SP-40 Series
Audio Production Consoles

Model SP-42 2-track console

Model SP-44 4-track console

Model SP-48 8-track console

Wheatstone Corporation

TECHNICAL MANUAL
December 1992

Second Edition – For consoles with serial numbers 20556 and up

SP-40 Series Audio Consoles Technical Manual - 2nd Edition

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Addenda

ALL Module Schematics:

All modules now use P&G 8000 series fader with JST connectors. Fader pinout is as follows:

MONO:

Pin 9 HI
Pin 8 GND
Pin 7 GND
Pin 6 WIPER
Pin 5 NC
Pin 4 NC
Pin 3 NC
Pin 2 NC
Pin 1 NC

STEREO:

Pin 9 HI
Pin 8 GND
Pin 7 GND
Pin 6 WIPER
Pin 5 GND
Pin 4 WIPER
Pin 3 GND
Pin 2 GND
Pin 1 HI

If your console's Stereo Line Input Module printed circuit boards are version SLE-4D, then the following component changes will apply to the SLE-4C schematics included in this manual:

(1) C70 & C73 capacitor values are changed from 22uF to 100uF.
(2) C71 & C87 capacitor values are changed from 100uF to 22uF.
(3) Integrated circuit U12 (Type 4053) will be implemented differently: Pins 4, 9, 3 & 5 are now unused (i.e., grounded out) and Pins 14, 11, 13 & 12 are employed instead (i.e., 10K resistor R102 now feeds pin 14, pin 13 feeds capacitor C44, pin 11 feeds pin 9 of U3, and pin 12 goes to ground).

SL-2 Stereo Line Input Module Schematic (SP-42 Console only):

EQ switches "SW2" and "SW4" are not loaded.

GP Group Module Schematic:

If your console is equipped with the optional mix-minus monitor bus: level control CR2 ("Send 2") is jumper-bypassed and resistor R55 becomes 10K .

If your console has more than one studio module: jumper J6 becomes a 10K   resistor and resistor R55 becomes 20K .

Stereo Line Input Schematic (SL-4, SL-42, SL-44, SL-48):

R21 resistor changed from 1K 5% to 4.7K 5%.

Stereo Line Input Schematic (SLE-42, SLE-44, SLE-48):

D7 changed from 1N914 to QMBR130 schottky diode.

Mic/Line Input Modules (MLE-48, MLE-42, MME-48) Schematic Diagrams:

The SW15 position numbers for Phantom Power and TB To Studio are incorrectly shown. Phantom Power is position 3, and TB To Studio is position 4.
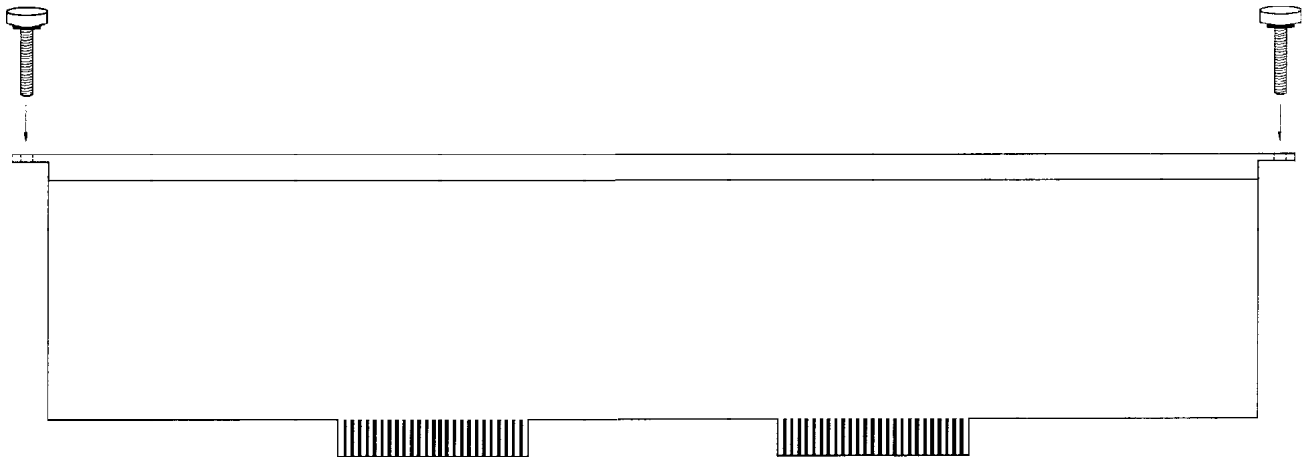
Module Removal Tools

Your Wheatstone audio console is equipped with two "module extractor tools" which are mounted in the front panel of the console mainframe.

All modules are held into the console mainframe by two mounting screws (top and bottom) which, when removed, leave specially threaded holes that accept the two extractor tools.

To remove a module faceplate from the mainframe:

Remove the top and bottom module mounting screws, unscrew the extractor tools from the mainframe, and screw each tool into a module mounting hole. *Use only four or five turns* (do not over-insert!). Using the extractor tools as handles, pull the module straight up out of the mainframe.

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SP–40 SERIES DESCRIPTION

The Wheatstone SP-40 console series is a dual purpose design intended for applications where the console will be used for both production work and on-air applications. As such, its module layout has characteristics similar to both traditional on-air boards and production models. Generally speaking, the lower half of a typical input module emulates on-air control layout, while the upper half contains equalization and send controls. This hybrid architecture allows both production and on-air personnel to easily learn and operate all models of the series.

There are three models: the SP-42 (intended for 2-track use), the SP-44 (4-track) and the SP-48 (8-track). All models are similar in layout, but differ primarily in the number of outputs available. The standard model is the SP-44.

SP-44 Four-track Production Console

This console comes equipped with four subgroups, two stereo outputs (Program and Audition), one mono sum output (Program L+R), one mix-minus output, three auxiliary sends and cue. Intended to interface with a four-track tape recorder (the subgroup outputs feed the recorder; multitrack playback is normally through the subgroups' tape inputs), the console may be ordered with 16 or 24 input channels. The mainframe includes VU meters for the subgroups, Program (left & right), Audition (left & right), and Mono (Program L+R). Group VUs can also meter the three sends and mix-minus, via front panel switching on the subgroup modules. A control room monitor module is standard equipment. The mainframe has room for five accessory modules (three on the right and two on the left).

SP-48 Eight-track Production Console

This is the 8-track version of the console series. It is identical with the SP-44 except it has eight subgroup channels instead of four. This also means there are an additional four VU meters housed in the mainframe. The SP-48 comes with 24 inputs.

SP-42 Two-track Transfer Console

This compact unit (26 by 26 inches) has 12 inputs and is designed to interface directly to a 2-track tape machine. It has two stereo outputs (Program and Audition), two auxiliary sends and cue. Four VU meters (Program and Audition left and right) are included. The mainframe includes a control room monitor module and has room for two accessory modules (righthand frame positions only).

SP-40 CONSOLE SERIES FEATUF	SP-42	SP-44	SP-48
MAINFRAME POSITIONS	16	24/33	35
INPUTS	12	16/24	24
GROUPS		4	8
CONTROL ROOM MODULE	Y	Y	Y
STEREO PROGRAM OUT	Y	Y	Y
STEREO AUDITION OUT	Y	Y	Y
MONO SUM (PGM L+R) OUT		Y	Y
MIX-MINUS OUT		Y	Y
CUE	Y	Y	Y
SEND BUSSES	2	3	3
TIMER	Y	Y	Y
GROUP METERS		4	8
PROGRAM METERS (L & R)	Y	Y	Y
AUDITION METERS (L & R)	Y	Y	Y
SEND METERS (switched w/Group VUs 1-3)		Y	Y
MIX-MINUS METER (switched w/Group VU 4)		Y	Y
LEFTHAND ACCESSORY POSITIONS		2	2
RIGHTHAND ACCESSORY POSITIONS	2	3	3

SP-40 Series Standard Features Listing by Console Model

| Mono Input
SP-42 | Mono Input
SP-44 | Mono Input
SP-48 | Stereo Input
SP-42 | Stereo Input
SP-44 | Stereo Input
SP-48 |

Input Modules – SP-40 Series Audio Consoles
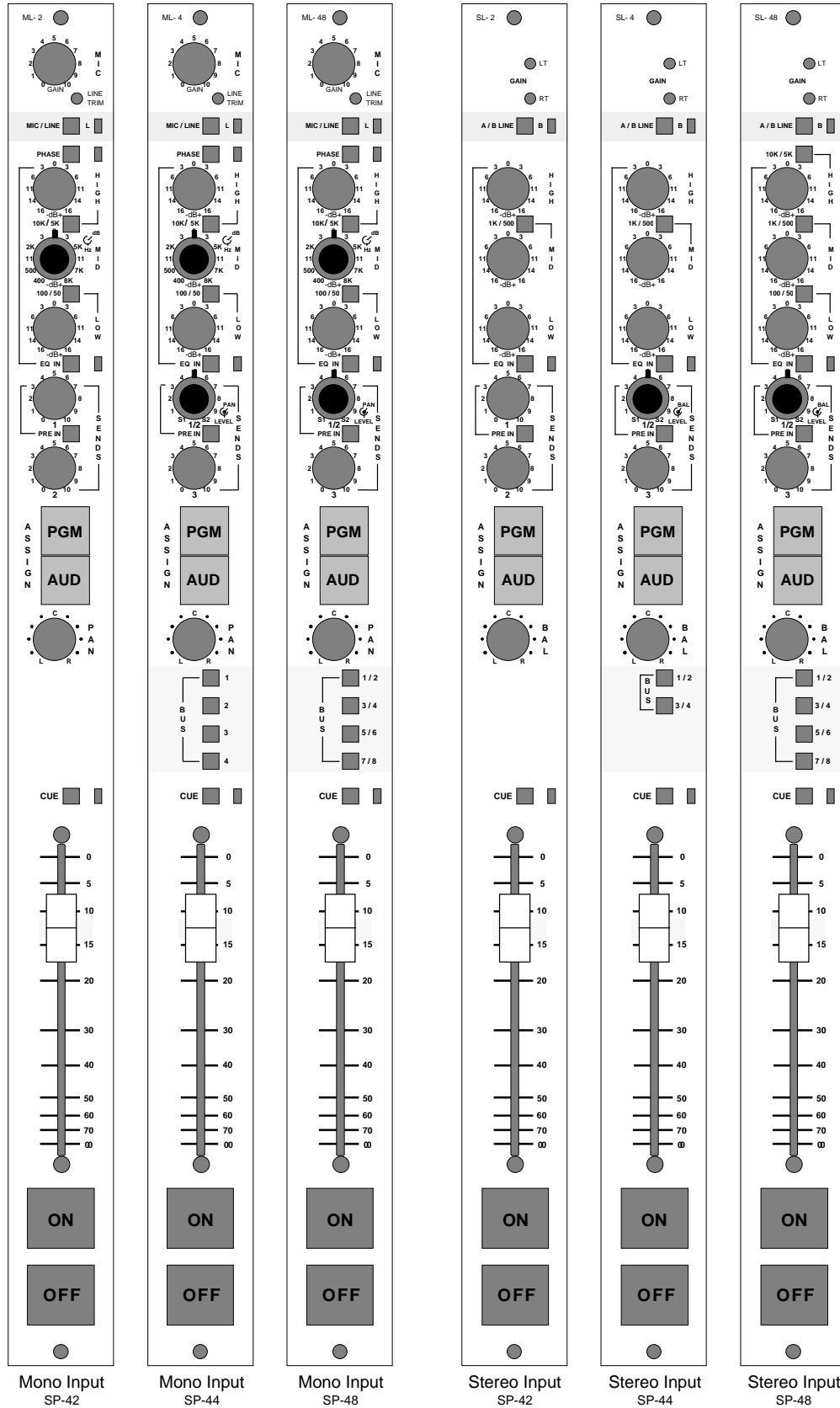
STANDARD MODULES

Mono Mic/Line Input (ML-48)

This module brings mic signals into the console; when switched to line input it is used to play individual tracks from the multi-track machine.

Familiar PGM and AUD switches are provided for on-air application and rapid learning curves. They also make easy work of routine 2–track transfers and dubs. Bus assign switches are also provided for 8–track production sessions. Additionally, there is an internal dipswitch feeding a mix-minus bus—perfect for call-in production work. A powerful three-band equalizer permits total creative freedom (the EQ may be switch bypassed). The panpot pans between the left and right PGM and AUD buses or Odd and Even pairs on the bus assign switches. Three auxiliary sends are provided. Sends 1 and 2 appear on a concentric knob pair (Level and Pan 1/2); they may be switched pre or post. Send 3 can be internally selected pre or post. A CUE switch (w/ LED) is also provided. CUE is automatically released when the channel on button is activated or when CUE is pressed again. CUE may be programmed to automatically interrupt control room or headphone feeds.

Other features include dipswitch selected phantom power, a phase reverse switch and a mic/line selector switch. Separate mic gain and line trim controls are provided.

The lower section of the module includes a P&G fader. Channel ON/OFF switches interface to the console's dipswitch programmed logic system, which allows remote channel on, off, tally and cough. Console command functions include control room and studio mute, and timer restart. Of course, control room and studio tally relays are included. These permit an on-air type production environment as well as direct-to-air capability.

Stereo Line Input (SL–48)

This module is used for stereo sources such as CDs, tape recorders, and cassette players. Its A/B source selector switch doubles the module's input capacity. Calibration procedures are made easy with the multi-turn front panel gain trims. The 3-band EQ section (with switchable center frequencies) provides reciprocal curves, allowing easy removal of previously applied equalization—a real plus for last minute afterthoughts. EQ bypass is provided.

Assign switches route signal to the stereo and 8-track machine in stereo pairs, and are provided with a balance control. The SP-48's unique stereo/mono send section provides for mono or stereo effects. Pre/post selector switches increase production flexibility. Like the mono mic module, a sophisticated automatic CUE system is included. A P&G stereo fader provides smooth, troublefree mixing.

Channel ON/OFF buttons are coupled to an on-air type machine and console logic system. Each color-coded button is illuminated. For long life and low maintenance, on/off lamps are solid state. When channel on status is selected, external machines, such as carts and CDs, may be started and can in turn send channel on/off commands back to the console. The logic system may be dipswitch selected to command control room and studio mute, and timer restart. A local or external ready command may signal back to the module.

Group #1
SP-44/48

Group #2
SP-44/48

Group #3
SP-48 only

Group #4
SP-48 only

Stereo Master
SP-42

Stereo Master
SP-44/48
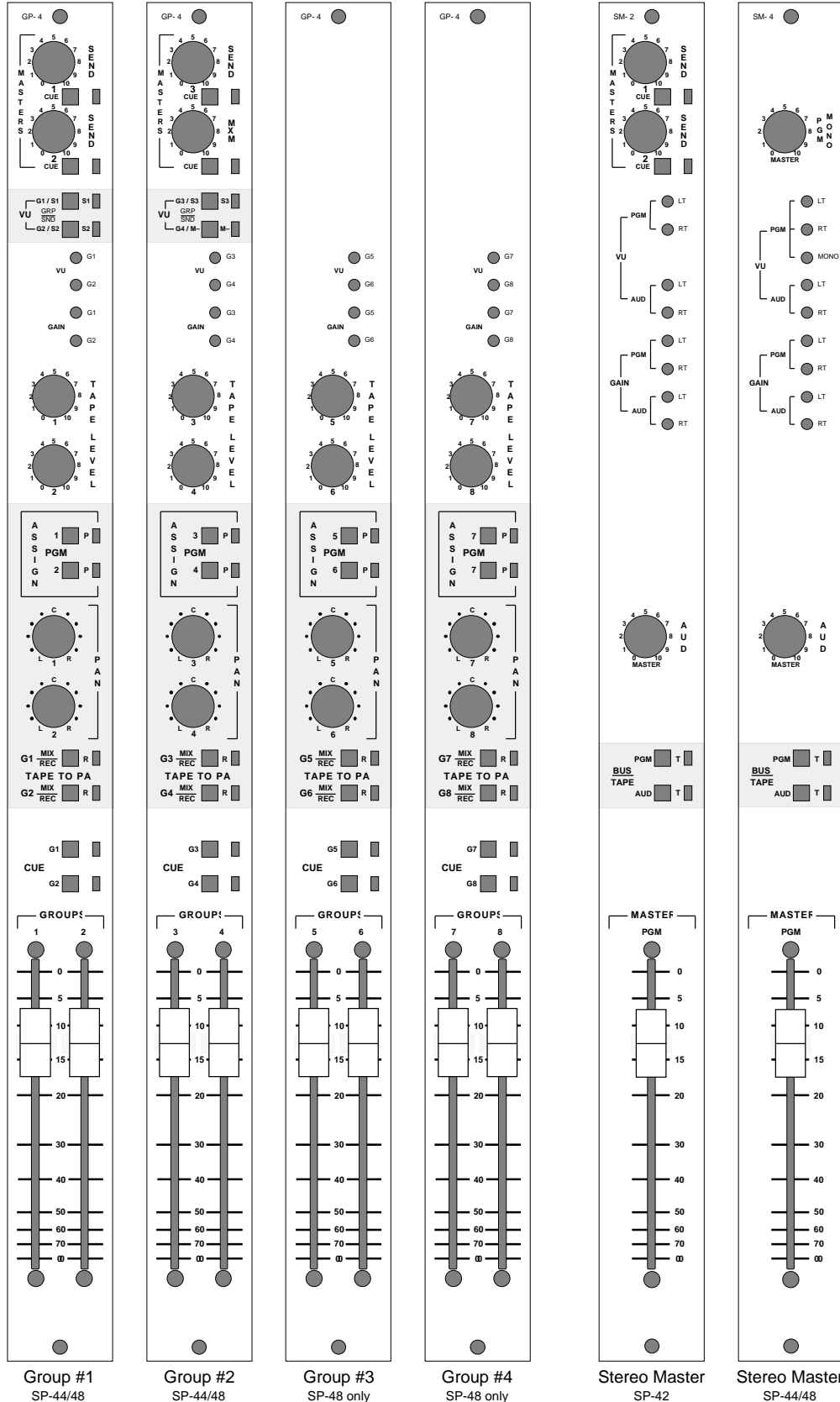
Group Modules (GP)

These modules provide the record outputs to the tape recorder during the multi-track lay-up, and provide subgrouping functions during mixdown sessions.

Each fader (two to a panel) controls the level of one track sent to the multi-track recorder. By acting as a record level to the tape recorder modulation levels can be precisely controlled from one fader, rather than having to adjust individual or groups of different faders, thus greatly improving productivity and avoiding the chance of losing the mix balance.

Once the eight tracks are recorded, the mixdown session can be handled in one of two ways. First, Bus/tape switches are switched to select the tape playback signals, which are routed through the group faders and their associated panpots to the PGM stereo output. In the second method the bus/tape switch is left in Bus mode and the mic/line modules are switched to line input (which are also connected to the tape machines playback); signals are then routed from the input module, grouped to the subgroups, and then mixed to the stereo output. This leaves the operator the choice of fast layups or more involved sessions when you're looking for that major market polish.

A CUE switch allows quick checking of the recording or subgroup signal. The pan off switch allows the groups to operate independently of the stereo mix for mix-minus, IFB, or bilingual production requirements, or in applications where it is desirable to feed the multi-track while simultaneously using the stereo PGM buses for other applications, such as dubbing or even live use.

Master level controls for the three auxiliary sends and the internal mix-minus bus are located at the top of the first two group modules. Front panel gain and VU multi-turn trimmers allow easy calibration.

Stereo Master Output (SM–4)

This module provides master output level control for the PGM, AUD and PGM mono sum outputs. PGM master is provided with a stereo P&G fader that would normally be used as the record level control to your 2–track master or output level to your on-air feed. A pair of bus/tape switches are provided that allow you to bring the input of your 2–track back to the module so you may easily check your completed recordings. The AUD and PGM mono outputs are both provided with conductive plastic rotary level controls. Front panel multi-turn gain and VU trims allow easy calibration.

Control Room Monitor (CR-4)

This standard module handles source and level controls to the control room, headphone and cue circuits. The source selector can pick up the PGM, AUD, and MONO buses as well as two external balanced line inputs, such as tape recorders or air returns. The CUE circuit can be programmed to interrupt the control room or headphone feeds for automatic operation. A high quality conductive plastic headphone level control is provided to assure reliable operation. The under- counter headphone jack is driven by a built-in power amplifier to assure plenty of drive. An external headphone I/O port is also provided for an external power amp if desired. The CR pot is conductive plastic and drives an electronically balanced output.

CR- 2

CR- 4

SC- 2

SC- 4

S O U R C E S E L E C T	S O U R C E S E L E C T	S O U R C E S E L E C T	S O U R C E S E L E C T
EXT1	EXT1	EXT1	EXT1
EXT2	EXT2	EXT2	EXT2
PGM	PGM	PGM	PGM
AUD	AUD	AUD	AUD
	MON		MON

CUE

CUE

TB

TB

AUTO RESTART

AUTO RESTART

TIMER

TIMER

START | STOP

RESET

HOLD

START | STOP

RESET

HOLD

HDPN

HDPN

STUDIO

STUDIO

CR

CR

TB

TB

Control Room
SP-42

Control Room
SP-44/48

Studio (opt.)
SP-42

Studio (opt.)
SP-44/48
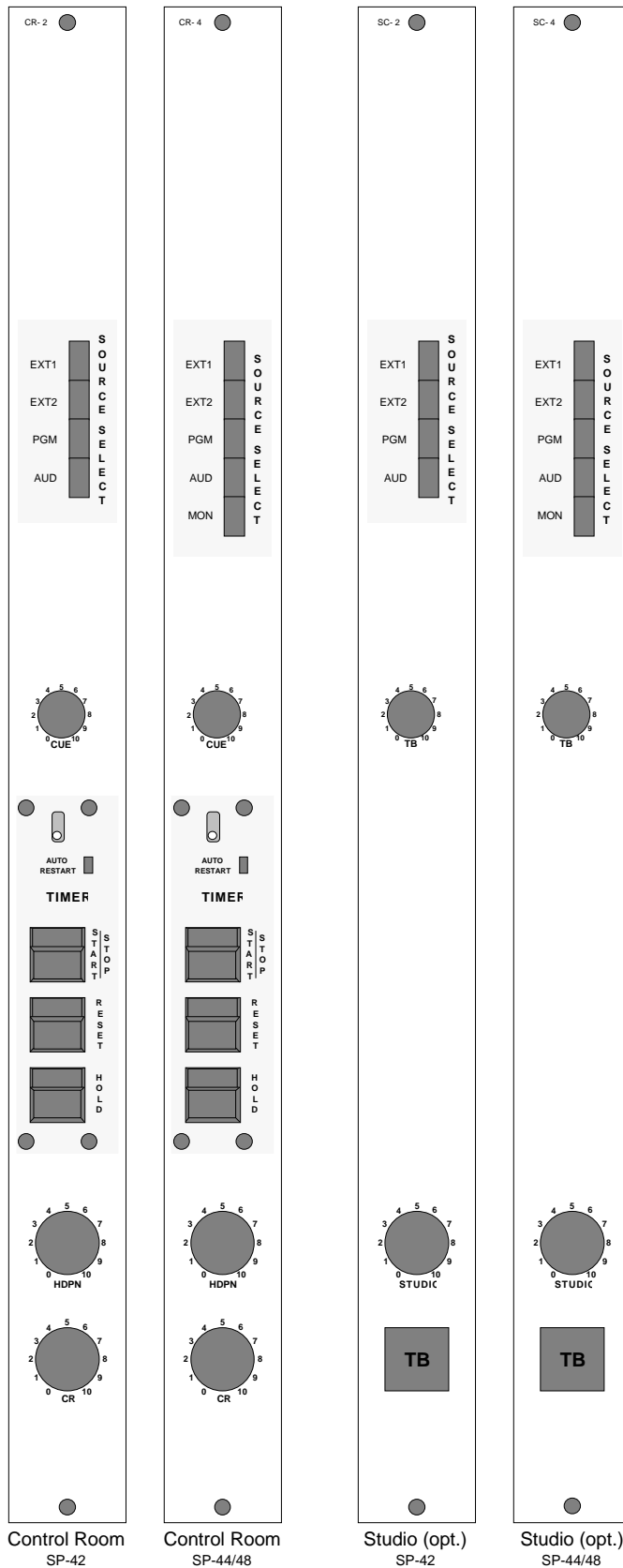
Monitor Modules – SP-40 Series Audio Consoles

LS-4	TR-4	SPN-4	ICM-4

SOURCE SELECT

>>

<<

PLAY

REC

STOP

>>

<<

PLAY

REC

STOP

EXT

TRIM MIC

MXM

AUD

ASSIGN PGM

RECORD READY

1

CUE CALLE 2

CALL ' CALL :

0
5
10
15
20
30
40
50
60
70
∞

ON

OFF

MIC

NULL

BUSY

PRIVAC'

INTERCOM

Stereo Selector	Tape Remote	Superphone	Intercom

Accessory Modules – SP-40 Series Audio Consoles
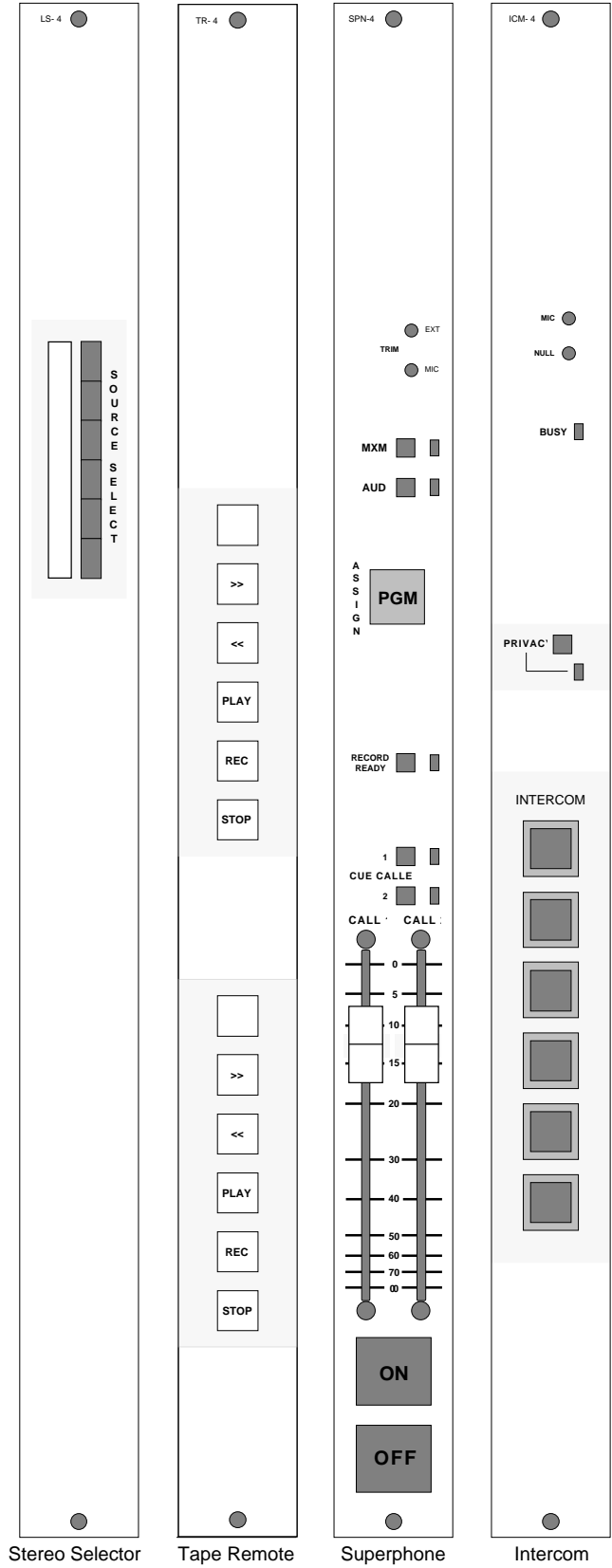
The following programmable functions are available: CUE may be programmed to interrupt HDPN or CR monitor; HDPN interrupt receives the CUE signal; CR interrupt provides a split feed, with PGM on left and CUE on the right (interrupts are dipswitch-selectable). This module also includes a control room mute circuit, which may be activated from an appropriately pre-programmed input channel, and also includes an on-air tally relay. This module also houses the optional timer control panel. Controls include timer START/STOP, RESET and HOLD buttons. An AUTO-RESTART enable switch links the timer to automatically restart from pre-programmed input channels.

OPTIONAL MODULES

Studio Module (SC–4)

The optional studio control module is provided with a source selector similar to the CR module, a conductive plastic studio level control (with electronically balanced output) and a talkback-to-studio circuit. The TB switch routes the announcer's mic to the studio output and also an external TB out port. The TB level control is used to preset the TB level to the studio independently of the studio level pot. This module also includes a studio mute circuit, which may be activated from an appropriately pre-programmed input channel. An on-air tally relay is included.

Stereo Line Selector (LS–4)

A source select switchbank with 6 stereo inputs and one stereo output. The output may be fed (via the module's standard DB-25 I/0 connectors) to any line input module, control room or studio module to increase its input source capacity.

Tape Remote Module (TR–4)

Available in two versions: Full Function (FF-2, with full control of two machines) and Start/Stop (SS-6, six pairs of start/stop buttons for control of six different machines). All buttons have LED indicators.

Superphone Module (SPN–4)

This module provides a new way of handling telephone segments: when a phone segment is desired, the announcer simply activates the module, and all mute, level and combining functions are handled automatically. It automatically selects the announcer's mic and mix-minus sources with a press of its ON button and allows conferencing between two callers (each on their own fader) and the station's microphones. Caller CUE switches provide a quick way to preview the callers, or even conduct the segment through the console's cue speaker. The PGM assign switch permits live talk-ins. An AUD input switch allows callers to receive any additional channels that have been assigned to the AUD bus. The MXM internal programming switches can be preset for your

normal talk segment, so the operator would hit the ON button and his mic and the MXM signals would be routed to the callers. It even has a balanced external input port—handy for remotes.

The module has logic circuitry linked to its ON/OFF switches that can start and stop an external tape machine, initiate record, activate cue, mute control room and studio, and restart the console timer—all from channel ON/OFF switches. It provides separate multitrack tape recorder feeds that route announcer mics and program material to track 1, a composite announcer and caller sum to track 2, and callers only to tracks 3 & 4. By splitting the mics from the callers, the operator can edit by using simple track punch-ins rather than razor edits.

Intercom Module (ICM–4)

This module is a major advance beyond the simple control room talkback button. The operator can communicate with the studio (as with traditional TB), but he can also talk with other studios and control rooms throughout the entire station complex. It is part of an integrated intercom system; a family of modules available for all Wheatstone radio consoles, plus a rackmount version for equipment room installation. It also interfaces with the Wheatstone TS-500 Talent Station.

When a call button is pressed, the anxnouncer mic is routed to any one of six destinations. The operator at the receiving end will hear the caller's voice through the cue speaker (unless, of course, he's on-the-air) and he can answer hands free to the initiating caller. A tally lamp at the receiving end illuminates to indicate which intercom station is initiating the call. The privacy button will mute the announcer's mic. Each module is self-powered from its host console, and a simple daisy chain interface is all that's required for installation.
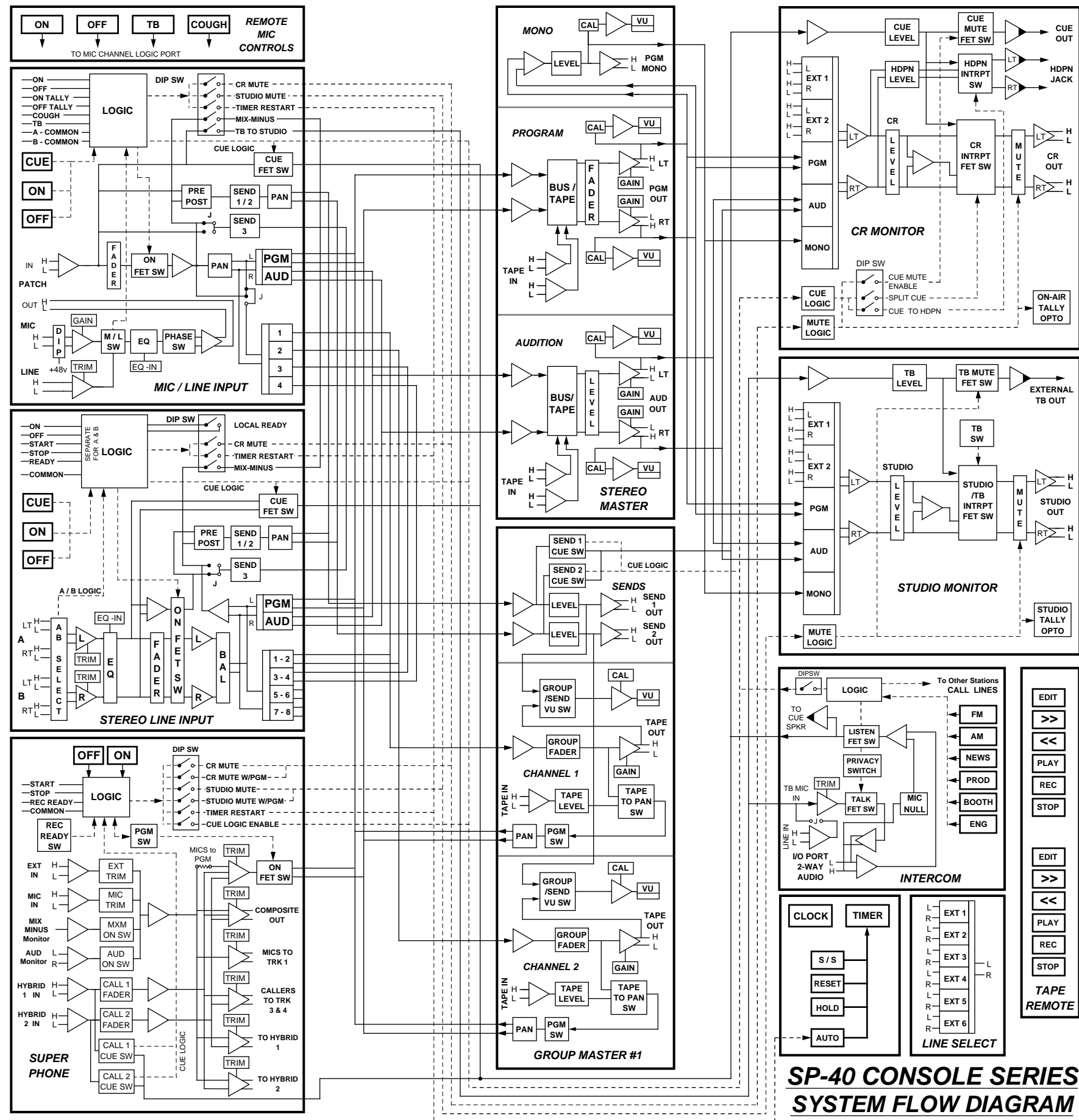
System Flow Diagram — SP-44 (48) Series Audio Console
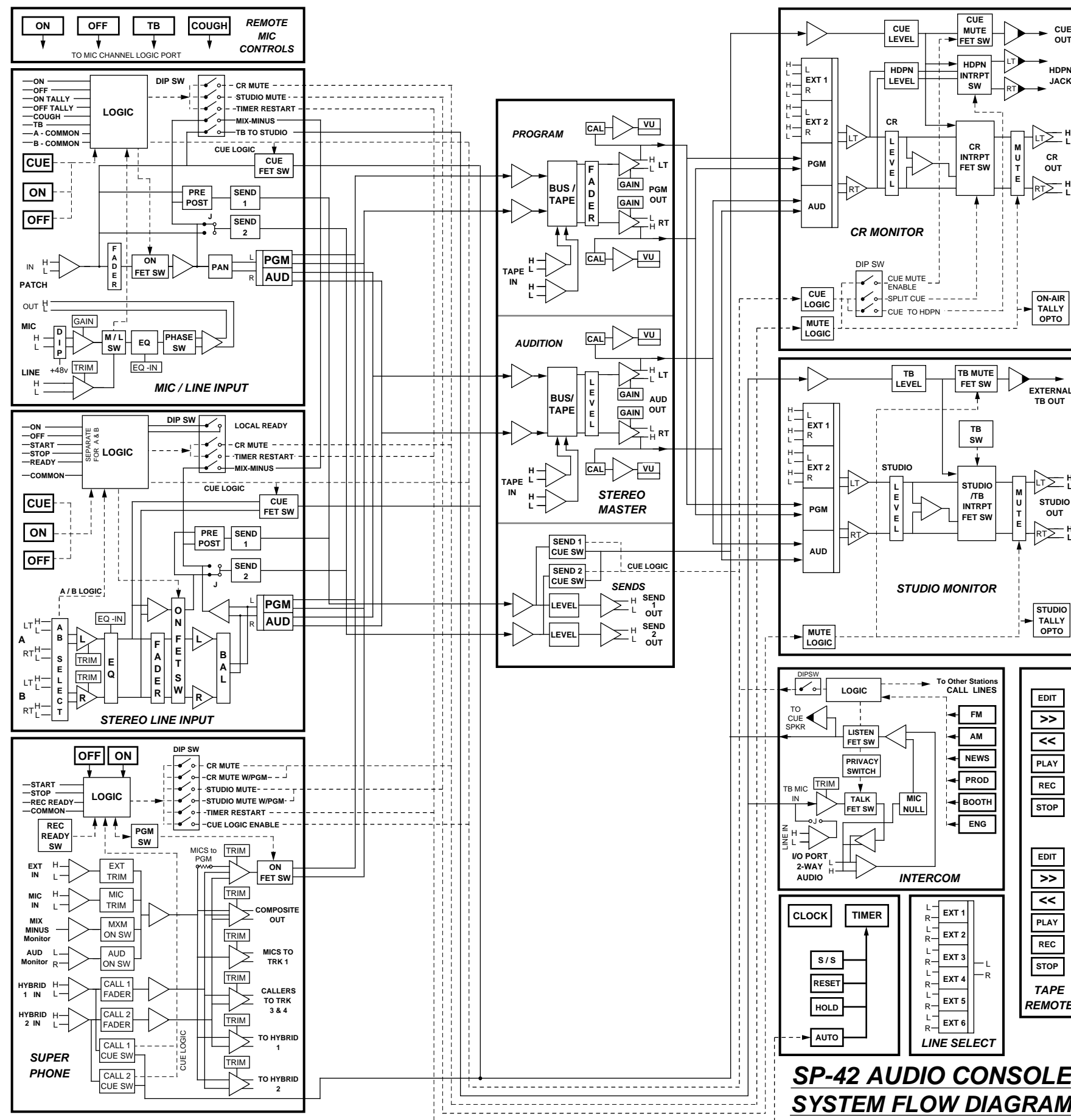
System Flow Diagram — SP-42 Audio Console

SP-40 SERIES CONSOLES — *Performance Specs*

Measured with mic/line input module unless marked "stereo line". All faders at nominal settings; gain is 0dB for line, 54dB for mic.

FREQ RESPONSE:
Line input   ±.1dB, 10Hz-20KHz
Mic input   ±.2dB, 10Hz-20KHz

THD + N: (+4dBu out)
Line input   <.004%, 20Hz-20KHz

SMPTE IMD:
.005% @+4dBu out

DIM:
.005% @+4dBu out

NOISE: (20Hz-20KHz BW)
Line better than 90dB below +4dBu
Mic EIN -128dB; -74dBu (150Ω source)

DYNAMIC RANGE:
Line -114dB

CROSSTALK:
-80dB @1KHz

OFF ISOLATION:
-80dB (10Hz-20KHz), -85dB @1KHz

SLEW RATE:
15V/μs

MAXIMUM GAIN: (input to group output)
Stereo Line +30dB
Line   +30dB
Mic   +72dB

GAIN TRIM RANGE:
Stereo Line -9dB to +18dB
Line   -8dB to +18dB
Mic   +10dB to +60dB

PHASE RESPONSE:
Line +3°/-14°, 20Hz-20KHz

SQUARE WAVE:
<1% overshoot; <1% ringing

INPUTS:
Stereo Line   +26dBu max (50KΩ bal)
Line   +26dBu max (50KΩ bal)
Mic   +10dBu max (150Ω source)

OUTPUT:
all outputs +29dBu max (electronically balanced)
except HDPN & CUE which have internal power amps

EQUALIZATION: (3 band peaking, ±16dB)
High: 10KHz/5KHz (switchable)
Mid: 8KHz-400Hz (sweepable)
Low: 100Hz/50Hz (switchable)

MIXING BUSES:
SP-48: 8 mono groups
            Stereo Program & Audition
            Program Mono Sum
            3 Auxiliary Sends
            1 Mix–Minus
            Cue
SP-44: 4 mono groups
            Stereo Program & Audition
            Program Mono Sum
            3 Auxiliary Sends
            1 Mix–Minus
            Cue
SP-42: Stereo Program & Audition
            2 Auxiliary Sends
            Cue

METERS:
SP-48: 13 total
  8 mono groups
  Stereo Program & Audition
  Program Mono Sum
  4 Auxiliary Sends (switched w/groups)
SP-44: 9 total
  4 mono groups
  Stereo Program & Audition
  Program Mono Sum
  4 Auxiliary Sends (switched w/groups)
SP-42: 4 total
  Stereo Program & Audition

FADERS: P&G 104mm conductive plastic

Specifications and features subject to change without notice.

Installation

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PLACING THE CONSOLE

SP-40 series consoles come shipped in two parts: a cardboard carton containing the rackmount power supply and its connecting cable, and a wooden crate containing the console itself. The wooden crate also contains a small package (the console connector kit: DB-25 I/O connector hoods and an AMP brand insulation displacement crimp tool). Begin the installation by unpacking and locating these items. Set the connector kit aside for later (its use is discussed in the next chapter).

SP-40 consoles are designed to be dropped into a countertop cut-out. The drawing and table below call out the various console dimensions and required cut-out sizes.

SP-40 SERIES CONSOLE MAINFRAME DIMENSIONS

MAINFRAME	CW	CUT–OUT
SP–48 (24 inputs)	55	20.5 x 53.2
SP–44 (24 inputs)	52	20.5 x 50.2
SP–44 (16 inputs)	38.4	20.5 x 36.6
SP–42 (12 inputs)	26.4	20.5 x 24.6
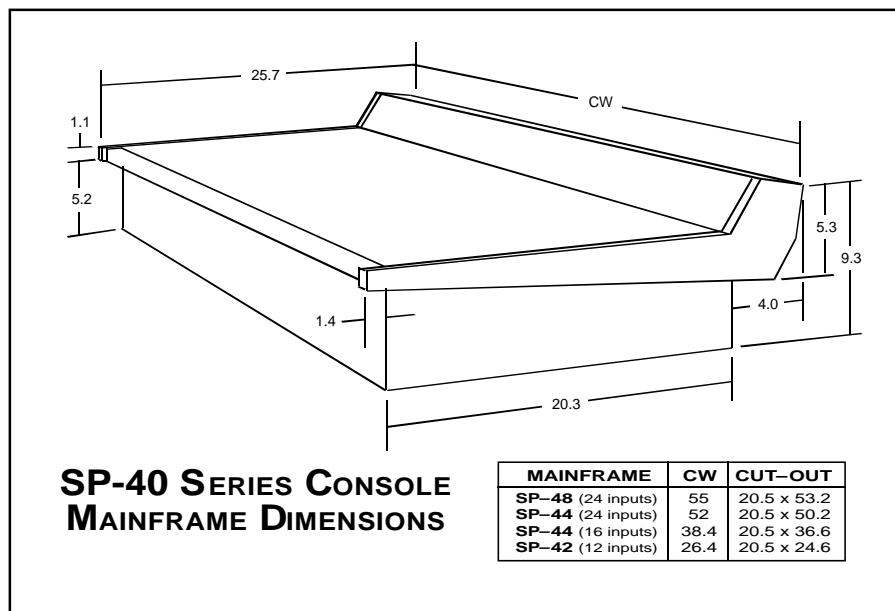
Bear in mind that final console placement should take into consideration avoiding proximity to any electromagnetic fields, such as large power transformers, motors, and flourescent lighting fixtures.

Make the required cut-out, and lower the unpacked console into place.

THE CONSOLE POWER SUPPLY

The console power supply is a standard 19" rackmount unit. It should be mounted in an adjacent equipment rack within 15 feet (but preferably no closer than 3 feet) of the console. The mounting location should allow proper air circulation around the unit. Avoid locating any high gain equipment (such as phono preamps, tape recorders, etc.) too near the power supply, to avoid magnetic interference into that equipment.

The power supply is fitted with a 3-wire grounded AC cord that should be plugged into a clean 120V AC outlet (that is, an AC source that feeds only the control room audio gear). This AC source should be a separate feed from those powering lighting, air-conditioning, or any other non-audio machinery. The third pin ground wire of the AC source should be tied to the central system ground point (see SYSTEM GROUND below).

The power feed recommended in the text is often installed and referred to in studios as an "isolated AC ground" outlet. It is usually orange in color.

With the power supply in place, plug in the AC power cord. Note the power supply uses a 3-amp slo-blo fuse (back of chassis). The five LED indicators on the supply's front panel should light up (PHANTOM, +V, –V, +5V, and +24V). Unplug the power supply and connect it to the console, using the supplied multi-conductor cable. Note the cable plugs into the back of the supply chassis and into the bottom of the console (righthand end). With the console connected, re-energize the power supply. The display indicators should again light; the console's VU meters should light up, and individual module ON/OFF switches and green CUE LEDs will power up randomly.

Dual Failsafe Supply

Your console may have been ordered with a dual failsafe option; in this case you will have two separate rackmount supplies with a single combiner panel that mounts between them. If this is the case, then connect both supplies to the combiner panel with the two short cables supplied, and connect the combiner panel to the console with the regular long cable. Note that both supplies must be energized for the failsafe function to work.

The first major installation step is to make sure the console is properly grounded. Once this is accomplished, audio and control connections (next chapter) may be made.

Unplug the power supply, and proceed with the next section, "System Ground".

SYSTEM GROUND

Safety requirements dictate that a positive connection from the console mainframe to electrical ground be made in the completed installation.

The system ground serves two important purposes:

(1) Provide a zero signal reference point for the entire audio system;
(2) Assure safety from electrical shock.

There exist two terms that one encounters in a discussion of ground:

(A) EARTH GROUND, which is usually a heavy copper rod driven into the soil adjacent to the building (around 6 feet down) or a connection to the copper water pipes leading into the building. Either is acceptable, unless, of course, the water pipe is plastic.

(B) THE POWER COMPANY EARTH CONDUCTOR that enters the building at the power line breaker box; this conductor should be (and is often by code) tied to the above-mentioned earth ground at one point. This point is the SYSTEM EARTH GROUND.

Tie the console mainframe ground to the system earth ground. Tie every piece of equipment in the entire audio system to the console mainframe ground.

TYPICAL SYSTEM GROUNDING SCHEM
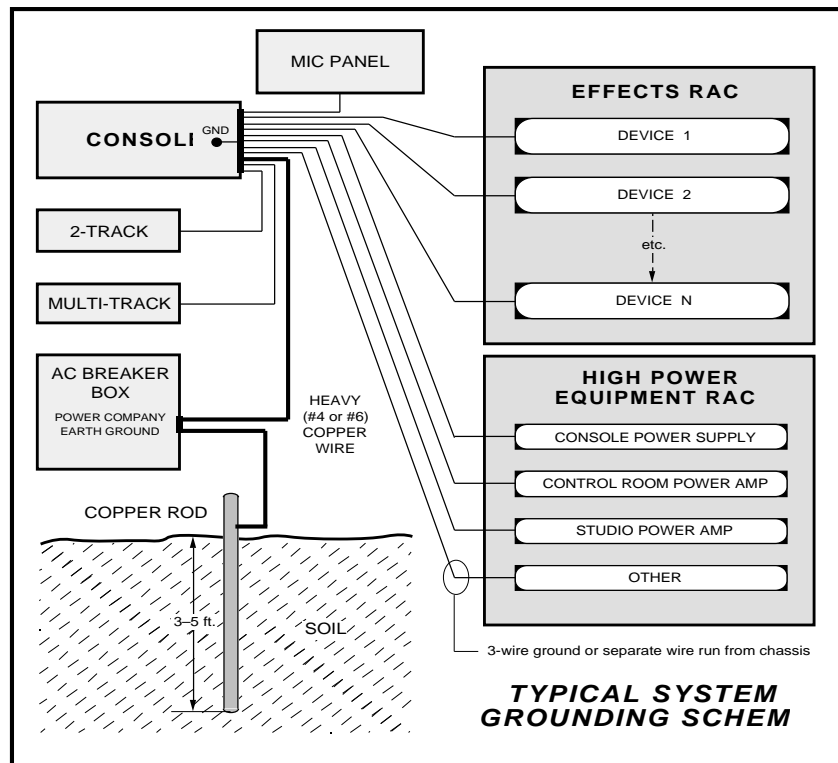
The grounding point on SP-40 consoles is a terminal lug strip located on the bottom of the mainframe, near the power connector. This is the central grounding point for the console mainframe. TIE THE CONSOLE MAINFRAME TO THE SYSTEM EARTH GROUND. TIE EVERY PIECE OF EQUIPMENT IN THE ENTIRE AUDIO SYSTEM TO THE CONSOLE MAINFRAME GROUND. If the system earth ground point is inaccessible, tie the console ground mainframe ground to the power company earth conductor at the main breaker box.

The aforementioned "isolated AC ground" (orange studio outlet; see page 2-2) can also be used to accomplish the required grounding.

Each piece of equipment should be connected by its own ground wire (usually the round third pin on the AC cord). This means that every AC outlet must have a separate conductor run to the console ground lug terminal; the outlets cannot be daisy-chained as is normally encountered in commercial and residential AC systems. Any equipment not supplied with 3-wire AC cables must have individual ground wires (16 gauge or larger) connected to their chassis grounds and then run to the console mainframe ground.

Further Grounding Details

Check all equipment to be absolutely certain that each unit is power transformer isolated from the AC mains to prevent safety hazards.

It is assumed that in each piece of audio equipment the audio ground and the chassis are tied together at some point. Any piece of equipment lacking a grounded chassis is likely to be prone to interference problems.

Locate all unbalanced audio equipment in the same rack if possible, to minimize chassis ground potential differences. It may also be helpful to insulate each piece of unbalanced equipment from its mounting rails in the rack by means of nylon 10-32 screws and insulating washers between rails and faceplates.

Once the system is properly grounded, you may proceed with the audio and control input/output connections (next chapter).

Console I/O Connections

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GENERAL

All audio and control I/O connections to SP-40 series consoles are made through DB-25 multipin connectors located on the bottom of the console mainframe. All input and group module mainframe positions have one DB-25 I/O connector each; output and control room monitor modules, as well as all accessory module positions, have two each.

The Insulation Displacement Connector System

The I/O wiring interface system is based on insulation displacement technology. A special AMP wiring tool is included with each console; it is auto-indexing, and allows individual wire connections to be positively made with a single squeeze of the tool's trigger. The trigger action is ratchet controlled, and will not release until a full connection is made. Once released, the DB-25 connector held in the tool's jaw automatically indexes to the next connector pin. The technology is such that no stripping, soldering or tinning of wire ends is required; all that is needed is for the twenty-five wires destined for the connector be snub cut and laid out in order (although tubing should be used on bare drain wires).An empty DB-25 connector is
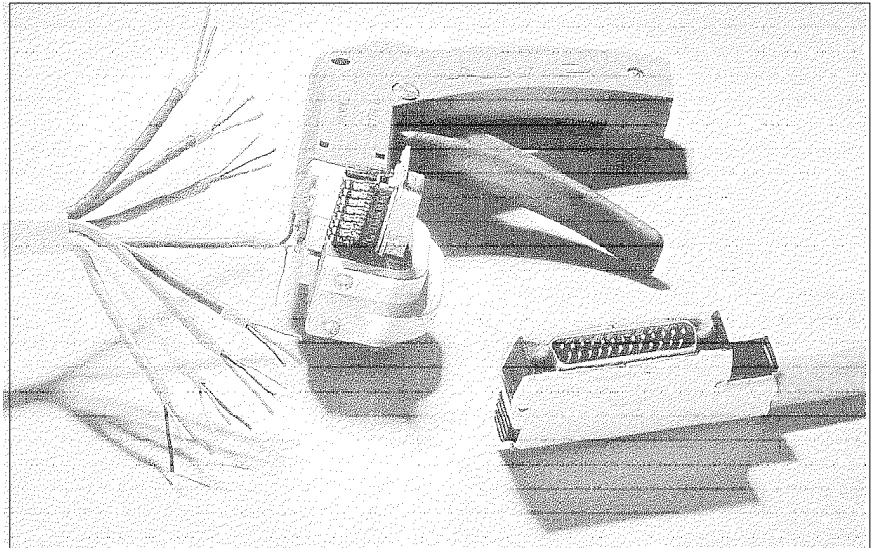
The AMP tool insulation displacement connector system. Note the right angle hood with self-locking tabs. The tool, DB-25 connectors (with gold plated pins) and latching hoods are supplied with each console.

inserted into the tool, indexed to the first pin, and the wires are inserted one by one into the jaw and the trigger squeezed.In this way a single multipin connector can be completely wired up in a minute or two.

In the event of a wiring error, connector pins may easily be removed from the shell with the wire still attached, and inserted into the correct position. Observe the side of the connector, with the metal part down.You'll see a row of "Vees"—simply

press the top of the vee together with a scribe or other sharp instrument; this will unlock the pin from the shell, and it can be removed and inserted into the correct position. Spread the vee apart to lock the pin in the new position. It should never be necessary to discard a connector due to a wiring error.

Note that mating right angle hoods for each connector are also supplied with the console. These have locking tabs that hold the connectors securely to the bottom of the console mainframe.

Factory Programming

As supplied from the factory, the console requires no logic connections to function. Therefore an orderly installation begins with the audio wiring. Once proper audio operation is verified (i.e., no ground loops),proceed with the control wiring.

Refer to the Module I/O Pinout text to connect the console to your equipment. Recommended setup is to have all microphone inputs connected to the first channels (mono mic/line type), with the remaining input channels used as stereo line inputs. It is good practice to group input types together. For example, if you have three cart machines, connect them to the inputs of three successive stereo line modules.

Stereo line inputs are factory programmed to restart the console's digital timer whenever a channel ON switch is pressed. This feature may be deactivated if desired (see "stereo line module dipswitch controlled functions", page 3-8)

Consoles are normally supplied with all mic channels pre-programmed to mute the control room speakers, so **you won't hear anything from the control room speakers or CUE if any mic channels are turned ON**. This mute function can be re-programmed (see "mono mic/line module dipswitch controlled functions", page 3-6).

Note the console's microphone inputs are provided with insert points for external processing. If you do not wish to use these patch points, it will be necessary to bridge them at the appropriate connector(s) before signal will pass. See "mono mic/line module audio connections" for details (page 3-5).

Balanced vs Unbalanced I/O Connections

Probably the most-asked questions about installing a console have to do with connecting unbalanced equipment at the inputs and outputs. By now everyone knows (or should know) that balanced inputs and outputs are highly desirable - they have an intrinsic ability to reject hum, noise, crosstalk, and RF, even if the shielding and grounding leave something to be desired. Telephone companies routinely pack hundreds of balanced lines into one cable, with no shielding, next to AC power lines and street lights, and if good balance is maintained, the individual circuits are completely free of noise and crosstalk.
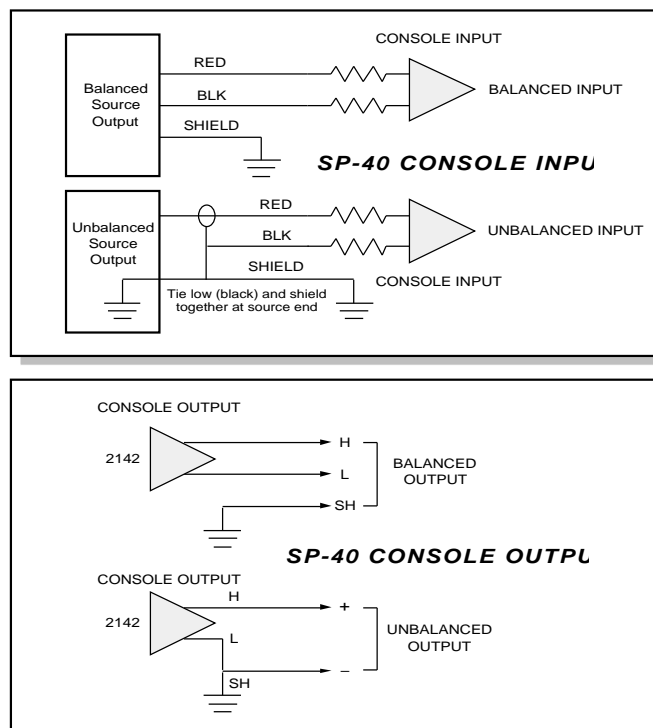
Not all equipment used in stations is balanced, however, and the most cost-effective devices often don't have +4 dBu output levels, either. Because of these realities, all Audioarts consoles are designed to accept balanced or unbalanced sources with levels as low as -10 dBu.

Connecting unbalanced inputs is simple - wire to the console with typical shielded two conductor cable (like Belden 9451), just as if you were connecting a balanced source. At the unbalanced machine's output, connect the black wire (LOW) to the shield. This "pseudo-balanced" connection has proven to be the simplest and most trouble-free way to go. Another plus is that the wiring need not be changed out if a balanced output machine is subsequently installed in that position. If the machine has a -10 dBu output, don't hesitate to turn your input trimmers as high as is needed.

SP-40 consoles use a new type of balanced output circuit, which behaves exactly like the secondary of a high-quality transformer, with no center tap - this output is both balanced and floating. Either the HIGH or LOW side of the output should be strapped to ground, with the output taken from the other side.(Normally you'd strap LOW to ground, and take HIGH to feed your unbalanced equipment.)

The ability to use output HIGH or LOW permits an easy phase reversal of the console's output signals, should this be desired.

This type of self-compensating active-balanced output has been tried before, but it required costly hand-matching of resistors to maintain stability and low distortion. The 2142 balanced line driver IC uses laser-trimming of the on-chip resistors, under computer control, to achieve the desired results at a realistic price. A major advantage over the discrete component designs is the ability to replace the IC without the need for hand-picking resistors to restore the performance of the circuit. If lightning ever strikes in your neighborhood, you know that nothing is totally immune to a close hit. It's comforting to know that you can simply unplug the left or right Program output stage, and swap in another (let's say, for example, from an Audition output or a group module Send output), and be back up and running in minutes.

MONO MIC/LINE INPUT MODULE (ML-4)

Mono Mic/Line Audio Connections (Upper DB-25 Connector)

Pin 25 - MIC INPUT, SHIELD
Pin 12 - MIC INPUT, LOW
Pin 24 - MIC INPUT, HIGH
Pin 11 - LINE INPUT, SHIELD
Pin 23 - LINE INPUT, LOW
Pin 10 - LINE INPUT, HIGH
Pin 22 - PATCH INSERT OUT, SHIELD
Pin 9 - PATCH INSERT OUT, LOW
Pin 21 - PATCH INSERT OUT, HIGH
Pin 8 - PATCH INSERT IN, SHIELD
Pin 20 - PATCH INSERT IN, LOW
Pin 7 - PATCH INSERT IN, HIGH

If you do not intend to use the electronically balanced insert patch loop, bridge pin 21 to pin 7 and pin 9 to pin 20 to preserve the signal path gain structure.

Pin 19 - AUDIO COMMON
Pin 6 - AUDIO COMMON
Pin 13 - AUDIO COMMON

Typical DB-25 I/O connector.

Mono Mic/Line Module Control Ports

The following control functions, listed by pin number, are available at the DB-25 I/O connector of each mono mic/line input module:

PIN 16: **ON** - When user-supplied circuitry provides a closure to DIGITAL COMMON (Pin 18; see below) this port turns the module ON.

PIN 3: **OFF** - When user-supplied circuitry provides a closure to DIGITAL COMMON (Pin 18; see below) this port turns the module OFF.

PIN 1: **COUGH** - When user-supplied circuitry provides a momentary closure to DIGITAL COMMON (Pin 18; see below) this port turns the module OFF for as long as the closure is maintained.

PIN 14: **TALKBACK** - When user-supplied circuitry provides a momentary closure to DIGITAL COMMON (Pin 18; see below) this port sends the module's signal to the console's cue/talkback bus for as long as the closure is maintained.

PIN 18: **DIGITAL COMMON** - Used for remote ON, OFF, COUGH and TALKBACK functions (see preceding).

NOTE: You can program the above remote functions to follow the module's MIC/LINE switch if desired; instead of providing a closure to Pin 18 (DIGITAL COMMON), make a closure to either Pin 17 (MIC LOGIC COMMON) or Pin 4 (LINE LOGIC COMMON).

PIN 17: **MIC LOGIC COMMON** - Used for remote ON, OFF, COUGH and TALKBACK functions (see preceding).

PIN 4: **LINE LOGIC COMMON** - Used for remote ON, OFF, COUGH and TALKBACK functions (see preceding).

PIN 15: **ON LAMP TALLY** - This logic control pin provides sink for an external tally lamp by going "low" when the module is ON. See mono mic/line input module schematic (page 5-3) for details.

PIN 2: **OFF LAMP TALLY** - This logic control pin provides sink for an external tally lamp by going "low" when the module is OFF. See mono mic/line input module schematic (page 5-3) for details.

PIN 5: **+5V DIG** - Used for ON and OFF TALLY functions (see preceding).

Mono MicLine Module Dipswitch Controlled Functions

There are two 4-position dipswitches on the printed circuit board of each mono mic/line input module. They may be user-programmed to provide the following functions:

Programmable Dipswitch "SW14"

Position 1: PRE FADER - When activated, takes the module's SEND 3 signal tap before the channel fader. Follows channel ON/OFF.

Position 2: POST FADER - When activated, takes the module's SEND 3 signal tap after the channel fader. Follows channel ON/OFF.

NOTE: Positions 1 and 2 are mutually exclusive; that is, activate one or the other, but not both.

Position 3: MIX-MINUS - When activated, sends the module's signal to the console's mix-minus bus. (The mix-minus signal tap is factory-programmed post fader.)

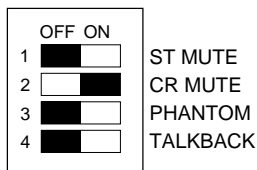Position 4: RESTART - When activated, automatically sets the console's digital timer to zero and starts a count whenever the module's ON switch is pressed.

Programmable Dipswitch "SW15"

Position 1: ST MUTE - When activated, automatically mutes talkback out and the console's studio output whenever that input module is turned ON *and* MIC is selected as the input source. This is used to prevent feedback from the studio announcer's mic. Note the studio tally relay is also activated.

Position 2: CR MUTE - When activated, automatically mutes the console's control room and cue speaker output whenever that input module is turned ON *and* MIC is selected as the input source. This is to prevent feedback from the CR announcer's mic. Also mutes CUE and activates the control room monitor module's TALLY relay, which may be used to control a user powered "On-Air" light.

Position 3: PHANTOM PWR - When activated, sends +48V phantom power to the microphone input pins.

Position 4: TALKBACK TO STUDIO - When activated, sends the module's signal to the console's talkback bus. When the console's TALKBACK button (on the optional studio monitor module) is pushed, the signal is routed to the console's talkback output and the studio speakers are interrupted. Note the talkback feed is taken pre-fader, pre-ON/OFF, so it is not necessary for the module to be ON in order to talk back to the studio.

Once the dipswitch settings have been made, check that each ML-4 input module dipswitch is correctly programmed before continuing.

Mix-minus assign is available only on SP-44 and SP-48 consoles. SP-42 consoles do not have a mix-minus ACN bus.

View of typical MLE-4 PCB mounted 4-position dipswitch. In this case position 2 has been activated. Assuming this is dipswitch #15, the module is now programmed to automatically mute control room whenever it is turned ON.

OFF	ON		
1	■		ST MUTE
2		■	CR MUTE
3	■		PHANTOM
4	■		TALKBACK

Note that a position is ON when the righthand side of the rocker switch is pressed DOWN; a position is OFF when the lefthand side is DOWN.

STEREO LINE INPUT MODULE (SL-4)

Stereo Line Module Audio Connections (Upper DB-25 Connector)

Pin 25 - LINE A INPUT LEFT, SHIELD
Pin 12 - LINE A INPUT LEFT, LOW
Pin 24 - LINE A INPUT LEFT, HIGH
Pin 11 - LINE A INPUT RIGHT, SHIELD
Pin 23 - LINE A INPUT RIGHT, LOW
Pin 10 - LINE A INPUT RIGHT, HIGH
Pin 22 - LINE B INPUT LEFT, SHIELD
Pin 9 - LINE B INPUT LEFT, LOW
Pin 21 - LINE B INPUT LEFT, HIGH
Pin 8 - LINE B INPUT RIGHT, SHIELD
Pin 20 - LINE B INPUT RIGHT, LOW
Pin 7 - LINE B INPUT RIGHT, HIGH
Pin 13 - AUDIO COMMON

Stereo Line Module Control Ports

The following control functions, listed by pin number, are available at the DB-25 I/O connector of each stereo line input module:

PIN 16: **"A" ON** - When user-supplied circuitry provides a closure to DIGITAL COMMON (Pin 1; see below) this port turns the module ON.

PIN 3: **"A" OFF** - When user-supplied circuitry provides a closure to DIGITAL COMMON (Pin 1; see below) this port turns the module OFF.

PIN 19: **"B" ON** - When user-supplied circuitry provides a closure to DIGITAL COMMON (Pin 1; see below) this port turns the module ON.

PIN 6: **"B" OFF** - When user-supplied circuitry provides a closure to DIGITAL COMMON (Pin 1; see below) this port turns the module OFF.

PIN 1: **DIGITAL COMMON** - Used for remote ON and OFF functions (see preceding).

PIN 15: **"A" START** - Provides a closure via the LOGIC COMMON pin (see below) when the module's ON switch is pressed. Used to start remote source machines (cart and tape machines, CD players, etc.).

PIN 2: **"A" STOP** - Provides a closure via the LOGIC COMMON pin (see below) when the module's OFF switch is pressed. Used to stop remote source machines (cart and tape machines, CD players, etc.).

PIN 18: **"B" START** - Provides a closure via the LOGIC COMMON pin (see below) when the module's ON switch is pressed. Used to start remote source machines (cart and tape machines, CD players, etc.).
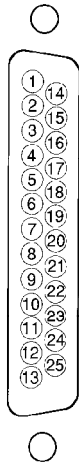
PIN 5: **"B" STOP** - Provides a closure via the LOGIC COMMON pin (see below) when the module's OFF switch is pressed. Used to stop remote source machines (cart and tape machines, CD players, etc.).

PIN 4: **LOGIC COMMON**
External START and STOP functions will follow the module's A/B source selector switch when provided with a closure to this pin.

PIN 14: **READY "A"**- Used to light the indicator lamp in the module's OFF button with an external source machine. The switch lamp then functions as a tally for the machine. The machine's READY (or tally) lines must also be hooked up to DIGITAL COMMON (Pin 1) to complete the lamp circuit.

PIN 17: **READY "B"**- Used to light the indicator lamp in the module's OFF button with an external source machine. The switch lamp then functions as a tally for the machine. The machine's READY (or tally) lines must also be hooked up to DIGITAL COMMON (Pin 1) to complete the lamp circuit.

NOTE: There is a PCB mounted dipswitch ("SW15") on stereo line modules with a LOCAL READY programming position on it. When the position (#1 on the switch) is activated the module's OFF SW indicator lamp will light whenever the module is turned OFF. If the dipswitch position is de-activated, then the lamp will light only from an external machine.

Stereo Line Module Dipswitch Controlled Functions

There are two 4-position dipswitches on the printed circuit board of each stereo line input module. They may be user-programmed to provide the following functions:

Programmable Dipswitch "SW14"

Position 1: PRE FADER - When activated, takes the module's SEND 3 signal tap before the channel fader. Follows channel ON/OFF.

Position 2: POST FADER - When activated, takes the module's SEND 3 signal tap after the channel fader. Follows channel ON/OFF.

NOTE: Positions 1 and 2 are mutually exclusive; that is, activate one or the other, but not both.

Position 3: MIX-MINUS - When activated, sends a summed (L+R) version of the module's signal to the console's mix-minus bus. (The mix-minus signal tap is factory-programmed post fader.)

Position 4 is not used.

Programmable Dipswitch "SW15"

Position 1: LOCAL READY - When activated the module's OFF SW indicator lamp will light whenever the module is turned OFF. If the dipswitch position is de-activated, then the OFF SW lamp will light only from an external machine. See Pin 14 ("Ready") above.

Position 2: CUE DROPOUT - When activated, causes the module's CUE function to be dis-engaged whenever the module's ON SW is pressed.

Position 3: RESTART - When activated, automatically sets the console's digital timer to zero and starts a count whenever the module's ON switch is pressed.

Position 4: CR MUTE - When activated, causes the console's control room output to be muted whenever the module is ON. The console cue speaker is also muted (though this may be bypassed; see dipswitch 8, position 4, on control room monitor module schematic, page 5-10), and the console tally opto relay is activated.

Mix-minus assign is available only on SP-44 and SP-48 consoles. SP-42 consoles do not have a mix-minus ACN bus.

View of typical PCB mounted 4-position dipswitch. Note that a position is ON when the righthand side of the rocker switch is pressed DOWN; a position is OFF when the left-hand side is DOWN.

GROUP MODULE (GP-4)

SP-40 series group module complements vary according to console model number. SP-42 consoles have no group modules at all. SP-44 consoles have two group modules; each module houses circuitry for two subgroup channels. SP-48 consoles have four group modules for a total of eight subgroup channels. Thus the pinouts that follow will vary according to which group module you are connecting to. On an SP-44 console I/O pin #15 will be "group 1 output high" for the first group module and "group 3 output high" for the second group module. Likewise Sends 1 and 2 on the first group module become send 3 and mix-minus on the second module. Note that on SP-48 consoles the last two group modules do not have send or mix-minus outputs at all. The pins associated with these outputs would be "no connection".

Group Module Audio Connections (Upper DB-25 Connector)
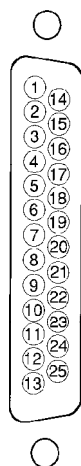
Pin 25 - TAPE 1 INPUT, SHIELD
Pin 12 - TAPE 1 INPUT, LOW
Pin 24 - TAPE 1 INPUT, HIGH
Pin 11 - TAPE 2 INPUT, SHIELD
Pin 23 - TAPE 2 INPUT, LOW
Pin 10 - TAPE 2 INPUT, HIGH
Pin 16 - GROUP 1(3/5/7) OUT, SHIELD
Pin 3 - GROUP 1(3/5/7) OUT, LOW
Pin 15 - GROUP 1(3/5/7) OUT, HIGH
Pin 2 - GROUP 2(4/6/8) OUT, SHIELD
Pin 14 - GROUP 2(4/6/8) OUT, LOW
Pin 1 - GROUP 2(4/6/8) OUT, HIGH
Pin 19 - SEND 1(3) OUT, SHIELD
Pin 6 - SEND 1(3) OUT, LOW
Pin 18 - SEND 1(3) OUT, HIGH
Pin 5 - SEND 2(MIX-MINUS) OUT, SHIELD
Pin 17 - SEND 2(MIX-MINUS) OUT, LOW
Pin 4 - SEND 2(MIX-MINUS) OUT, HIGH
Pins 8,22 - AUDIO COMMON
Pins 7,9,20,21 - NO CONNECTION

MASTER OUTPUT MODULE (SM-4 or SM-2)

SP-40 series output modules have **two** DB-25 I/O connectors: Upper ("U-DB"; for inputs) and Lower ("L-DB"; for outputs).

Master Output Module Audio Connections

Inputs; Upper DB-25 Connector
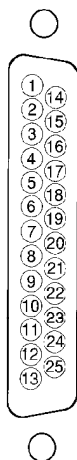
    Pin 25 - TAPE 1 INPUT LT, SHIELD
    Pin 12 - TAPE 1 INPUT LT, LOW
    Pin 24 - TAPE 1 INPUT LT, HIGH
    Pin 11 - TAPE 1 INPUT RT, SHIELD
    Pin 23 - TAPE 1 INPUT RT, LOW
    Pin 10 - TAPE 1 INPUT RT, HIGH
    Pin 22 - TAPE 2 INPUT LT, SHIELD
    Pin 9 - TAPE 2 INPUT LT, LOW
    Pin 21 - TAPE 2 INPUT LT, HIGH
    Pin 8 - TAPE 2 INPUT RT, SHIELD
    Pin 20 - TAPE 2 INPUT RT, LOW
    Pin 7 - TAPE 2 INPUT RT, HIGH
    Pins 2,5,16,19 - AUDIO COMMON
    Pins 1,3,4,6,8,14,15,17,18 - NO CONNECTION

Master Output Module Audio Connections

Outputs; Lower DB-25 Connector
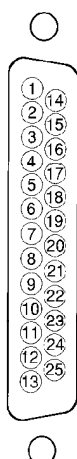
    Pin 25 - PROGRAM OUT LT, SHIELD
    Pin 12 - PROGRAM OUT LT, LOW
    Pin 24 - PROGRAM OUT LT, HIGH
    Pin 11 - PROGRAM OUT RT, SHIELD
    Pin 23 - PROGRAM OUT RT, LOW
    Pin 10 - PROGRAM OUT RT, HIGH
    Pin 22 - AUDITION OUT LT, SHIELD
    Pin 9 - AUDITION OUT LT, LOW
    Pin 21 - AUDITION OUT LT, HIGH
    Pin 8 - AUDITION OUT RT, SHIELD
    Pin 20 - AUDITION OUT RT, LOW
    Pin 7 - AUDITION OUT RT, HIGH
    Pin 19 - SEND 1 OUT, SHIELD*
    Pin 6 - SEND 1 OUT, LOW*
    Pin 18 - SEND 1 OUT, HIGH*
    Pin 5 - PROGRAM MONO (SEND 2*) OUT, SHIELD
    Pin 17 - PROGRAM MONO (SEND 2*) OUT, LOW
    Pin 4 - PROGRAM MONO (SEND 2*) OUT, HIGH
    Pins 2,16 - AUDIO COMMON
    Pins 1,3,14,15 - NO CONNECTION

        *SP-42 consoles only

CONTROL ROOM MONITOR MODULE (CR-4)

Control Room Module Audio Connections

Lower DB-25 Connector

Pin 25 - EXTERNAL LINE 1 IN LEFT, SHIELD
Pin 12 - EXTERNAL LINE 1 IN LEFT, LOW
Pin 24 - EXTERNAL LINE 1 IN LEFT, HIGH
Pin 11 - EXTERNAL LINE 1 IN RIGHT, SHIELD
Pin 23 - EXTERNAL LINE 1 IN RIGHT, LOW
Pin 10 - EXTERNAL LINE 1 IN RIGHT, HIGH
Pin 22- EXTERNAL LINE 2 IN LEFT, SHIELD
Pin 9 - EXTERNAL LINE 2 IN LEFT, LOW
Pin 21 - EXTERNAL LINE 2 IN LEFT, HIGH
Pin 8- EXTERNAL LINE 2 IN RIGHT, SHIELD
Pin 20 - EXTERNAL LINE 2 IN RIGHT, LOW
Pin 7 - EXTERNAL LINE 2 IN RIGHT, HIGH
Pin 19 - CR OUTPUT LEFT, SHIELD
Pin 6 - CR OUTPUT LEFT, LOW
Pin 18 - CR OUTPUT LEFT, HIGH
Pin 5 - CR OUTPUT RIGHT, SHIELD
Pin 17 - CR OUTPUT RIGHT, LOW
Pin 4 - CR OUTPUT RIGHT, HIGH
   Control Room Output is electronically balanced, low source
   impedance; load impedance is 600   or greater.
Pin 16 - CUE OUTPUT, SHIELD
Pin 3 - CUE OUTPUT, LOW
Pin 15 - CUE OUTPUT, HIGH
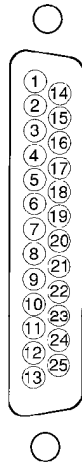
Control Room Module Auxiliary Ports

Lower DB-25 Connector

Pin 1 - ON-AIR TALLY opto collector
Pin 14 - ON-AIR TALLY opto emitter
   The On-Air Tally opto is activated by input module ON switches that have been programmed to Mute CR (page 3-6).
Pin 2 - N/C

Control Room Module Dipswitch Controlled Functions

There is a PCB-mounted 4-position dipswitch on the printed circuit board of the control room monitor module. It may be user-programmed to provide three special functions:

Control Room Module Programmable Dipswitch "SW8"

Position 1: SPLIT CUE - When activated, causes CUE mode to interrupt the console's regular control room output. How the signal is interrupted depends on four programming jumpers ("J1 thru J4") on the CR PCB. These jumpers allow a summed (L+R) version of the regular program (determined by the SOURCE SELECT switchbank on the module) to be sent to one side of the CR monitor stereo output, while CUE is sent to the other. See control room monitor module schematic (page 5-10) for exact details. NOTE that consoles are normally programmed at the factory for CUE to appear on the right channel, while L+R source select sum appears on the left.

Position 2: HDPN - When activated, causes CUE mode to interrupt the console's headphone output. The headphone signal (which follows the CR module source select switchbank) is replaced by CUE in both left and right channels. OPERATIONAL NOTE: the headphone level control is bypassed, and the CUE level is determined by the setting of the CUE master control level pot.

Position 3: unused

Position 4: CUE MUTE ENABLE - When activated, CR mute logic (see page 3-6) will mute the console's Cue signal.
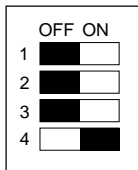
View of typical PCB mounted 4-position dipswitch. Note that a position is ON when the righthand side of the rocker switch is pressed DOWN; a position is OFF when the left-hand side is DOWN.

OPTIONAL STUDIO MONITOR MODULE (SC-4)

Studio Module Audio Connections (Lower DB-25 Connector)

Pin 25 - EXTERNAL LINE 1 IN LEFT, SHIELD
Pin 12 - EXTERNAL LINE 1 IN LEFT, LOW
Pin 24 - EXTERNAL LINE 1 IN LEFT, HIGH
Pin 11 - EXTERNAL LINE 1 IN RIGHT, SHIELD
Pin 23 - EXTERNAL LINE 1 IN RIGHT, LOW
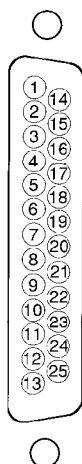Pin 10 - EXTERNAL LINE 1 IN RIGHT, HIGH
Pin 22- EXTERNAL LINE 2 IN LEFT, SHIELD
Pin 9 - EXTERNAL LINE 2 IN LEFT, LOW
Pin 21 - EXTERNAL LINE 2 IN LEFT, HIGH
Pin 8- EXTERNAL LINE 2 IN RIGHT, SHIELD
Pin 20 - EXTERNAL LINE 2 IN RIGHT, LOW
Pin 7 - EXTERNAL LINE 2 IN RIGHT, HIGH
Pin 19 - STUDIO OUTPUT LEFT, SHIELD
Pin 6 - STUDIO OUTPUT LEFT, LOW
Pin 18 - STUDIO OUTPUT LEFT, HIGH
Pin 5 - STUDIO OUTPUT RIGHT, SHIELD
Pin 17 - STUDIO OUTPUT RIGHT, LOW
Pin 4 - STUDIO OUTPUT RIGHT, HIGH
   Studio Output is electronically balanced, low source impedance;
   load impedance is 600   or greater.
Pin 16 - TB OUTPUT, SHIELD
Pin 3 - TB OUTPUT, LOW
Pin 15 - TB OUTPUT, HIGH

Studio Module Auxiliary Ports (Lower DB-25 Connector)

Pin 1 - ON-AIR TALLY 2 opto collector
Pin 14 - ON-AIR TALLY 2 opto emitter
   The On-Air Tally 2 opto is activated by mono mic/line input
   module ON switches that have been programmed to Mute
   Studio. See page 3-6.
Pin 2 - N/C

Studio Module Programmable Talkback Interrupt Jumpers

When the module's TALKBACK switch is pressed, the TB signal interrupts the console's regular studio monitor output. How the signal is interrupted depends on four programming jumpers ("J1 thru J4") on the module's PCB. These jumpers allow a summed (L+R) version of the regular program (determined by the SOURCE SELECT switchbank on the module) to be sent to one side of the studio monitor stereo output, while TB is sent to the other. See studio monitor module schematic (page 5-12) for exact details. NOTE that consoles are normally programmed at the factory for TB to appear on the right channel, while L+R source select sum appears on the left. NOTE that the TB interrupt signal level is determined by the TB level control, NOT the STUDIO level pot.

OPTIONAL SUPERPHONE MODULE (SPN-4)

Superphone Module Audio Connections
Upper DB-25 connector (inputs)
Ext input high is pin #24
Ext input low is pin #12
Ext input shield is pin #25
Mic input high is pin #10
Mic input low is pin #23
Mic input shield is pin #11
> The mic input is intended for medium level signals; such as those found at a mic input module insert point

Hybrid 1 input high is pin #21
Hybrid 1 input low is pin #9
Hybrid 1 shield is pin #22
Hybrid 2 high is pin #7
Hybrid 2 low is pin #20
Hybrid 2 shield is pin #8
Audio Common is on pins 19,5,16 and 2
Pins 18,6,4,17,15,3,1 and 14 are N/C

Lower DB-25 connector (outputs)
Composite output high is pin #24
Composite output low is pin #12
Composite output shield is pin #25
> The Composite Output is the sum of ALL inputs to the Superphone module. It may be connected directly to a recorder input if desired.

Mics to Track 1 output high is pin #10
Mics to Track 1 output low is pin #23
Mics to Track 1 output shield is pin #11
Caller Sum output high is pin #21
Caller Sum output low is pin #9
Caller Sum output shield is pin #22
Hybrid 1 output high is pin #7
Hybrid 1 output low is pin #20
Hybrid 1 output shield is pin #8
Hybrid 2 output high is pin #18
Hybrid 2 output low is pin #6
Hybrid 2 output shield is pin #19

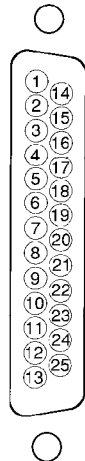## Superphone Module Control Connections
Lower DB-25 connector
The superphone module ON and OFF switches can be used to start and stop a remote tape recorder. A RECORD READY switch is also provided. DB-25 control pin numbers are as follows:
> Control logic COMMON is pins #4 and #17
> STOP is pins #3 and #16
> START (PLAY) is pins #2 and #15
> RECORD READY is pins #1 and #14
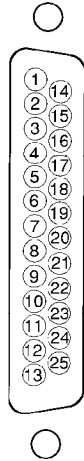
OPTIONAL ICM-4 INTERCOM MODULE
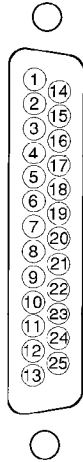
Intercom Module INPUT AUDIO connections
Upper DB-25 connector
Balanced line in/out high is pin #15
Balanced line in/out low is pin #3
Balanced line in/out shield is pin #16
Optional speaker output high is pin #1
Optional speaker output low is pin #14
Optional speaker output shield is pin #2

Intercom Module OUTPUT AUDIO connections
Lower DB-25 connector
Balanced line in/out high is pin #15
Balanced line in/out low is pin #3
Balanced line in/out shield is pin #16

Intercom Module CONTROL connections
Upper DB-25 connector
External digital + power feed is pin #10
External digital common is pin #23
Station call line 1 is pin #4
Station call line 2 is pin #17
Station call line 3 is pin #18
Station call line 4 is pin #6
Station call line 5 is pin #7
Station call line 6 is pin #20
External +V feed is pin #24
External -V feed is pin #12
Additional audio commons at pins #5, 8, 11, 19, 22 & 25

Intercom Module REDUNDANT CONTROL connections
Lower DB-25 connector
External digital + power feed is pin #10
External digital common is pin #23
Station call line 1 is pin #4
Station call line 2 is pin #17
Station call line 3 is pin #18
Station call line 4 is pin #6
Station call line 5 is pin #7
Station call line 6 is pin #20
External +V feed is pin #24
External -V feed is pin #12
Additional audio commons at pins #5, 8, 11, 19, 22 & 25

OPTIONAL STEREO LINE SELECT MODULE (LS-4)

Upper DB-25 Audio Connections

Pin 24 - LINE 1 IN LT high
Pin 12 - LINE 1 IN LT low
Pin 25 - LINE 1 IN LT shield
Pin 10 - LINE 1 IN RT high
Pin 23 - LINE 1 IN RT low
Pin 11 - LINE 1 IN RT shield
Pin 21 - LINE 2 IN LT high
Pin 9 - LINE 2 IN LT low
Pin 22 - LINE 2 IN LT shield
Pin 7 - LINE 2 IN RT high
Pin 20 - LINE 2 IN RT low
Pin 8 - LINE 2 IN RT shield
Pin 18 - LINE 3 IN LT high
Pin 6 - LINE 3 IN LT low
Pin 19 - LINE 3 IN LT shield
Pin 4 - LINE 3 IN RT high
Pin 17 - LINE 3 IN RT low
Pin 5 - LINE 3 IN RT shield
Pin 15 - LINE 4 IN LT high
Pin 3 - LINE 4 IN LT low
Pin 16 - LINE 4 IN LT shield
Pin 1 - LINE 4 IN RT high
Pin 14 - LINE 4 IN RT low
Pin 2 - LINE 4 IN RT shield

Lower DB-25 Audio Connections
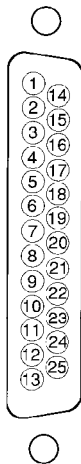
Pin 24 - LINE 5 IN LT high
Pin 12 - LINE 5 IN LT low
Pin 25 - LINE 5 IN LT shield
Pin 10 - LINE 5 IN RT high
Pin 23 - LINE 5 IN RT low
Pin 11 - LINE 5 IN RT shield
Pin 21 - LINE 6 IN LT high
Pin 9 - LINE 6 IN LT low
Pin 22 - LINE 6 IN LT shield
Pin 7 - LINE 6 IN RT high
Pin 20 - LINE 6 IN RT low
Pin 8 - LINE 6 IN RT shield
Pin 15 - OUTPUT LT high
Pin 3 - OUTPUT LT low
Pin 16 - OUTPUT LT shield
Pin 1 - OUTPUT RT high
Pin 14 - OUTPUT RT low
Pin 2 - OUTPUT RT shield

Tape Remote Module
I/O Connector Pinouts

TR-4

1A
2A
3A
4A
5A
6A

SW 6A COM — 25
13 — N/C
SW 6A LED– — 24
12 — SW 6A N.O.
SW 5A COM — 23
11 — SW 6A LED+
SW 5A LED– — 22
10 — SW 5A N.O.
SW 4A COM — 21
9 — SW 5A LED+
SW 4A LED– — 20
8 — SW 4A N.O.
SW 3A COM — 19
7 — SW 4A LED+
SW 3A LED– — 18
6 — SW 3A N.O.
SW 2A COM — 17
5 — SW 3A LED+
SW 2A LED– — 16
4 — SW 2A N.O.
SW 1A COM — 15
3 — SW 2A LED+
SW 1A LED– — 14
2 — SW 1A N.O.
1 — SW 1A LED+

I/O PORTS
(Upper DB-25)

1B
2B
3B
4B
5B
6B

SW 6B COM — 25
13 — N/C
SW 6B LED– — 24
12 — SW 6B N.O.
SW 5B COM — 23
11 — SW 6B LED+
SW 5B LED– — 22
10 — SW 5B N.O.
SW 4B COM — 21
9 — SW 5B LED+
SW 4B LED– — 20
8 — SW 4B N.O.
SW 3B COM — 19
7 — SW 4B LED+
SW 3B LED– — 18
6 — SW 3B N.O.
SW 2B COM — 17
5 — SW 3B LED+
SW 2B LED– — 16
4 — SW 2B N.O.
SW 1B COM — 15
3 — SW 2B LED+
SW 1B LED– — 14
2 — SW 1B N.O.
1 — SW 1B LED+

I/O PORTS
(Lower DB-25)

Operational Notes

Chapter Contents

Note that individual module controls and general uses are explained in the earlier chapter "Console Overview". The following notes are provided as additional information regarding console operation.

FADER AND LEVEL CONTROLS

Normally, the faders will be run at the "in-hand" setting indicated by the darts on the fader scale, corresponding to about 12 dB below maximum fader setting. If you find yourself continually running a channel with the fader all the way to the top, the signal source is probably at too low a level. If the source has its own level control, that control may need to be turned up.

Except for the headphone level, the console's output level controls will generally be run at a 2 o'clock setting. If this results in the control room speaker amplifier having to be run close to minimum, then turn the console's CR level control down some, or use external pads to attenuate the input signal to the power amplifier.

Run the headphone level at a setting that is comfortable for you, but remember, LOUD SOUNDS CAN DAMAGE YOUR HEARING. Remember that a signal source may be at a higher level than you think it is. Be careful when switching channels ON or into CUE, especially if they will be heard in the headphones. NOTE the CUE level control bypasses headphone volume settings for channels that are in CUE. If CUE is turned up, you could get hit with very loud signals, even if the headphone level control is turned down.

If there is no headphone output check to make sure no input module CUE switches are activated, as they will automatically interrupt the regular headphone program.

INPUT ASSIGN & MONITOR SELECT SWITCHES

The console is provided with two stereo output busses. The busses are utilized by assigning input channels to them. For example: An input module is assigned to AUD if the AUD button for that channel is down. Further, the AUD bus is selected by the control room monitor speakers when the AUD source select button on the CR-4 module is down. Because of these two actions, the input channel signal is heard in the control room speakers.

The PGM, (or Program) bus is generally used for the on-air signal. For example, if the commercial spot recorded on the cart machine connected to channel 7 is supposed to be heard on the air, then channel 7 should be assigned to PGM. On the other hand, if you have two studio mics that should both be on-air, those two channels should be assigned to PGM.

Even though, at a particular time, only one or two inputs may be assigned to the PGM bus, the other inputs may still be used. For example, while a channel 2 studio mic is on-air, with a CD being played on channel 6 as background to the studio mic, the operator can assign the tape recorder on channel 9 to the AUD (or Audition) bus, with AUD then being selected at the CR (Control Room), so the operator can locate a certain song on the tape without interfering with the on-air signal. Note that input module CUE functions may also be used for the same purpose (see below).

The on-air signal from a modulation monitor or a high-quality tuner can be connected to one of the EXT (External) inputs of the CR module, to allow the operator to hear monitor off-air by using the EXT selector for that module.

CUEING

In addition to the assignment features described above, the console has an additional mono CUE bus that can be used by the operator when he or she needs to be sure that, for example, the cart machine on channel 7 is set to play the right jingle. Channel 7 CUE button is pushed, and the associated LED lights. The material on that channel appears at the console CUE output, and (if so programmed) also on the headphones. Meanwhile, the on-air signal is uninterrupted. Once the cart selection is verified, the CUE button is pressed again to take the channel out of CUE. At the proper time, the channel ON button is pushed. If the external logic to the cart is connected to the module logic port, pushing the ON button will also activate the cart machine. Note it is not necessary for the module fader to be up to activate channel ON functions.

SENDS

The console's send bus outputs allow input channel signals to be used for specialized purposes without interfering with normal output and subgroup routing operations. Typical uses might be for feeds to processing or effects devices, communication links, remote monitors, dedicated sub-mixes, mix-minus work, etc.

SUBGROUPS

The console's group modules (SP-44 and SP-48 consoles only) are designed to be used as individual track outputs for multi-track tape recording. Track playbacks may be easily accomplished by front panel BUS/TAPE switching for each subgroup channel. It is also possible to bring track playbacks to individual input modules, which permits the addition of EQ during playback. Normally this routing is done through the line inputs of mono mic/line modules or Line Source B of stereo line inputs.

TALKBACK

On consoles equipped with an optional SC-4 Studio Monitor Module, the console's Talkback bus allows the operator's microphone to act as an outgoing intercom signal. By programming the input module controlling this microphone to feed the TB bus (see page 3-6), whenever the console TB button is pressed that microphone's signal will be sent to the console's Talkback output. This output can then be used to feed a remote amp/speaker (or headphone, telephone hybrid, or order wire).

Schematic Drawings

CHAPTER CONTENTS

Upper DB I/O edgecard connector pins. Odd pins 1 (bottom) thru 13 (top) are on the component side (shown). Even pins 2 (bottom) thru 14 (top) are on the solder side of the card. These feed a DB-25 multipin connector mounted on the bottom pan of the console mainframe. *SP-40 series input and group modules have one I/O connector per module; output, control room monitor and all accessory modules each two I/O connectors.* (The second connector will be located directly beneath the one shown.)

Upper bus connector pins (50). Even pins 2 (top) thru 50 (bottom) are on the component side (shown). Odd pins 1 (top) thru 49 (bottom) are on the solder side of the card.

Fuse link resistors (3.3) These may be identified on each module by their stand-offs (see page 6-2).

Lower bus connector pins (50). Even pins 2 (top) thru 50 (bottom) are on the component side (shown). Odd pins 1 (top) thru 49 (bottom) are on the solder side of the card.

5-pin fader connector
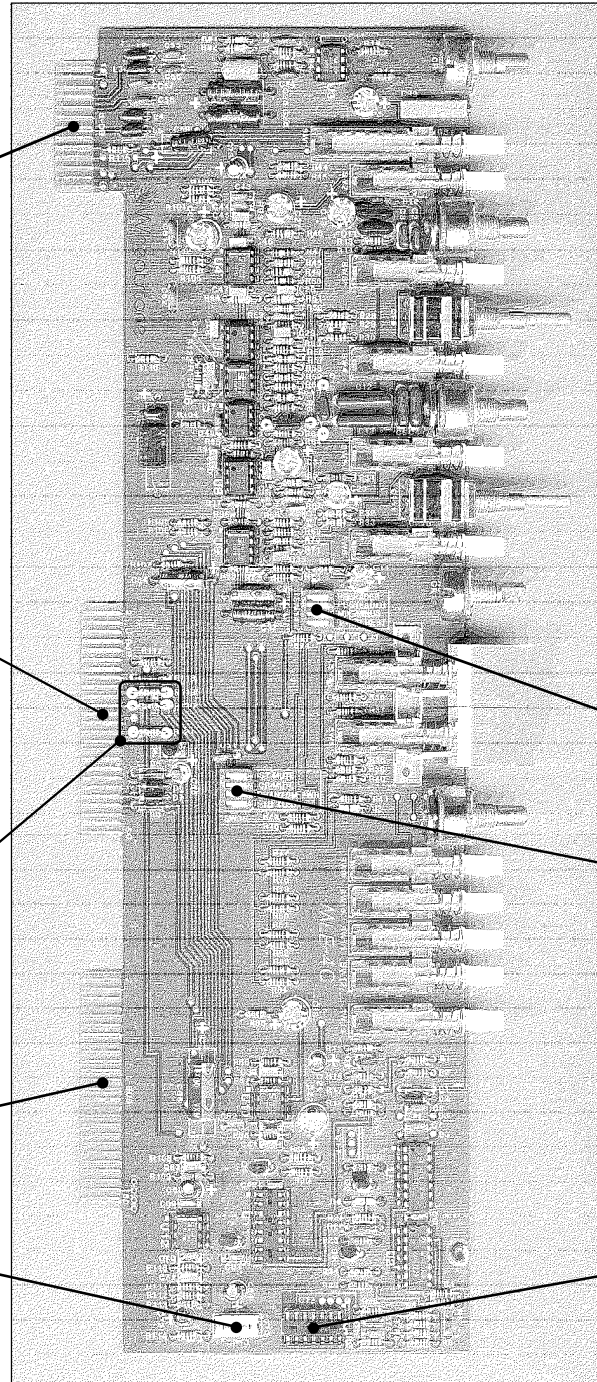
4-position programming dipswitch

4-position programming dipswitch

Channel ON/OFF switch connector (14-pin dip socket)

Typical Printed Circuit Board (mic/line input shown)

MLE-42 INPUT MODULE

SP-4 AUDIO MIXING CONSOLE

5-31-96

PSP

Wheatstone Corporation
7305 Performance Drive
Syracuse, N.Y. 13212

SCHEMATIC DRAWING

MLE-4D PCB   30S0002A

MLE-48 INPUT MODULE
SP-4 AUDIO MIXING CONSOLE

5-31-96
PSP

Wheatstone Corporation
7305 Performance Drive
Syracuse, N.Y. 13212

SCHEMATIC DRAWING
MLE-4D PCB   30S0001A
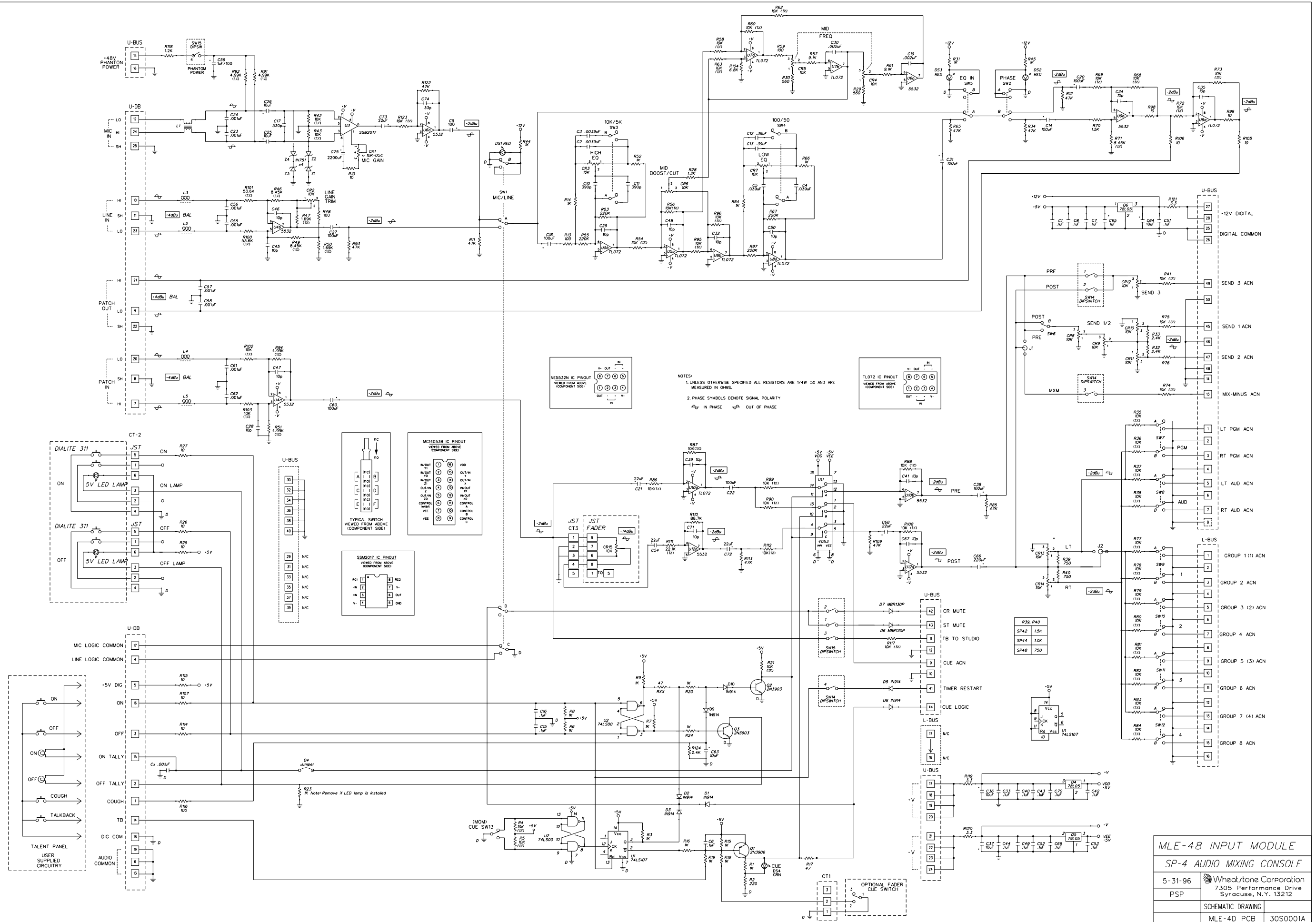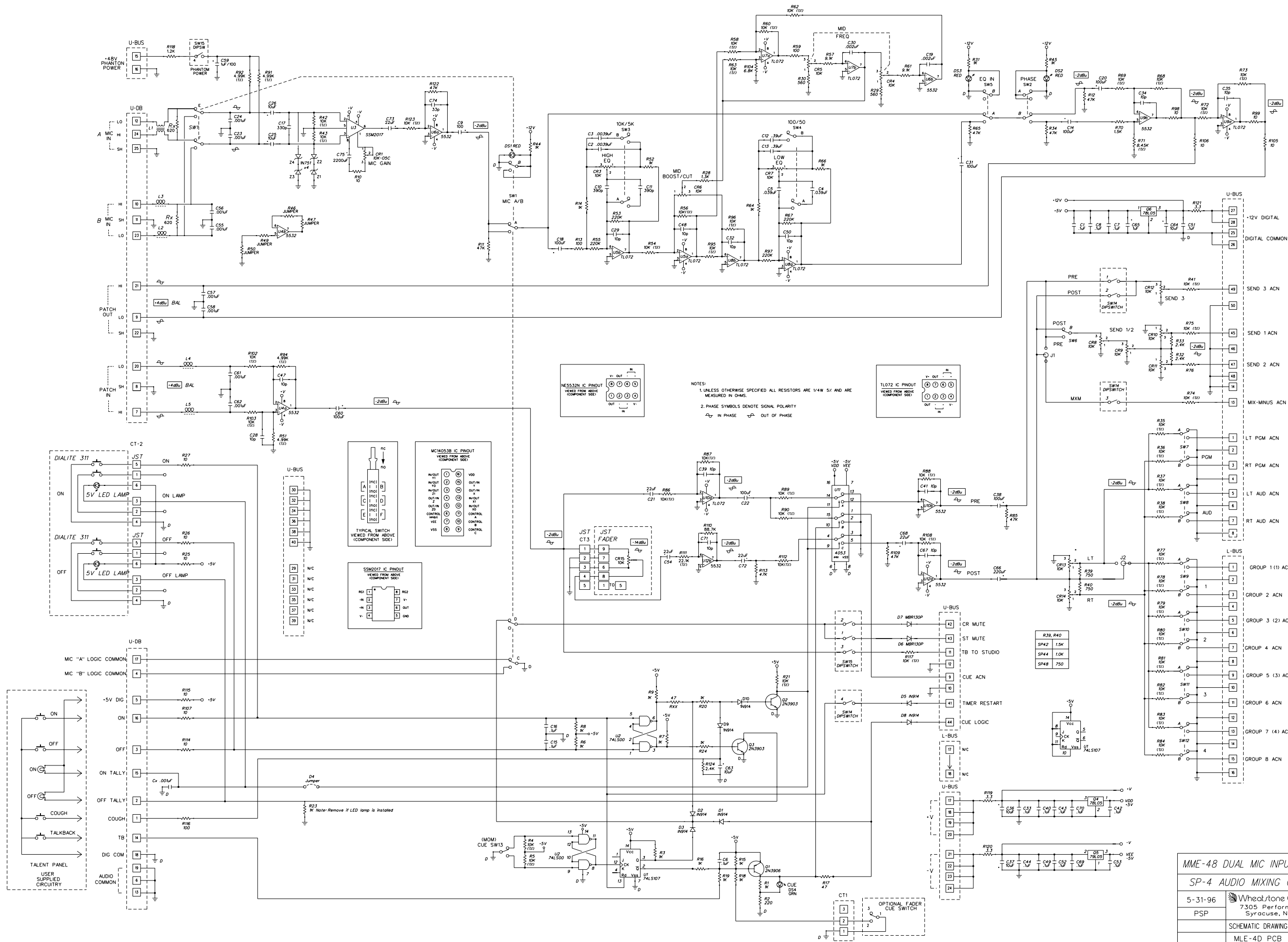
MME-48 DUAL MIC INPUT MODULE

SP-4 AUDIO MIXING CONSOLE

5-31-96

PSP

Wheatstone Corporation
7305 Performance Drive
Syracuse, N.Y. 13212

SCHEMATIC DRAWING

MLE-4D PCB 30S0003A

NOTES:
1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/4W 5% AND ARE MEASURED IN OHMS.

2. PHASE SYMBOLS DENOTE SIGNAL POLARITY.

IN PHASE
OUT OF PHASE

Stereo Line Input Module Schematic (SP-44/48)

TL072
5532 IC PINOUT
VIEWED FROM ABOVE
(COMPONENT SIDE)

R34	R35
1.5K	SP-42
1.0K	SP-44
750	SP-48

7400 IC PINOUT
(VIEWED FROM ABOVE)
(COMPONENT SIDE)

TYPICAL SWITCH
VIEWED FROM ABOVE
(COMPONENT SIDE)

4053 IC PINOUT
VIEWED FROM ABOVE
(COMPONENT SIDE)

Pin		Pin	
IN/OUT Y1	1	16	VDD
IN/OUT Y0	2	15	OUT/IN Y
IN/OUT Z1	3	14	OUT/IN X
OUT/IN Z	4	13	IN/OUT X1
OUT/IN Z0	5	12	IN/OUT X0
CONTROL INHIBIT	6	11	CONTROL A
VEE	7	10	CONTROL B
VSS	8	9	CONTROL C

L-BUS
SPARE 47
SPARE 48
SPARE 49
SPARE 50

U-BUS
30 / 32 / 34 / 36 / 38 / 40

1 LT
2 PGM ACN
4 RT
5 LT
6 AUD ACN
7 RT
8

L-BUS
1 GROUP 1 (1) ACN
2
3 GROUP 2 ACN
4
5 GROUP 3 (2) ACN
6
7 GROUP 4 ACN
8
9 GROUP 5 (3) ACN
10
11 GROUP 6 ACN
12
13 GROUP 7 (4) ACN
14
15 GROUP 8 ACN
16

U-BUS
49 SEND 3 ACN
50
45 SEND 1 ACN
46
47 SEND 2 ACN
48
13 MIX-MINUS ACN
14

+5V / +12V
27 +12V DIGITAL
28
25 DIGITAL COMMON
26

-5V VEE / -V
21 / 22 / 23 / 24   -V

+5V VDD / +V
17 / 18 / 19 / 20   +V

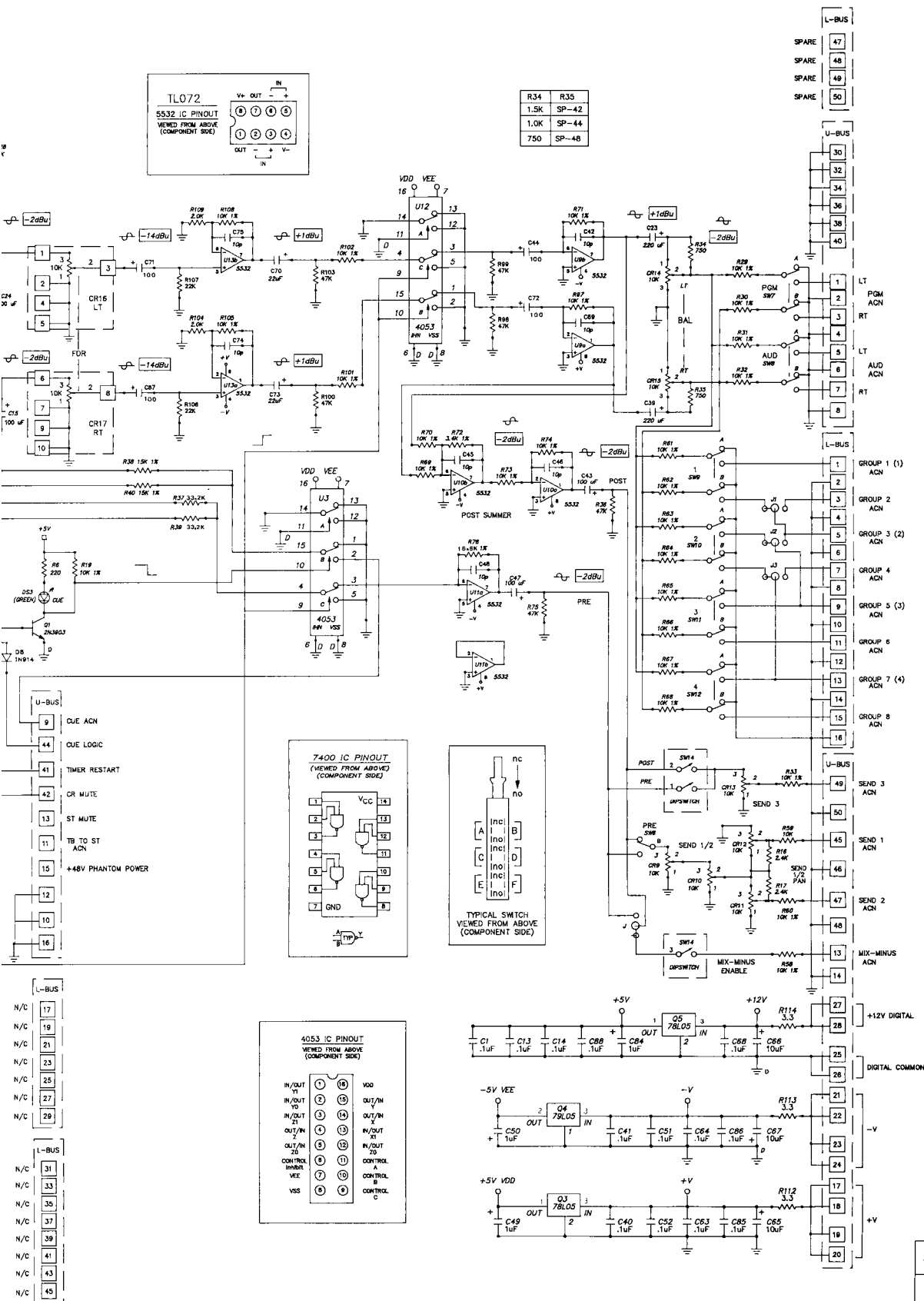U-BUS
9 CUE ACN
44 CUE LOGIC
41 TIMER RESTART
42 CR MUTE
13 ST MUTE
11 TB TO ST ACN
15 +48V PHANTOM POWER
12 / 10 / 16

L-BUS
N/C 17 / 19 / 21 / 23 / 25 / 27 / 29
N/C 31 / 33 / 35 / 37 / 39 / 41 / 43 / 45

POST SUMMER
PRE
POST
PGM SW7
AUD SW8
BAL
MIX-MINUS ENABLE
SEND 1/2 PAN

SLE-4 STEREO INPUT MODULE
SP-4 AUDIO CONSOLE

08-17-92	Wheatstone Corporation
JS	6720 V.I.P. Parkway Syracuse, NY. 13211
SHT 1 OF 1	SCHEMATIC DRAWING
SLE-4C PCB	SP421

Stereo Line Input Module Schematic (SP-42)

SL-2 STEREO LINE INPUT

SP-42 AUDIO CONSOLE

03-31-93 Wheatstone Corporation
7305 PERFORMANCE DRIVE
MS   Syracuse, N.Y. 13212

SCHEMATIC DRAWING
SLE-4C PCB   SP449

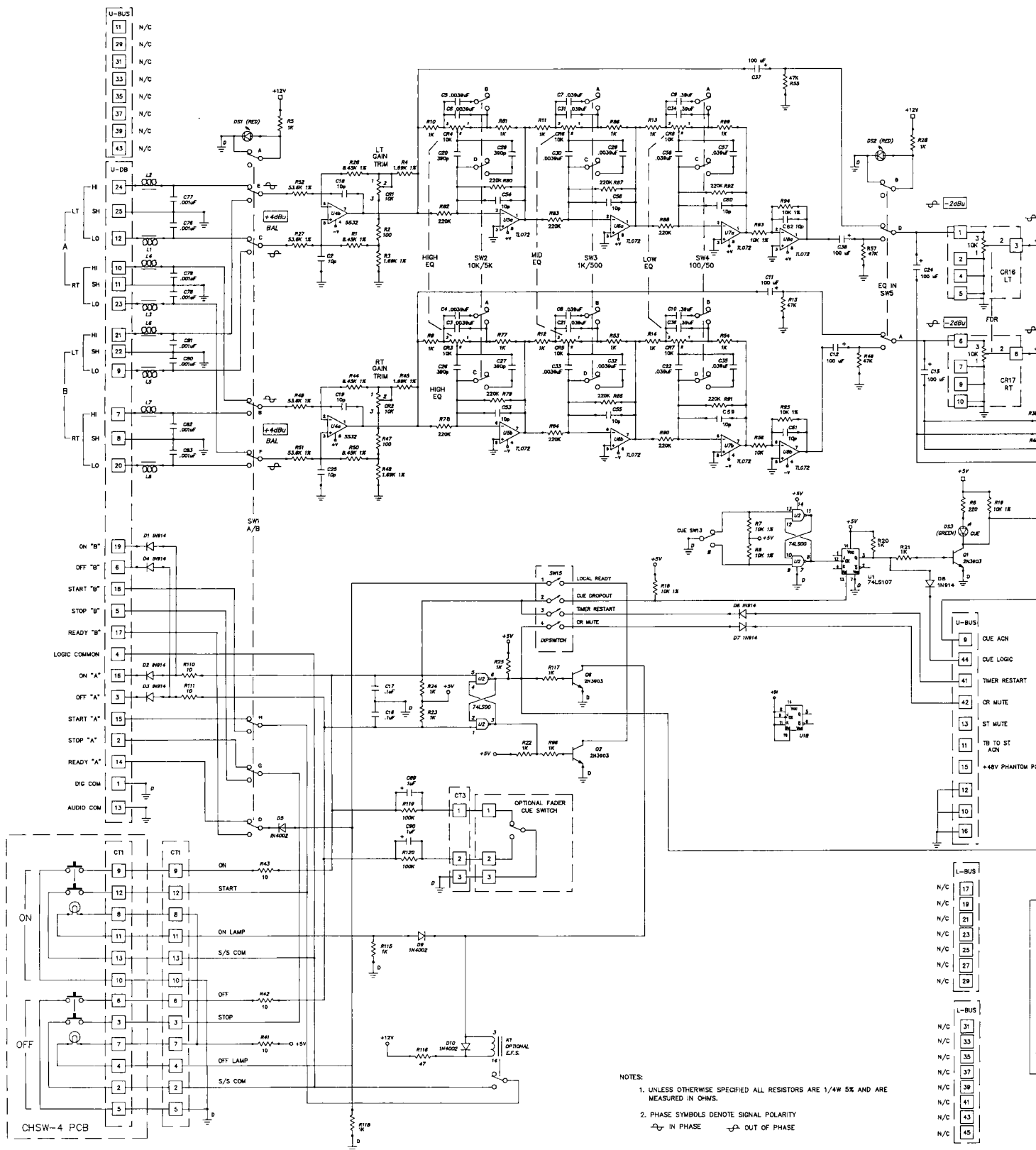**Group Module Schematic**

Stereo Master Output Module Schematic (SP-44/48)
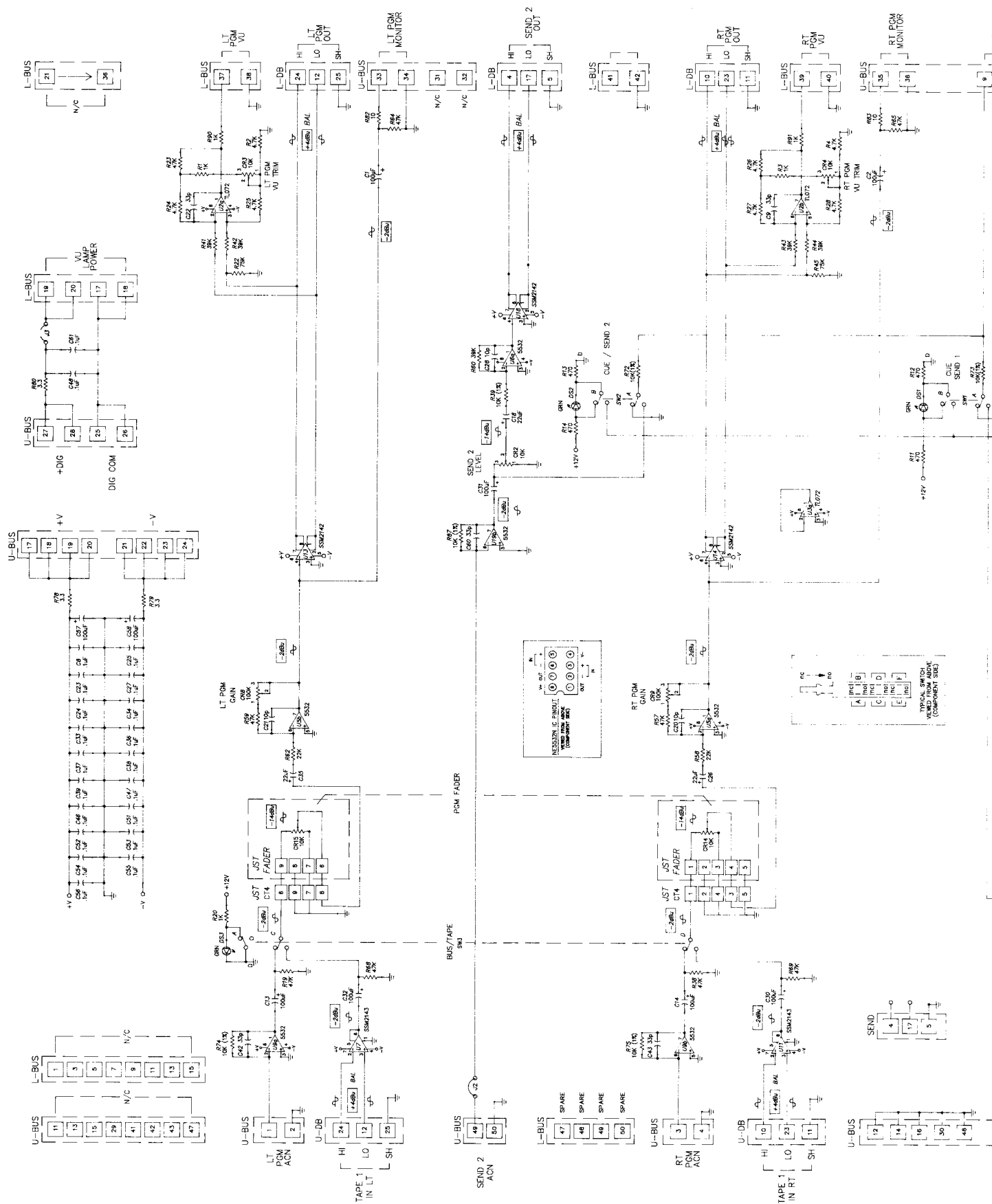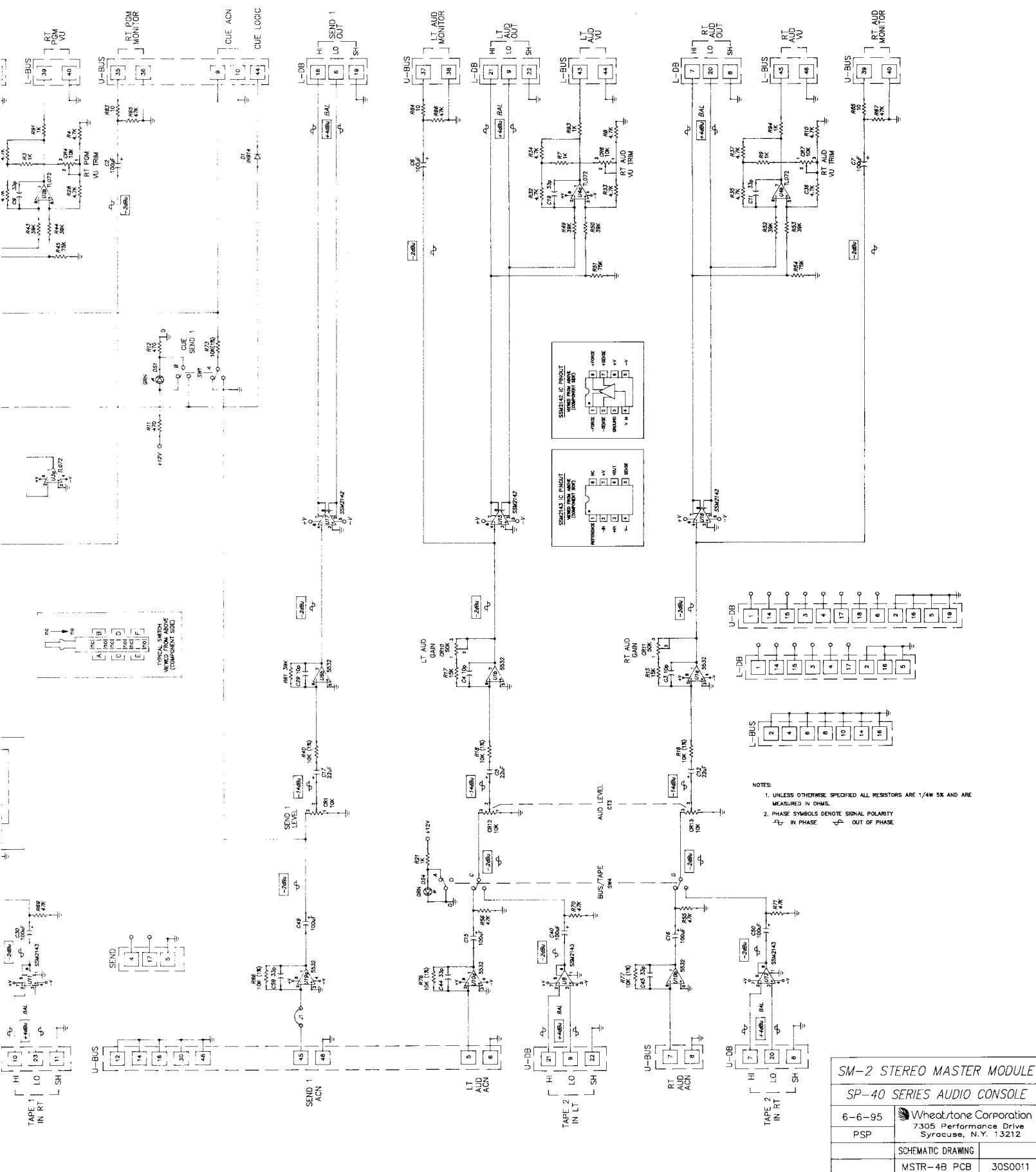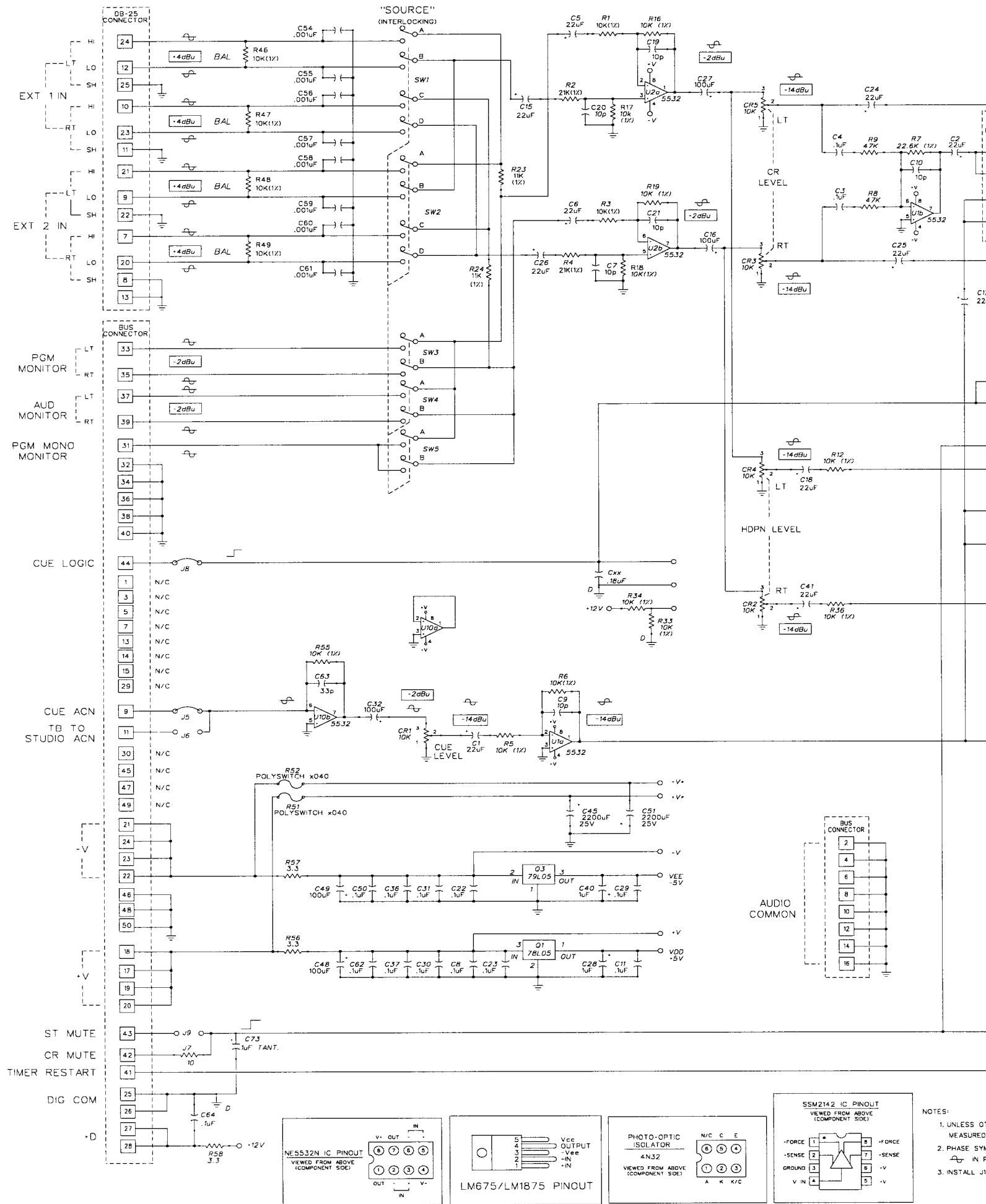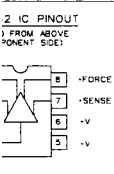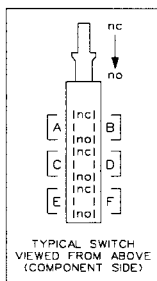
SM-4 STEREO MASTER MODULE

SP-40 SERIES AUDIO CONSOLE

6-9-95

Wheatstone Corporation
7305 Performance Drive
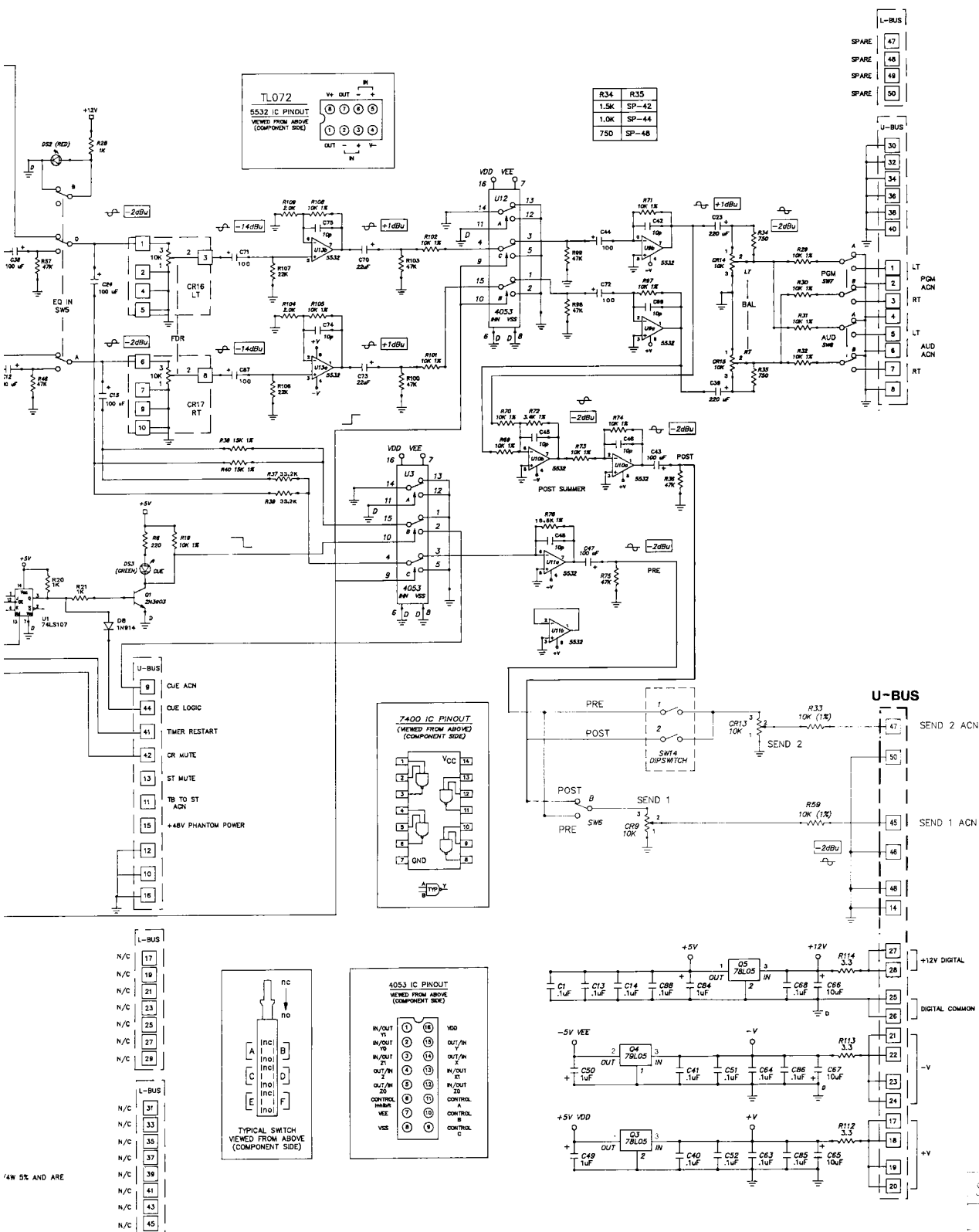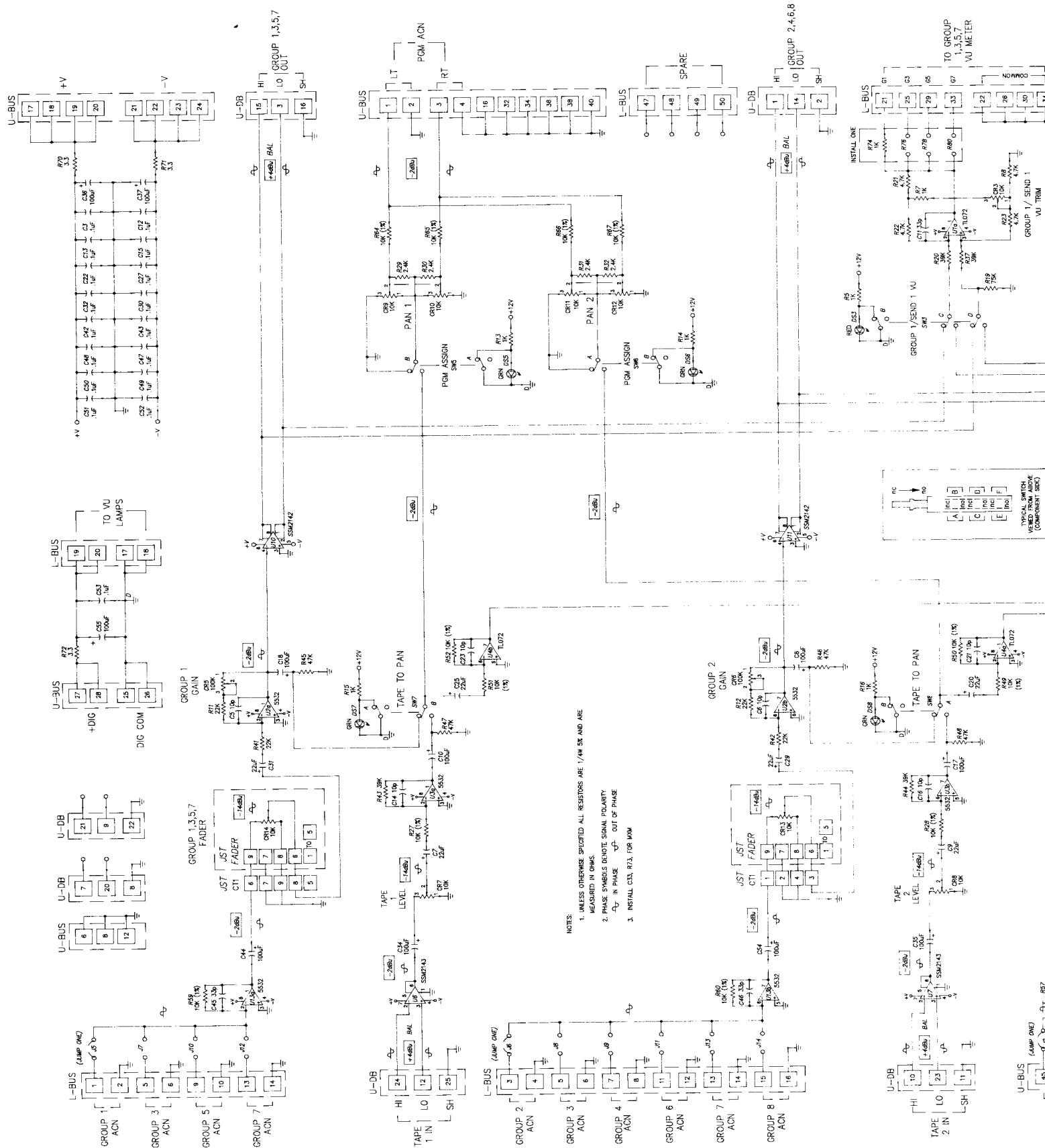Syracuse, N.Y. 13212

PSP

SCHEMATIC DRAWING

MSTR-4 PCB   30S0012

NOTES:
1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/4W 5% AND ARE MEASURED IN OHMS.
2. PHASE SYMBOLS DENOTE SIGNAL POLARITY
   ⌐ IN PHASE   ⌐ OUT OF PHASE

Stereo Master Output Module Schematic (SP-42)

NOTES:

1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/4W 5% AND ARE MEASURED IN OHMS.

2. PHASE SYMBOLS DENOTE SIGNAL POLARITY
   ⌐ IN PHASE   ⌐ OUT OF PHASE

SM-2 STEREO MASTER MODULE

SP-40 SERIES AUDIO CONSOLE

6-6-95	Wheatstone Corporation
PSP	7305 Performance Drive
	Syracuse, N.Y. 13212

SCHEMATIC DRAWING

| MSTR-4B PCB | 30S0011 |

Control Room Monitor Module Schematic (SP-44/48)

CR-4 CONTROL ROOM MODULE
SP-40 SERIES AUDIO CONSOLE

5-4-98

Wheatstone Corporation
600 Industrial Drive
New Bern, N.C. 28562

PSP

SCHEMATIC DRAWING

CR-4 PCB   30S0006A

NOTES:
1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/4W 5% AND ARE MEASURED IN OHMS.
2. PHASE SYMBOLS DENOTE SIGNAL POLARITY
   IN PHASE   OUT OF PHASE
3. INSTALL J1, REMOVE R11 FOR CUE TO CR ENABLE
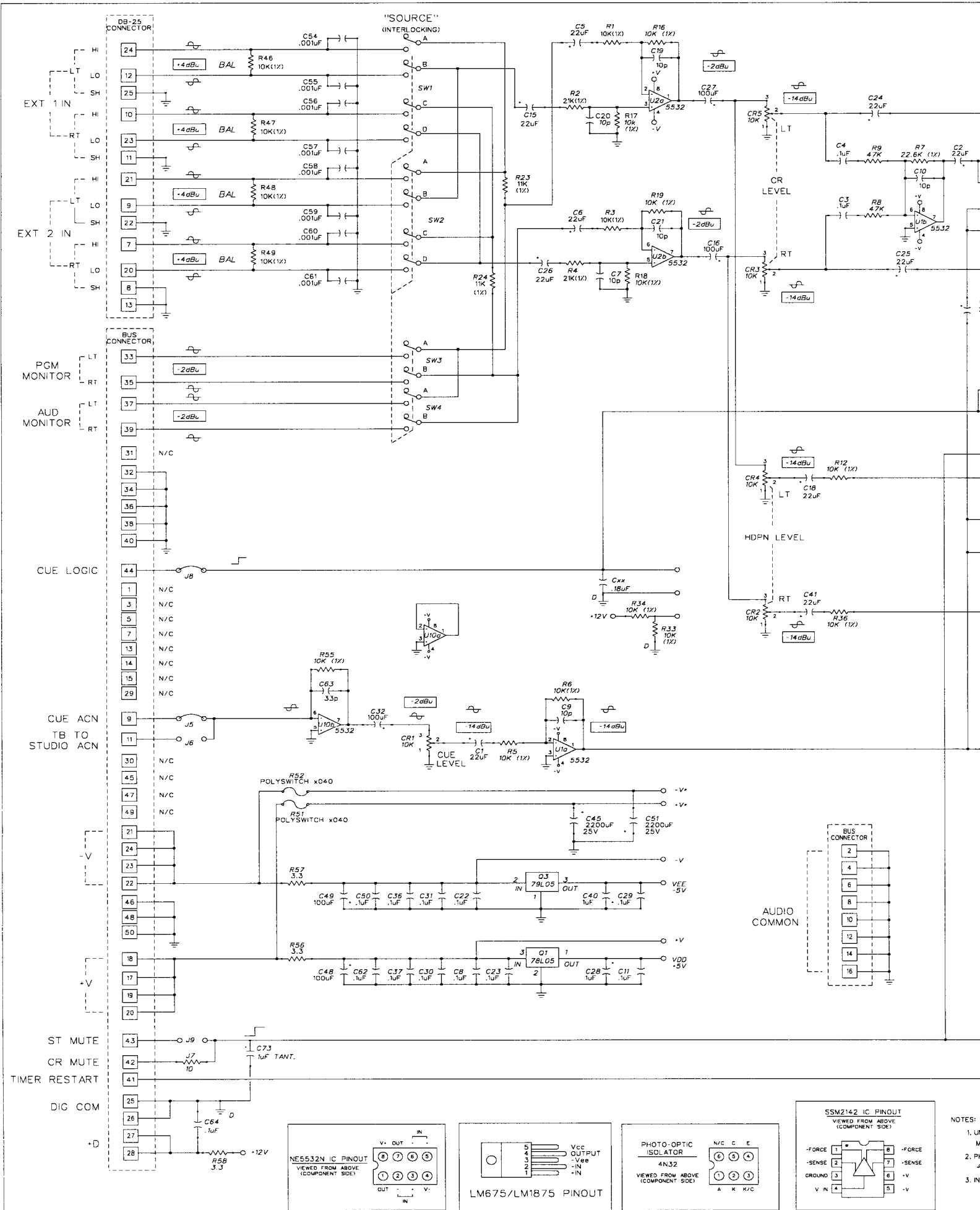
Control Room Monitor Module Schematic (SP-42)
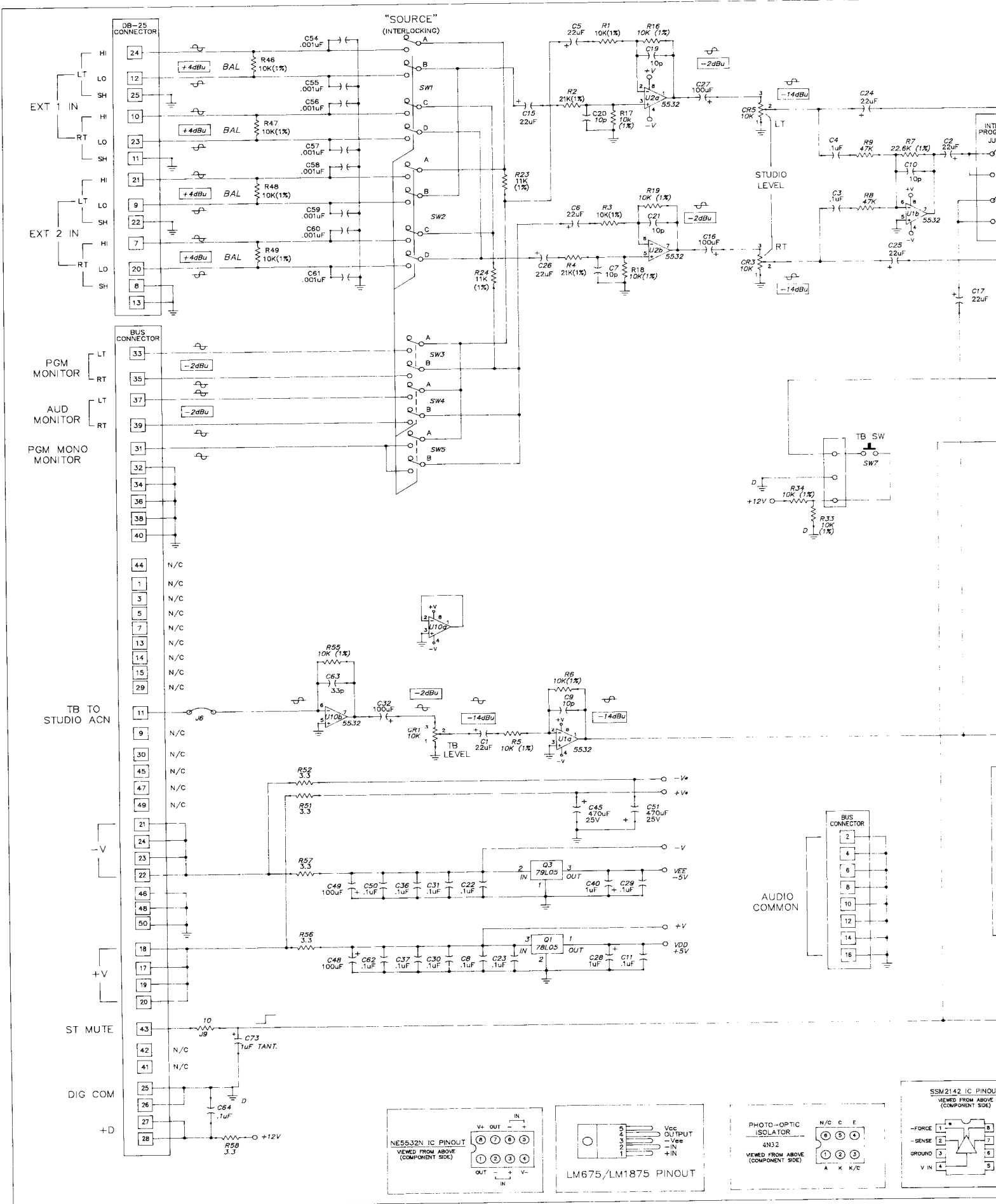
Studio Monitor Module Schematic (SP-44/48)
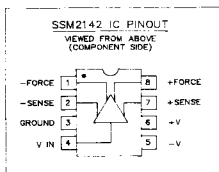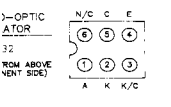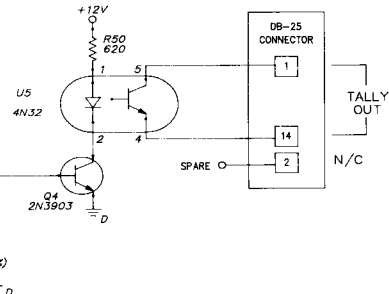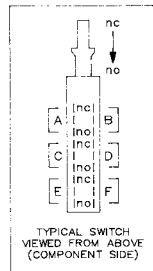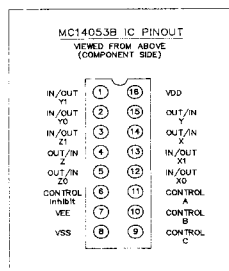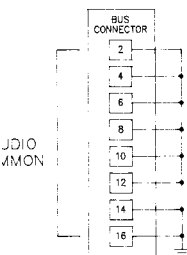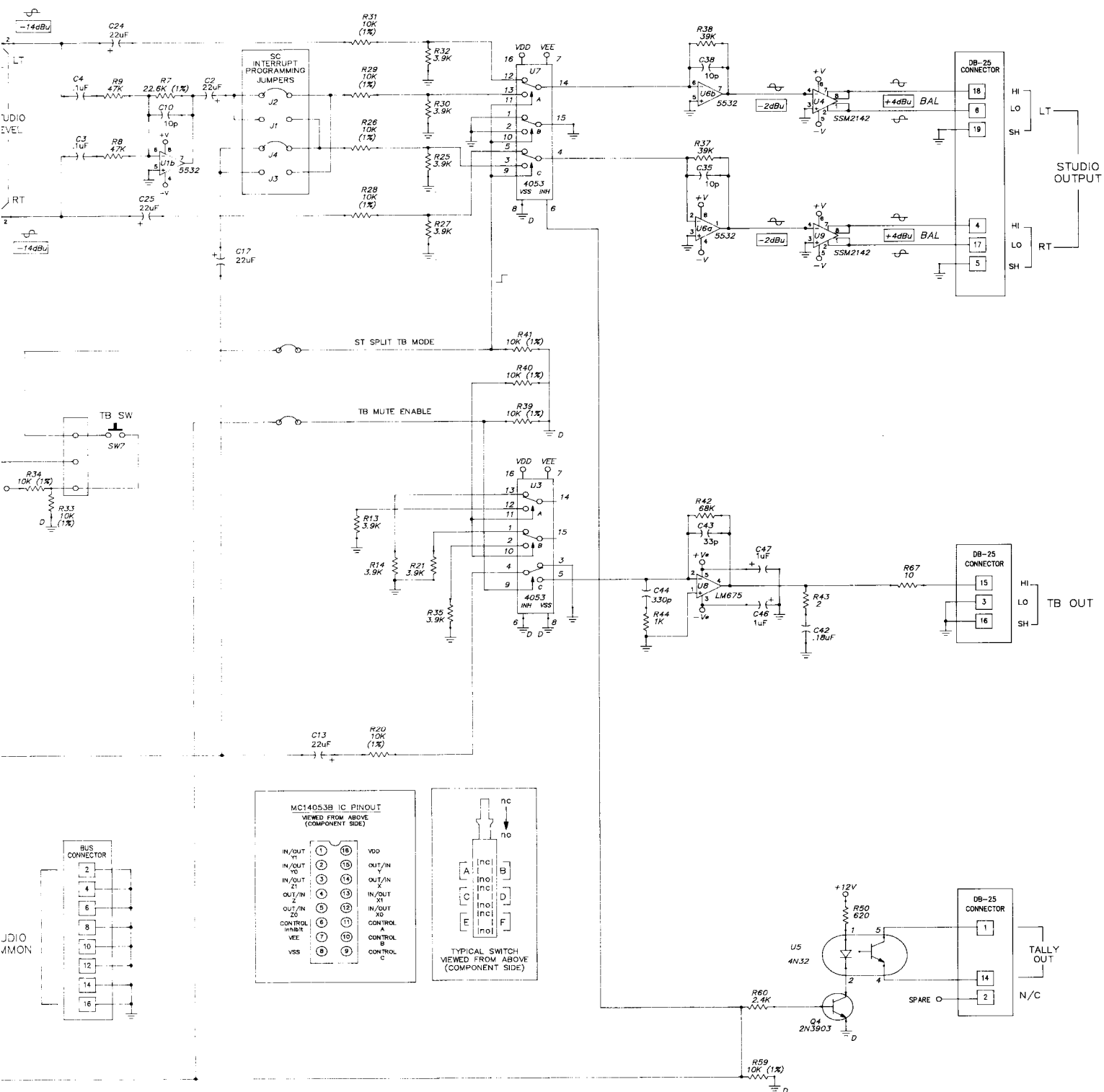
NOTES:

1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/4W 5% AND ARE MEASURED IN OHMS.

2. PHASE SYMBOLS DENOTE SIGNAL POLARITY
   ⌐⌐ IN PHASE   ⌐⌐ OUT OF PHASE

3. INSTALL J1, REMOVE R11 FOR CUE TO CR ENABLE

SC-4 STUDIO MODULE

SP-40 SERIES AUDIO CONSOLE

6-9-95	Wheatstone Corporation
PSP	7305 Performance Drive Syracuse, N.Y. 13212
	SCHEMATIC DRAWING
	CR-4 PCB	30S0008

Studio Monitor Module Schematic (SP-42)

LS-4 IN/OUTS
DB Connector Pinouts

INPUT PORTS
(Upper DB-25)

INPUT/OUTPUT PORTS
(Lower DB-25)

LINE 1 — SW1, R1 10.0K, R2 10.0K
LINE1INLTHI, LINE1INLTLO, LINE1INRTHI, LINE1INRTLO

LINE 2 — SW2, R3 10.0K, R4 10.0K
LINE2INLTHI, LINE2INLTLO, LINE2INRTHI, LINE2INRTLO

LINE 3 — SW3, R5 10.0K, R6 10.0K
LINE3INLTHI, LINE3INLTLO, LINE3INRTHI, LINE3INRTLO

LINE 4 — SW4, R7 10.0K, R8 10.0K
LINE4INLTHI, LINE4INLTLO, LINE4INRTHI, LINE4INRTLO

LINE 5 — SW5, R9 10.0K, R10 10.0K
LINE5INLTHI, LINE5INLTLO, LINE5INRTHI, LINE5INRTLO

LINE 6 — SW6, R11 10.0K, R12 10.0K
LINE6INLTHI, LINE6INLTLO, LINE6INRTHI, LINE6INRTLO

LINE 7 — SW7, R13 10.0K, R14 10.0K
LINE7INLTHI, LINE7INLTLO, LINE7INRTHI, LINE7INRTLO

LINEOUTLTHI (LDB/15), LINEOUTLTLO (LDB/3), LINEOUTRTHI (LDB/1), LINEOUTRTLO (LDB/14)

AGND

I/O CONNECTORS CHART

UPPER DB-25 CONNECTOR (CT1)

Pin	Signal		Pin	Signal
UDB25	AGND	25	13	UDBPIN13 (UDB13)
UDB24	LINE1INLTHI	24	12	LINE1INLTLO (UDB12)
UDB23	LINE1INRTLO	23	11	AGND (UDB11)
UDB22	AGND	22	10	LINE1INRTHI (UDB10)
UDB21	LINE2INLTHI	21	9	LINE2INLTLO (UDB9)
UDB20	LINE2INRTLO	20	8	AGND (UDB8)
UDB19	AGND	19	7	LINE2INRTHI (UDB7)
UDB18	LINE3INLTHI	18	6	LINE3INLTLO (UDB6)
UDB17	LINE3INRTLO	17	5	AGND (UDB5)
UDB16	AGND	16	4	LINE3INRTHI (UDB4)
UDB15	LINE4INLTHI	15	3	LINE4INLTLO (UDB3)
UDB14	LINE4INRTLO	14	2	AGND (UDB2)
		1		LINE4INRTHI (UDB1)

LOWER DB-25 CONNECTOR (CT2)

Pin	Signal		Pin	Signal
LDB25	AGND	25	13	LDBPIN13 (LDB13)
LDB24	LINE5INLTHI	24	12	LINE5INLTLO (LDB12)
LDB23	LINE5INRTLO	23	11	AGND (LDB11)
LDB22	AGND	22	10	LINE5INRTHI (LDB10)
LDB21	LINE6INLTHI	21	9	LINE6INLTLO (LDB9)
LDB20	LINE6INRTLO	20	8	AGND (LDB8)
LDB19	AGND	19	7	LINE6INRTHI (LDB7)
LDB18	LINE7INLTHI	18	6	LINE7INLTLO (LDB6)
LDB17	LINE7INRTLO	17	5	AGND (LDB5)
LDB16	AGND	16	4	LINE7INRTHI (LDB4)
LDB15	LINEOUTLTHI	15	3	AGND (LDB3)
LDB14	LINEOUTRTLO	14	2	AGND (LDB2)
		1		LINEOUTRTHI (LDB1)

INPUT PORTS (Upper DB-25)

LINE 1 LT IN SH	25	13 — N/C
LINE 1 LT IN HI	24	12 — LINE 1 LT IN LO
LINE 1 RT IN LO	23	11 — LINE 1 RT IN SH
LINE 2 LT IN SH	22	10 — LINE 1 RT IN HI
LINE 2 LT IN HI	21	9 — LINE 2 LT IN LO
LINE 2 RT IN LO	20	8 — LINE 2 RT IN SH
LINE 3 LT IN SH	19	7 — LINE 2 RT IN HI
LINE 3 LT IN HI	18	6 — LINE 3 LT IN LO
LINE 3 RT IN LO	17	5 — LINE 3 RT IN SH
LINE 4 LT IN SH	16	4 — LINE 3 RT IN HI
LINE 4 LT IN HI	15	3 — LINE 4 LT IN LO
LINE 4 RT IN LO	14	2 — LINE 4 RT IN SH
	1	LINE 4 RT IN HI

INPUT/OUTPUT PORTS (Lower DB-25)

LINE 5 LT IN SH	25	13 — N/C
LINE 5 LT IN HI	24	12 — LINE 5 LT IN LO
LINE 5 RT IN LO	23	11 — LINE 5 RT IN SH
LINE 6 LT IN SH	22	10 — LINE 5 RT IN HI
LINE 6 LT IN HI	21	9 — LINE 6 LT IN LO
LINE 6 RT IN LO	20	8 — LINE 6 RT IN SH
LINE 7 LT IN SH	19	7 — LINE 6 RT IN HI
LINE 7 LT IN HI	18	6 — LINE 7 LT IN LO
LINE 7 RT IN LO	17	5 — LINE 7 RT IN SH
LINE LT OUT SH	16	4 — LINE 7 RT IN HI
LINE LT OUT HI	15	3 — LINE LT OUT LO
LINE RT OUT LO	14	2 — LINE RT OUT SH
	1	LINE RT OUT HI

Line Select Module Schematic - Sheet 1 of 1

Superphone Module Schematic

SPN-4 SUPER PHONE MODULE

SP-40 SERIES AUDIO CONSOLE
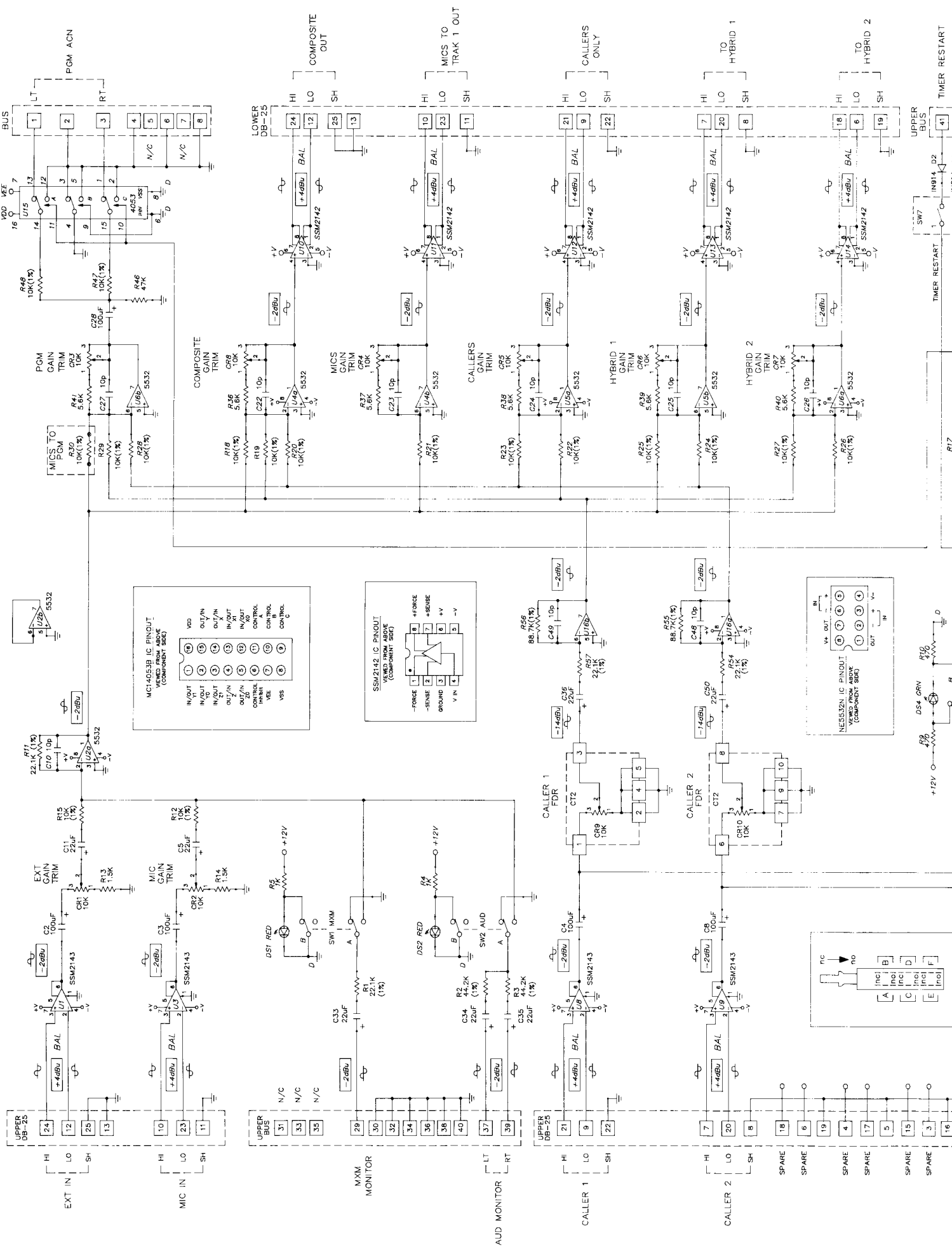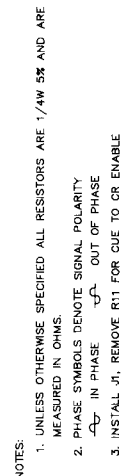
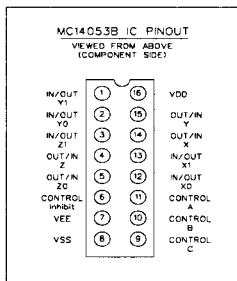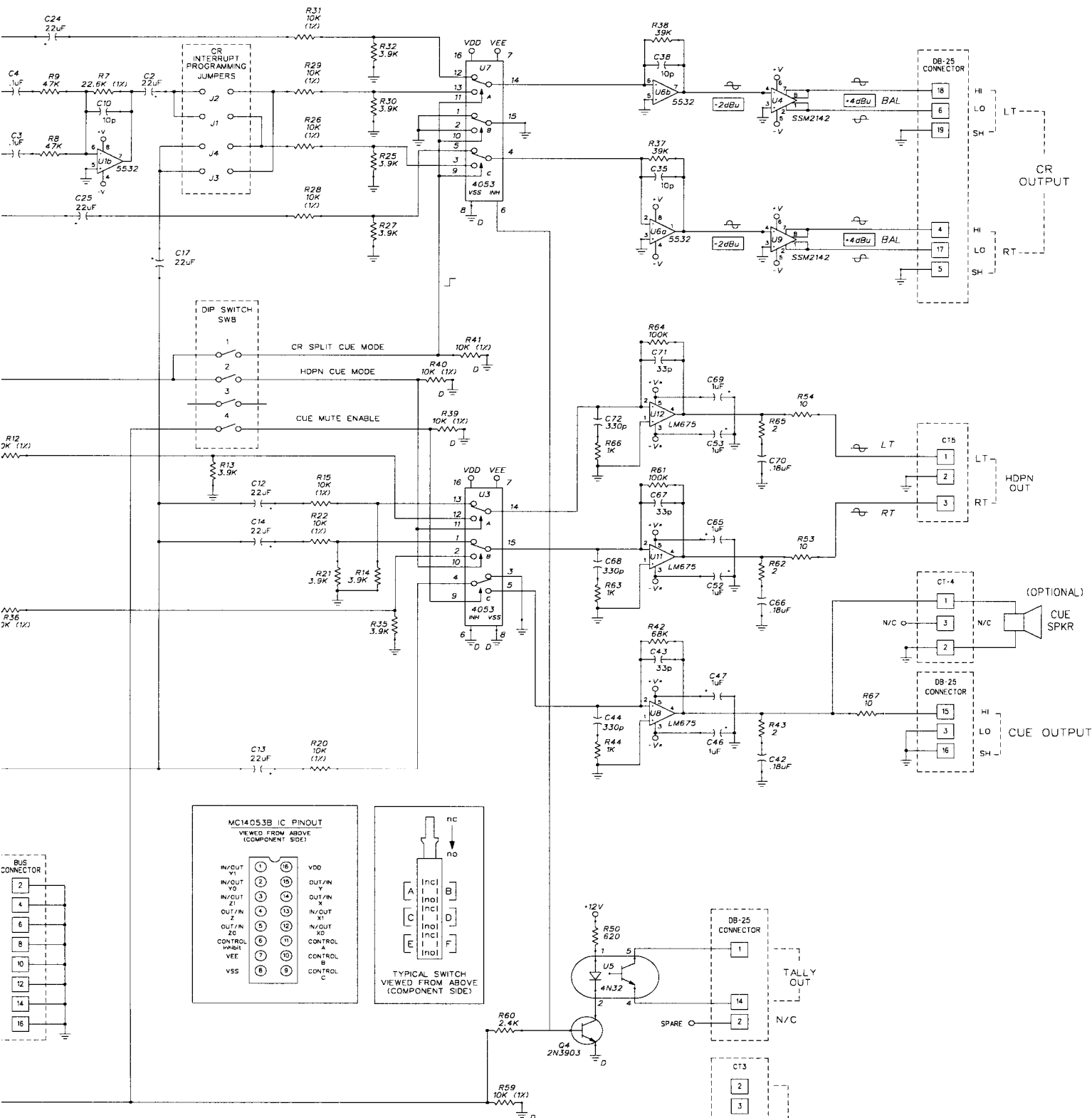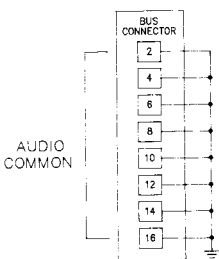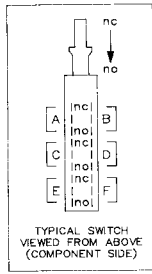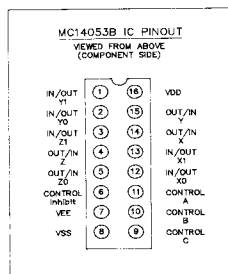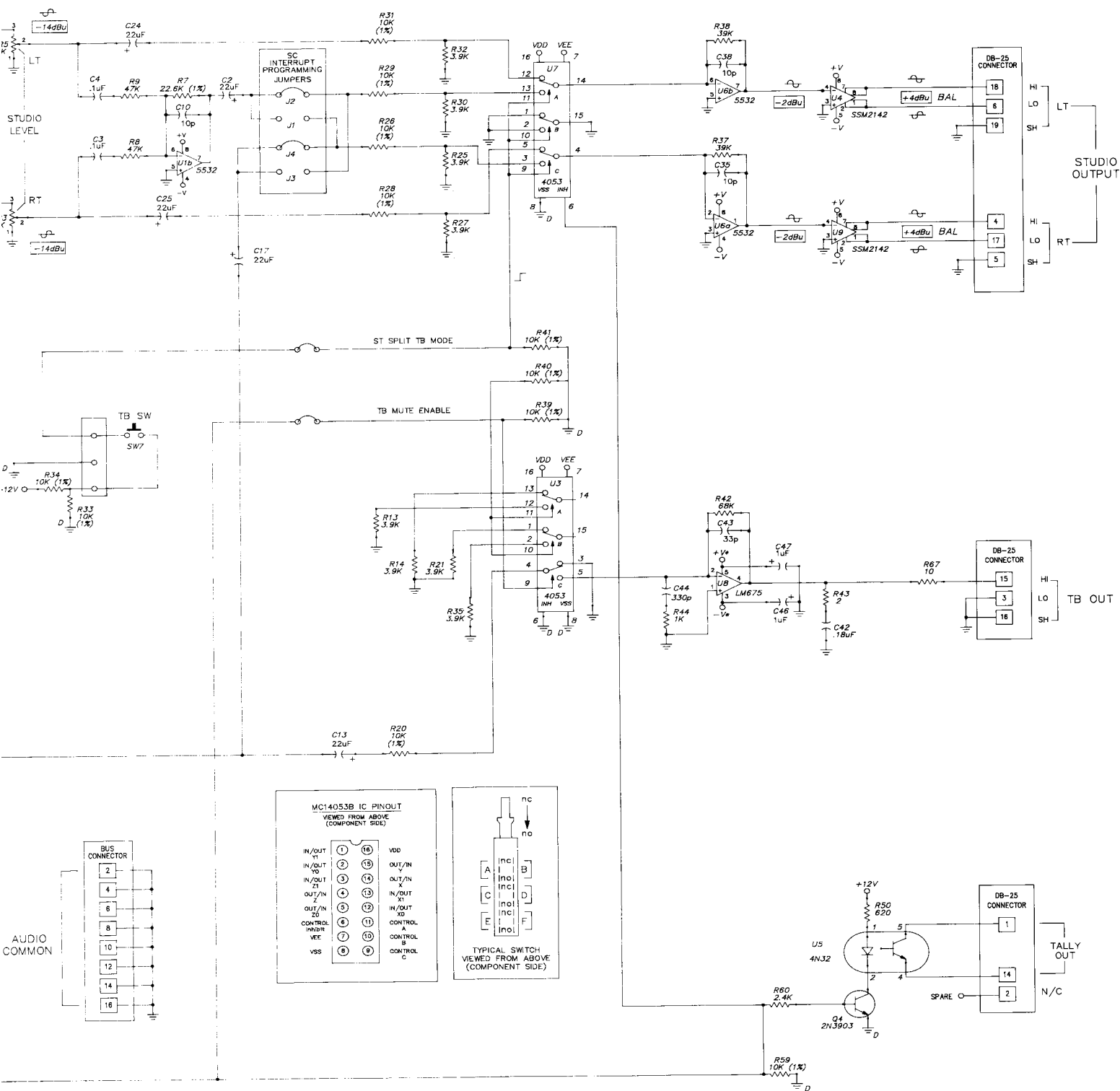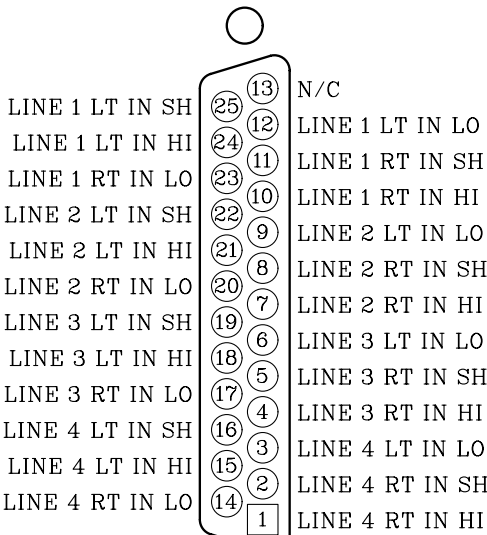| 11-02-92 | Wheatstone Corporation |
	6720 V.I.P. Parkway
JS	Syracuse, NY. 13211
DO NOT SCALE	SCHEMATIC DRAWING
	SPN-4 PCB	SP432

NOTES:
1. UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/4W 5% AND ARE MEASURED IN OHMS.
2. PHASE SYMBOLS DENOTE SIGNAL POLARITY. IN PHASE. OUT OF PHASE.
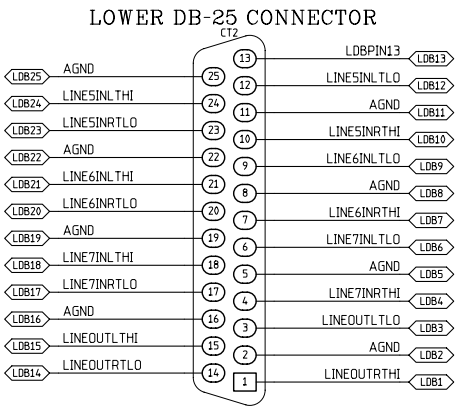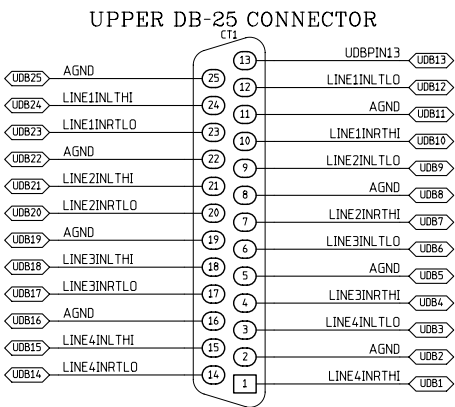3. INSTALL J1, REMOVE R11 FOR CUE TO CR ENABLE.
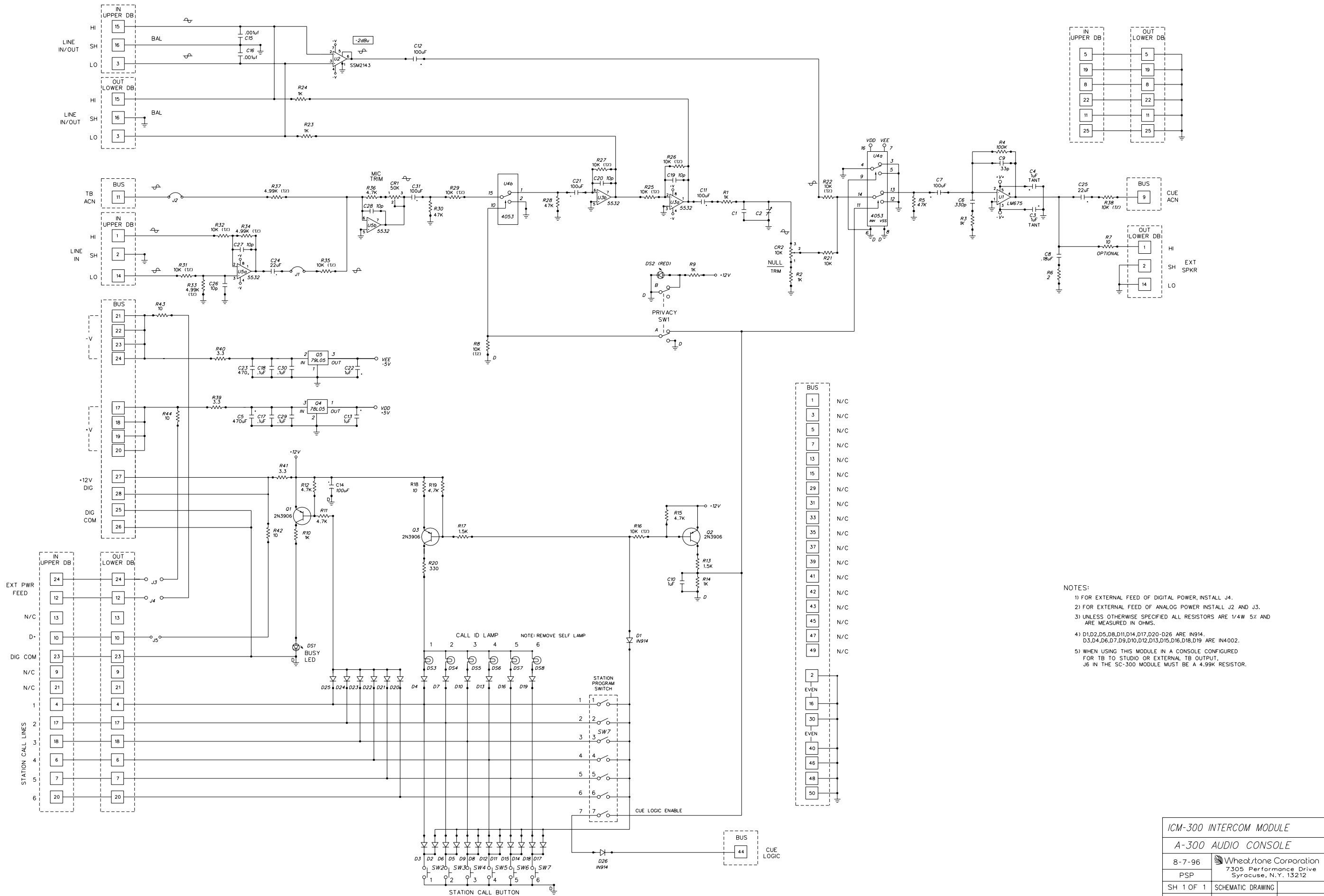
NOTES:
1) FOR EXTERNAL FEED OF DIGITAL POWER, INSTALL J4.
2) FOR EXTERNAL FEED OF ANALOG POWER INSTALL J2 AND J3.
3) UNLESS OTHERWISE SPECIFIED ALL RESISTORS ARE 1/4W 5% AND ARE MEASURED IN OHMS.
4) D1,D2,D5,D8,D11,D14,D17,D20-D26 ARE IN914.
   D3,D4,D6,D7,D9,D10,D12,D13,D15,D16,D18,D19 ARE IN4002.
5) WHEN USING THIS MODULE IN A CONSOLE CONFIGURED FOR TB TO STUDIO OR EXTERNAL TB OUTPUT, J6 IN THE SC-300 MODULE MUST BE A 4.99K RESISTOR.

ICM-300 INTERCOM MODULE

A-300 AUDIO CONSOLE

8-7-96

PSP

Wheatstone Corporation
7305 Performance Drive
Syracuse, N.Y. 13212

SH 1 OF 1 | SCHEMATIC DRAWING

ICM-300 PCB | 11S0015

LOWER TR-300 PCB

R1 1K — SW1
R2 1K — SW2
R3 1K — SW3
R4 1K — SW4
R5 1K — SW5
R6 1K — SW6

CT1
| 2 | 1 | | 4 | 3 | | 6 | 5 | | 8 | 7 | | 10 | 9 | | 12 | 11 | | 14 | 13 | | 16 | 15 | | 18 | 17 | | 20 | 19 | | 22 | 21 | | 24 | 23 |

CT1
| 2 | 1 | | 4 | 3 | | 6 | 5 | | 8 | 7 | | 10 | 9 | | 12 | 11 | | 14 | 13 | | 16 | 15 | | 18 | 17 | | 20 | 19 | | 22 | 21 | | 24 | 23 |

LOWER DS25 CONNECTOR
| 14 | 1 | | 15 | 2 | | 16 | 3 | | 17 | 4 | | 18 | 5 | | 19 | 6 | | 20 | 7 | | 21 | 8 | | 22 | 9 | | 23 | 10 | | 24 | 11 | | 25 | 12 |

UPPER TR-300 PCB

R1 1K — SW1
R2 1K — SW2
R3 1K — SW3
R4 1K — SW4
R5 1K — SW5
R6 1K — SW6

CT1
| 2 | 1 | | 4 | 3 | | 6 | 5 | | 8 | 7 | | 10 | 9 | | 12 | 11 | | 14 | 13 | | 16 | 15 | | 18 | 17 | | 20 | 19 | | 22 | 21 | | 24 | 23 |

CT1
| 2 | 1 | | 4 | 3 | | 6 | 5 | | 8 | 7 | | 10 | 9 | | 12 | 11 | | 14 | 13 | | 16 | 15 | | 18 | 17 | | 20 | 19 | | 22 | 21 | | 24 | 23 |

UPPER DB25 CONNECTOR
| 14 | 1 | | 15 | 2 | | 16 | 3 | | 17 | 4 | | 18 | 5 | | 19 | 6 | | 20 | 7 | | 21 | 8 | | 22 | 9 | | 23 | 10 | | 24 | 11 | | 25 | 12 |

TR-300 TAPE REMOTE MODULE
A-300 AUDIO CONSOLE

8-6-96
PSP
SH 1 OF 1

Wheatstone Corporation
7305 Performance Drive
Syracuse, N.Y. 13212

SCHEMATIC DRAWING
TR-300 PCB   11S0014

MINUTES

SECONDS

7 SEGMENT DISPLAY PINOUT
VIEWED FROM ABOVE
(COMPONENT SIDE)

74AC00 IC PINOUT VIEWED FROM ABOVE (COMPONENT SIDE)

74AC08 IC PINOUT VIEWED FROM ABOVE (COMPONENT SIDE)

74AC14 IC PINOUT VIEWED FROM ABOVE (COMPONENT SIDE)

74LS74 IC PINOUT VIEWED FROM ABOVE (COMPONENT SIDE)

74HC4511 IC PINOUT VIEWED FROM ABOVE (COMPONENT SIDE)

74HC4060 IC PINOUT VIEWED FROM ABOVE (COMPONENT SIDE)

74HC192 IC PINOUT VIEWED FROM ABOVE (COMPONENT SIDE)

START/STOP

1 HZ OUTPUT

1 HZ INPUT

RESET

RESTART

HOLD

POWER INTERFACE

TO TIMER CONTROL

CT1		
1	RESET	RESET
2	HOLD	HOLD
3	START/STOP	START/STOP
4	VCC	+5V
5	+DIGin	+DIG IN
6	GND	DIG.COM
7	GND	DIG.COM
8	RESTART	RESTART

TO CLOCK

CT2		
1		N/C
2	1HZIN	1HZ INPUT
3	1HZOUT	1HZ OUTPUT
4		N/C
5	GND	DIG.COM
6	GND	DIG.COM
7	+DIGin	+DIG IN
8	+DIGin	+DIG IN

TM-6

Wheatstone Corporation
600 Industrial Drive
New Bern, NC 28562

CONTRACT NO.		
APPROVALS	DATE	
DRAWN	SA	10-24-00
CHECKED		
ISSUED		
W* 700248		

SIZE D FSCM NO. DWG. NO. 00S0008D REV

SCALE TM-6SD PCB SHEET 1 OF 1

Power Supply Schematic - Sheet 1 of 1
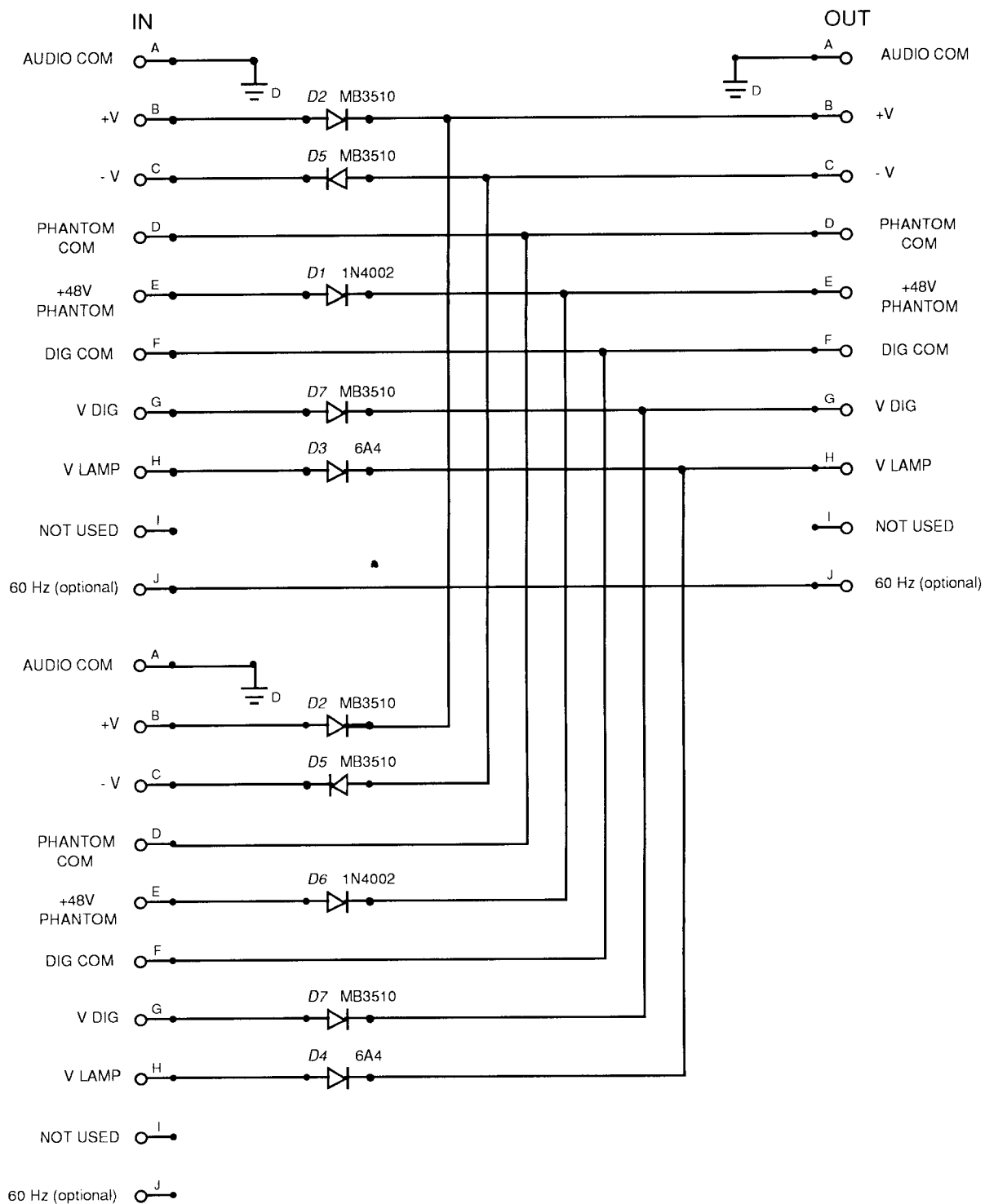
Failsafe Switchover Panel Schematic

Troubleshooting

CHAPTER CONTENTS

Technical information for the console is contained on the schematic drawings. Installation and hook up information is summarized in the text of this manual (see "Installation" and "Console I/O Connections" chapters).

BASIC TROUBLESHOOTING PROCEDURES

If you have encountered difficulty in testing your installation, check the items listed below before opening the console. *Note that some items may seem very obvious; it is often the most obvious things that we overlook.*

1. Check that the AC power source for the console is live, and that the console power cable is connected to the AC source.

2. Make sure that the sources you are using to test the console installation are producing normal, line level signals. For example, if a cart machine is the source, is the cart playing? Is the output of it connected to the console?

3. When checking for sound from the control room speakers, is the amplifier on? Is the amplifier volume turned up to a normal level? Are the speakers connected to the amplifier outputs?

4. If you have checked external devices and connections, and feel that the problem is within the console, double check all wiring before attempting to troubleshoot the console itself.

NOTE: THE FOLLOWING PRECAUTIONS SHOULD BE TAKEN WHILE TROUBLE-SHOOTING OR TESTING A "LIVE" (I.E., POWERED-UP) CONSOLE.

(1) Use extreme care when removing or replacing modules, to prevent shorting switchboard traces against an exposed metal surface. If a module must be removed, but remain connected while troubleshooting, place a piece of cardboard or other non-conducting material across the console where the module will be placed. This will prevent shorting, and also avoid scratching or marring the faceplates.

(2) Be extremely careful when using meter or oscilloscope test probes, to avoid shorting a test point to an adjacent connection. This is especially important when probing a pin 7 op-amp output, since the adjacent pin 8 is at 18 volts.

(3) NEVER remove or insert an integrated circuit while the console is powered up.

INTEGRATED CIRCUITS

The audio circuits of the console consist almost entirely of plug-in IC op-amps. The types called out in the schematic drawings and parts lists are chosen for optimum performance; in an emergency situation other types of known matching pin-out and capability can be temporarily substituted. Some useful troubleshooting hints for these circuits follow.

(1) Resistors and capacitors, including electrolytic capacitors, have a vanishingly small failure rate in this equipment.

(2) Do not attempt to put any significance to the fact that you can measure very low signal levels on the inverting or "minus" input of an op-amp stage. Due to the large open-loop gain of the typical op-amp, the inverting input of an amplifier, configured as an inverter with its non-inverting input grounded, acts as a "virtual ground," and signal levels at this point can be expected to be extremely low. However, a circuit fault could result in a large signal level at the inverting input, so it may be worth checking.

(3) When one of these ICs fails, it commonly swings its output to one of the power supply rails. This should be a first check when a bad IC is suspected. Measure the output pin of the IC directly (as opposed to measuring after a coupling capacitor) under a no-signal condition and look for a large DC offset at the output. Note that this test is not valid for those op-amps used in non-audio circuits such as integrators and relay drivers.

(4) The capacitive loading effect of a test probe may occasionally cause oscillations in a high gain amplifier circuit. For this reason it is advisable, when using meter probes to measure DC voltage in an amplifier circuit, to isolate the "hot" lead from the circuit under test with a 10K resistor. This introduces a slight measurement error, depending on the meter input impedance, but this error is slight compared to the error that occurs if the amplifier is oscillating. If signal tracing with an oscilloscope, use a low capacity probe.

(5) Because of the feedback loop in the op-amp circuit, sometimes a signal can be measured or heard even when the IC is defective or even removed. Generally this signal will become more and more distorted as the level increases; also the gain of the affected path will be incorrect. Don't assume that because you can observe an output signal the IC must be working properly.

(6) This console has self-compensating active-balanced outputs on its main output channels (i.e., SENDS, GROUPS, Program, Audition and Mono OUTPUTS plus optional Superphone module outputs). These circuits behave exactly like the secondary of a high-quality transformer, with no center tap—the output is both balanced and floating. When connecting unbalanced equipment, either the HIGH or LOW side of the console output should be strapped to ground, with the output taken from the other side. (Normally you'd strap LOW to ground, and take HIGH to feed your unbalanced equipment; but the ability to use output HIGH or LOW permits an easy phase reversal of the console's output signals should this be desired).

(7) All of the console modules pick up their power supply voltage from the main distribution busses by means of small value (typically 3.3) resistors. These resistors are provided to limit the current drawn by the module under fault conditions and prevent a module level fault from becoming a console level fault. These resistors will generally become open circuits when an IC fails, often with no visual indication. Whenever a fault if suspected check the voltage

on the module side of these resistors. If one needs replacement (there are extras in the spare parts kit) be sure to stand it up from the circuit card as it can become hot enough to burn the card under fault conditions. When all of the circuits in a module indicate the same fault (all outputs have no audio and a large DC value, or all meters are pegged under no signal conditions, etc.) it is generally due to one of these fusing resistors being open. Do not defeat the protection offered by these resistors by replacing them with wires. In a pinch any low value 1/4 watt resistor can be used.

OTHER DETAILS

In general, SP-40 consoles are rugged and user friendly. I/O connections can be unplugged or plugged in while powered up with no damage, provided the precautions described above concerning removal and replacement of modules are carefully followed. Occasionally, this will cause a transient in the logic system that may be sufficient to affect a channel's ON/OFF status, but this is rare. (Note that mic module ON/OFF status and CUE switches power up randomly when the console is energized; this is normal, and does not indicate anything wrong with the logic system.)

If the power cable is being unplugged from the mainframe or the power supply, be sure to first turn the power off to avoid arcing the connector pins. The Lexan panel overlays are durable, and can be easily cleaned with Windex. If they become burned or torn through carelessness they can be replaced; consult Wheatstone for details. Care should be taken with the plexiglas covering the VU meters, as it is easily scratched. **Fader knobs should be removed or installed only when the fader is at the end of its travel,** to avoid "bowing" the internal fader structure.

Wheatstone maintains an active program of user support and technical assistance. You are encouraged to call the factory with any questions, problems, ideas, or suggestions regarding your SP-4 console.