher for the other intercom channels, or as an automated, programmable version of the IC-6SX shown on an earlier diagram.

When designing or specifying an intercom system, consider this - "An intercom system will LIKELY consist of elements which may include Party-Line Systems, Matrix Systems, Wireless Systems and Interfaces". If, as in many of the earlier examples, the number of individual channels is small, and the configuration of those channels is well defined and unlikely to change often, then a matrix intercom is LIKELY to be superfluous.

If, on the other hand, the system requirements point to a large number (greater than eight or ten) channels, and the daily needs for which groups need to talk with, then the versatility offered by a matrix intercom system is worth the time, money and effort to design it.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

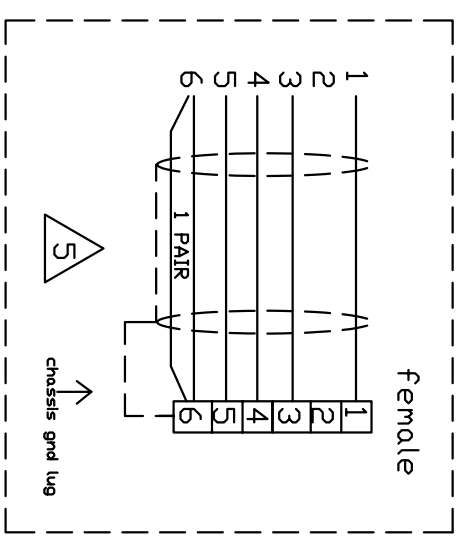
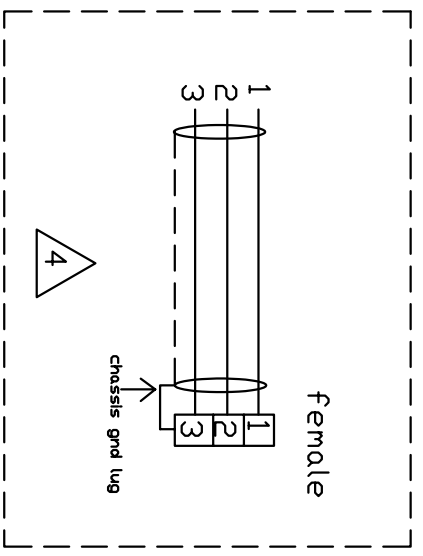
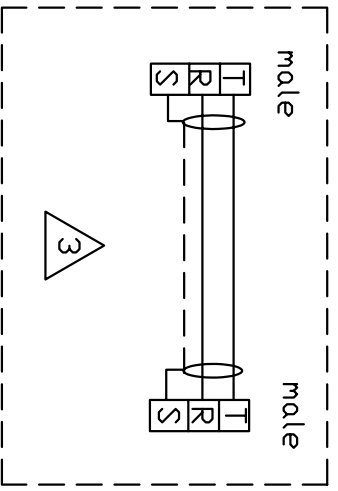
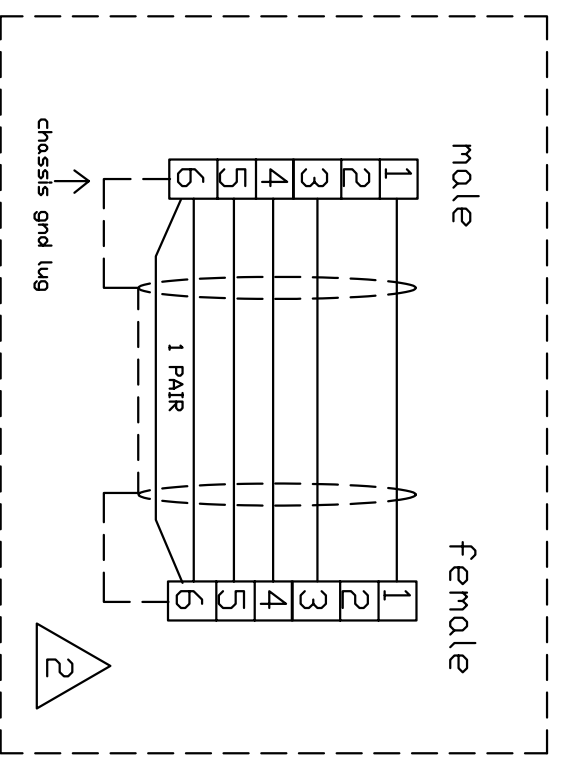
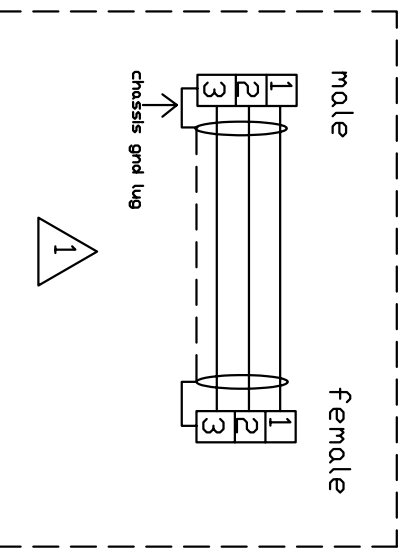


DRAWN BY		TELEX COMMUNICATIONS INC. 12000 PORTLAND AVE. SOUTH BURNSVILLE, MN 55337	
SIZE	FSCM NO.	DWG NO.	REV
A		ZEUSCOMBD.DWG	A
SCALE	N/A	SHEET 1 OF 1	
ZEUS/AUDIICOM		COMBD INTERCOM SYSTEM	

Cable Diagrams

This drawing shows the various cable connections as noted on the first 13 drawings.

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



- 1 SINGLE CHANNEL CABLE - 3 CONDUCTOR 22AWG. WITH SHIELD
ATTACH SHIELD TO CHASSIS LUG OF XLR
- 2 DUAL CHANNEL CABLE - 6 CONDUCTOR 22AWG. WITH SHIELD
ATTACH SHIELD TO CHASSIS LUG OF XLR (EACH CHANNEL SHOULD HAVE SEPERATE GND WIRE)
- 3 SINGLE CHANNEL RCA CABLE - 2 CONDUCTOR 22AWG. WITH SHIELD
ATTACH SHIELD TO CHASSIS LUG OF XLR
- 4 SINGLE CHANNEL CABLE FOR TERM LUGS - 3 CONDUCTOR 22AWG. WITH SHIELD
ATTACH SHIELD TO CHASSIS LUG OF XLR
- 5 DUAL CHANNEL CABLE FOR TERM LUGS- 6 CONDUCTOR 22AWG. WITH SHIELD
ATTACH SHIELD TO CHASSIS LUG OF XLR

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CABLE DIAGRAM

DRAWN BY		S ANDERSON	
SIZE	FSCM NO.	DWG NO.	REV
A		SYS_AUDIDCOMM_DIA_14B	B
SCALE	N/A	SHEET	14 OF 15

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED

AUDIOID	COMM MODEL	CURRENT DRAW (MAX)
BP-1002		65 mA
BP-2002		65 mA
WM-1000		65 mA
WM-2000		65 mA
SS-1002		175 mA
SS-2002		175 mA
US-2002		150 mA
ES-4000A		150 mA
MS-2002		65 mA
EMS-4001		65 mA
JB-1		0 mA
CCB-1		12 mA
SPK-1000		150 mA
SPK-2000		150 mA
TFB-1000		60 mA

POWER SUPPLY MODEL	CURRENT OUTPUT
PS-1F	.5amps/12watts
PS-2001L	2amps/48watts
SPS-2001A	2amps/48watts
PS-4001	2amps/48watts
PS-L (DC WALL PACK)	.5amps/12watts

TELEX COMMUNICATIONS INC.
 12000 PORTLAND AVE. SOUTH
 BURNSVILLE, MN 55337

CURRENT SPECIFICATIONS CHART

DRAWN BY		S ANDERSON	
SIZE	FSCM NO.	DWG NO.	REV
A		SYS_AUDIOCOMM_DIA_15B	B
SCALE	N/A	SHEET	15 OF 15