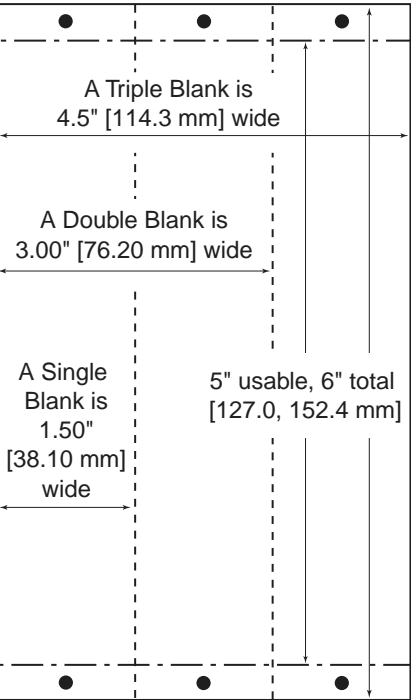
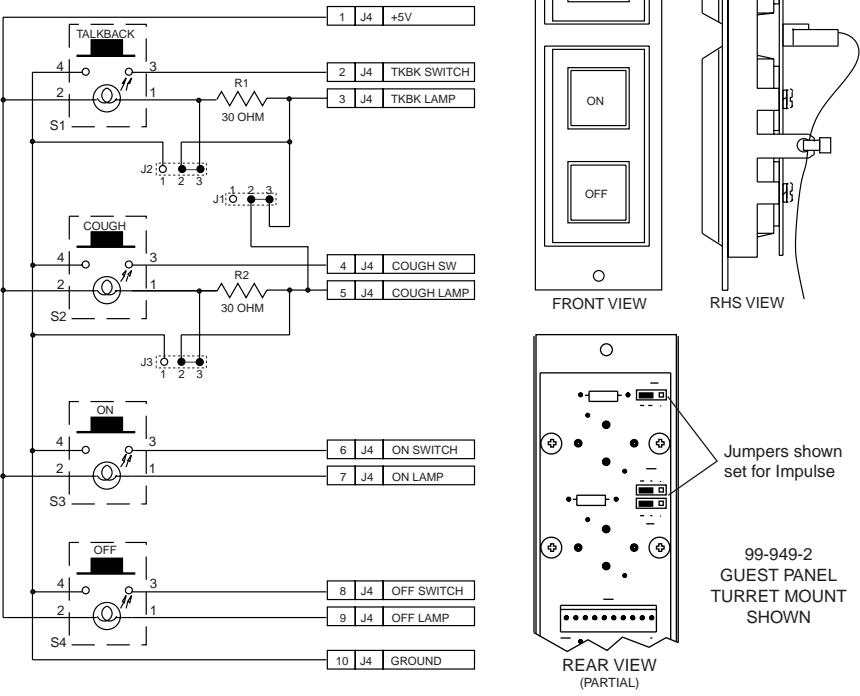


GUEST PANEL, CABINET MOUNT (99-949-1), TURRET MOUNT (99-949-2)

J4: Housing, wafer, 10-pin female locking Molex # 22-01-2107 (PR&E # 15-524)
Terminals, gold, female crimp Molex # 08-58-0110 (PR&E # 15-8)

S1 - S4: Switch, 17 mm JAE # 11LC17-0 (PR&E # 25-873)
Lamp, JAE # 11LB17-0 (PR&E # 12-101)



ACCESSORY PANEL DIMENSIONS
(Left end of operator panel, below
the Timer and RLS buttons)

SINGLE BLANK: 80-1500-4
DOUBLE BLANK: 80-1500-5
TRIPLE BLANK: 80-1500-6 *
* supplied with console

INTEGRITY CONSOLE
RECORDER REMOTE



TAPE: 99-99-3-x

General Information

Thanks for joining the growing ranks of broadcasters employing Pacific Research & Engineering (PR&E) consoles.

The Impulse is a sophisticated console with a wide range of features held in a compact design. To obtain maximum benefit from the console, please read through this manual prior to product installation.

CONSOLE OVERVIEW

The Impulse has the following features:

- Four microphone preamps
- Plug-in cards to configure each channel for analog, digital, or optical signals
- Analog & digital program outputs
- Control Room & Studio monitoring
- 7 x 2 analog remote line selector
- ESE-compatible time of day clock
- Production Timer with manual and automatic control
- Welded steel chassis for strength and RFI immunity
- Countertop installation
- Easy-access rear panel connectors covered by a cosmetic cover after installation

Feature Descriptions

Microphone Preamplifiers

Impulse has four preamplifiers with individual gain control and microphone phantom power (+48 VDC) switching. The preamp outputs are +4 dBu balanced mono for direct jumper cable connection to an analog Input channel or to outboard mic processors.

Input Channels

Impulse is available with 12 or 20 input channels. Each channel is configured, with a plug-in Input Card, for analog or digital (AES-3, S/PDIF or optical) signals.

Every channel has input selection (A or B), channel on/off control (with built-in logic interface), fader level control (with selectable global fader-start) and assignment selectors (to Cue, Off-Line and three output buses). Channel trimmers on the analog Input Cards adjust signal gain to accept levels from -10 dBu to +4 dBu.

Each input is electronically switched through an A/B Input selector. Logic wiring to external peripherals connects to a 24-pin logic connector on each channel. Logic and module functional options for either input A or B are set through internally-accessed DIP switches.

Telco Channels

Two dedicated Telco channels are provided adjacent to the monitor controls. They provide the audio connections for two telephone hybrids and a two-channel recorder. A board-mounted trim control allows the Impulse to interface with hybrids using outputs of -10 dBu up to +4 dBu.

Each Telco channel's hybrid mix-minus output (Feed to Caller) can be set manually from between the three program buses and the Off-Line mix bus. An Autofeed function automatically switches the Feed to Caller between the Off-Line mix bus and the assigned Program buses as the Telco channel is turned off and on.

Outputs

Each audio bus (Program-1, Program-2 and Program-3) has its own AES-3 digital output as well as two analog outputs (main and auxiliary stereo line outputs) on Pgm-1 & Pgm-2 and one analog output on Pgm-3. The analog mono outputs (Main and Aux) can be jumper-set to output the summed output of any program bus. Each analog output signal is +4 dBu balanced.

Monitoring

The monitoring and communication controls for a Control Room (CR) and a separate Studio (or voice booth, call screener or other room) are provided. Separate volume controls, with speaker muting logic for the CR and Studio speakers, are provided for the CR headphone and monitors, the Cue speaker and the Studio monitors. Both CR and Studio warning logic outputs are also provided.

Each room has independent multiple source selection from among three external inputs, Pgm-1, Pgm-2, Pgm-3 and a Telco monitor.

The Talkback system includes a built-in adjustable electret CR Talkback mic with line-level External and Talk to Studio outputs, and an external mic or line level remote Talkback input with talkback logic input. In addition, any input channel set as a Studio mic can talkback to the CR through the Cue speaker.

Clock & Timer

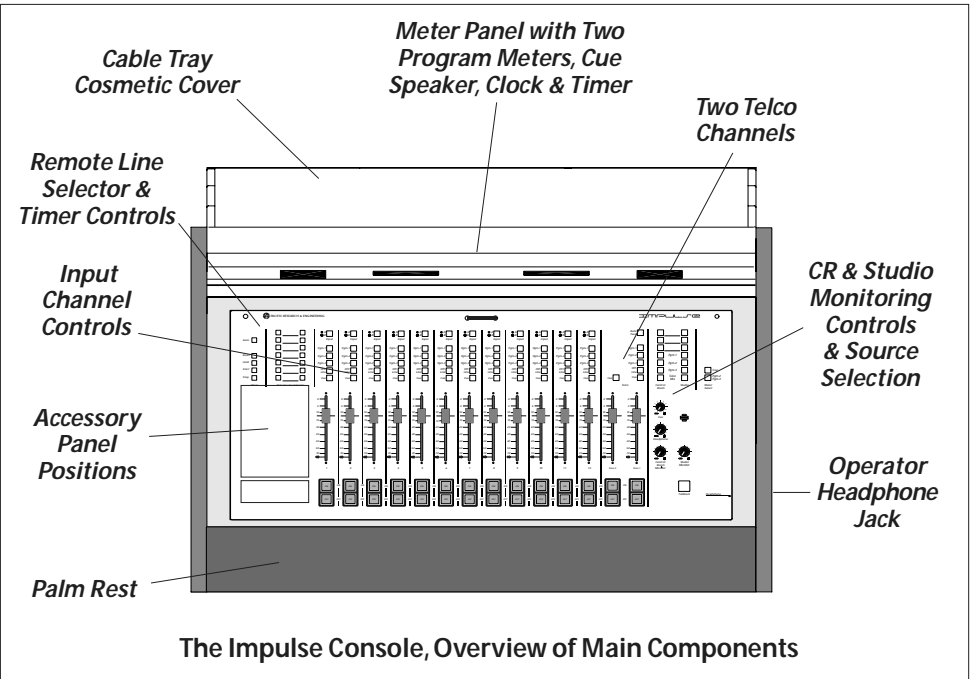
The digital clock and timer are located in the meter panel. The timer is controlled automatically by the channel logic or manually though the control surface's Start, Stop, Hold, and Reset buttons.

Remote Line Selector (RLS)

The analog remote line selector is a 7x2 source selector for balanced, line-level, mono or stereo signals. Two banks of seven switches provide manual, exclusive source selection, for routing to the two RLS outputs.

Power Supply

The switching power supply is mounted within the meter panel. It has four regulated output voltages. Two outputs (± 15 volts) power the analog circuits. A third (+5 volts) powers the DSP and logic control circuits. The remaining output supplies phantom powering (+48 volts) for condenser microphones connected to the Microphone Preamplifiers.



SPECIFICATIONS

Impulse-20 specifications are shown.

Test Conditions

Specifications are per channel, with 600 ohm loads on analog outputs.

0 dBu corresponds to 0.775 volts RMS regardless of circuit impedance. This equals 0 dBm into a 600 ohm circuit for convenient level measurements using meters calibrated for 600 ohm circuits.

Noise specs based on 22 kHz bandwidth. Noise increases about 1.7 dB if a meter with a 30 kHz bandwidth is used.

THD (Total Harmonic Distortion) is measured at +23.5 dBu output using a swept signal and a 22 kHz low pass filter.

FSD = Full Scale Digital, +24 dBu

Microphone Preamplifiers

Source Impedance: 150 Ω

Input Impedance: 5 k Ω min. balanced

Input Level Range: Adj. -70 to -30 dBu

Input Headroom: 20 dB above nom.

Output Impedance: 220 Ω balanced

Nominal Output: +4 dBu, balanced

Output Load Impedance: 2.5 k Ω min.

Analog Inputs

Source Impedance: 600 Ω or less

Input Impedance: >40 k Ω, balanced

Input Level Range: Adj. -10 to +4 dBu

Input Headroom: 20 dB above nom.

Analog Main Outputs

Output Source Impedance: 80 Ω bal.

Output Load Impedance: 1 k Ω min.

Nominal Output Levels:

Program Outputs: adj. +4 dBu

Telco Mix-Minus: set at +4 dBu

Telco Recorder Mix Feed: +4 dBu

Maximum Output Levels:

Program and Monaural: +24 dBu

Telco Mix-Minus: +24 dBu

Telco Recorder Mix Feed: +24 dBu

Digital Inputs & Outputs

Reference: +4 dBu = -20 dB FSD

Signal Format: AES-3, S/PDIF on input only

AES-3 Input Compliance: 24-bit

AES-3 Output Compliance: 24-bit

Digital Reference Frequency: Internal crystal

Internal Sample Rate: 48 kHz

Processing Resolution: 24-bit fixed with ext.

precision accumulators

Conversions: A/D 24-bit Delta-Sigma, Sample rate

conversion on all digital inputs;

D/A 24-bit, using 1-bit conversion.

Latency: <1 ms, Mic in-Monitor out; <300 μs digital

in-digital out

Monitor Outputs

Output Impedance: 80 Ω, Z-balanced

Output Load: 2.5 k Ω or greater

Output Level: 0 dBu nominal, +20 dBu max.

Console Headphone Jack Output:

Output Impedance: 100 ohms

Output Load: > 4 ohms

Output Level: +8 dBu nominal, +20 dBu max. into a 600 ohm load

External Headphone Amplifier Output:

Source Impedance: 80 Ω

Load Impedance: < 2.5 k Ω

Output Level: +4 dBu nominal, +24 dBu max.

Frequency Response

Mic or Line Input to Program Output:

+0 dB/-0.5 dB, 20 Hz to 20 kHz

Telco Input to Program Output:

+0 dB/-1.0 dB, 20 Hz to 20 kHz

Equivalent Input Noise

Microphone Preamp. -127 dBu, 150 ohm source

Dynamic Range

Analog Input to Analog Output: 89 dB, 91 dB“A

weighted (both ref. to FSD)

Digital Input to Analog Output: 92 dB, 95 dB“A

weighted (both ref. to FSD)

Total Harmonic Distortion + Noise

Mic Pre Input to Mic Pre Output: <0.005%, 20 Hz to 20

kHz, -38 dBu input, +18 dBu output, 100 k ohm load, 22

kHz filter bandwidth.

Analog Input to Analog Output: <0.02% at 1 kHz, +18

dBu input, +18 dBu output, 1 k ohm load, 22 kHz filter

bandwidth.

<0.05%, 20 Hz to 20 kHz, +18 dBu input, +18 dBu

output, 1 k ohm load, 22 kHz filter bandwidth.

Digital Input to Digital Output: <0.0016%, 20 Hz to 20

kHz, +18 dBu input, +18 dBu output, 22 kHz filter

bandwidth

Digital Input to Analog Output: <0.005% at 1 kHz, +18

dBu input, +18 dBu output, 1 k ohm load, 22 kHz filter

bandwidth.

<0.05%, 20 Hz to 20 kHz, +18 dBu input, +18 dBu

output, 1 k ohm load, 22 kHz filter.

Crosstalk Isolation

Program-to-Program: >88 dB, 20 Hz - 20 kHz

Stereo Separation

Analog Program Outputs: >87 dB @ 1 kHz,

>78 dB, 20 Hz to 20 kHz

Power Requirements

Input AC voltage: 85 - 264 VAC, 50/60 Hz

AC input: 8 foot IEC power cord

Impulse-12 current draw: 120 watts

Impulse-20 current draw: 170 watts

AC Ground: Chassis grounded through AC cord

Power Supply Outputs

Phantom power: +48VDC at 0.10 Amp

Audio power: ±15VDC at 1.00 Amp (each leg)

Digital & Logic power: +5 VDC at 7.5 Amps

Harris reserves the right to change specifications without notice or obligation.

WARRANTY

The Impulse console carries a manufacturer’s warranty subject to the following guidelines and limitations:

A) Except as expressly excluded herein, PR&E (“Seller”) warrants equipment of its own manufacture against faulty workmanship or the use of defective materials for a period of one (1) year from date of shipment to Buyer. The liability of the Seller under this Warranty is limited to replacing, repairing or issuing credit (at the Seller’s discretion) for any equipment, provided that Seller is promptly notified in writing within five (5) days upon discovery of such defects by Buyer, and Seller’s examination of such equipment shall disclose to its satisfaction that such defects existed at the time shipment was originally made by Seller, and Buyer returns the defective equipment to Seller’s place of business in Mason, Ohio, packaging and transportation prepaid, with return packaging and transport guaranteed.

B) Equipment furnished by Seller, but manufactured by another, shall be warranted only to the extent provided by the other manufacturer.

C) Thermal filament devices (such as lamps and fuses) are expressly excluded from this warranty.

D) The warranty period on equipment or parts repaired or replaced under warranty shall expire upon the expiration date of the original warranty.

E) This Warranty is void for equipment which has been subject to abuse, improper installation, improper operation, improper or omitted maintenance, alteration, accident, negligence (in use, storage, transportation or handling), operation not in accordance with Seller’s operation and service instructions, or operation outside of the environmental conditions specified by Seller.

F) This Warranty is the only warranty made by Seller, and is in lieu of all other warranties, including merchantability and fitness for a particular purpose, whether expressed or implied, except as to title and to the expressed specifications contained in this manual. Seller’s sole liability for any equipment failure or any breach of this Warranty is as set forth in subparagraph A) above; Seller shall not be liable or responsible for any business loss or interruption, or other consequential damages of any nature whatsoever, resulting from any equipment failure or breach of this warranty.

4. Remove the flat head Phillips screws holding the Main board to the bottom chassis. Unplug the board from the adjacent Main boards and remove the circuit board.

Fader Servicing

All faders are single-element, conductive plastic (PR&E # 95-1044). There are no replaceable nor rebuildable parts on the Impulse fader assembly. Fader service is comprised of cleaning and lubricating, or replacing.

Use only a cotton swab wet with distilled water to wipe off the conductive plastic.

Accessories

Harris has a full line of logic cables designed for use with the Impulse console and the modular

cabinetry. QuickLine cabinetry is rapid-assembly

studio furniture that can be configured to create indi-

vidualized studio furniture packages in either stand-up

or sit-down styles.

PrimeLine furniture line can also be used with an Impulse console. PrimeLine offers pre-assembled cabinet components, in stand-up or sit-down heights, with pre-cut console and wiring access holes. PrimeLine cabinets can be factory pre-wired since the cabinets are shipped blanket-wrapped via van line.

Button Engraving

Input and Telco channels come standard with their red and yellow button caps engraved ON and OFF. Custom engraving on the button caps can be ordered at the time of purchase or engraved replacement button caps can be ordered once the input sources have been determined.

Each button cap can have one or two lines of engraving with up to four alphanumeric characters and a ½ character punctuation divider (space, period, hyphen, slash, backslash, etc.) on each line.

Engraving is normally done on the yellow button cap to identify the A input source on the top line and the B input source on the bottom line.

Custom engraving can be specified when a blank button cap is ordered. For a yellow button cap, order 25-872. For a red button cap, order 25-871. For a white button cap, as used for the Talkback button, order 25-870.

Note: The use of chemical cleaners on the conductive plastic will substantially shorten fader life. Never touch the fader slider contact fingers while cleaning the fader parts.

If the fader movement is rough, either the lubricant on the glide rail has evaporated or foreign material has gotten into the fader. Dow Corning 510 is the preferred glide rail lubricant as it will not migrate to the slider contact fingers like other lubricating oils.

Each fader is fastened to the operator panel using two 1/16 inch button head screws and plugs into a circuit board connector.

To lubricate the top rail, remove the fader side cover

Fader Knobs

Input channels come standard with black fader knobs. Various other colored fader knobs are available. The table identifies the PR&E part numbers by knob color and typical source.

PR&E #	Color	Typical Source
32-710-1	black	Remote
32-712-1	red	Microphone
32-714-1	yellow	Cart deck / DDS
32-715-1	green	CD player / turntable
32-716-1	blue	Cassette / reel-to-reel
32-719-1	white	Telco
32-720-1	gray	Other Studios
32-721-1	orange	Multitrack inputs

CONSOLE CONTROL PANELS

To the left of the channel 1 controls is the User Panel area. This area can hold up to three custom or standard PR&E control panels. Panel dimensions are listed on page 20.

Recorder Remote Panel

The Recorder Remote panel used on the PR&E Integrity console (99-993-x) can also be used on Impulse. It is a single recorder remote with five control buttons (Play, Stop, Record, Forward and Reverse).

The panel comes with a 24-pin Molex connector for use with standard PR&E cables. The mating Molex connector and pins are included for making up a custom cable in the field.

The panel can be ordered without lamps (99-993-0), with 5 volt lamps (99-993-1), with 14 volt lamps (99-993-2) or with 24 volt lamps (99-993-3) to match the recorder’s tally voltages.

and center the fader slider. Place a drop of Dow Corning 510 on the rail to each side of the slider. Move the slider through the full range of fader travel to lubricate the rail. Wipe off any excess lubricating fluid using a dry cotton swab.

Custom Remote Control Panels

Three blank panels are available to create custom panels: Single width, 1.5" x 6.0" (80-1663-4), Dual width, 3.0" x 6.0" (80-1663-3) and Triple width, 4.5" x 6.0" (80-1663-2). Minimum clearance below these panels is 2" (50.8 mm). A small cover panel, 2.25" x 4.5" (80-1663-1), located directly below the User Panel area, can also be used, although vertical clearance below this panel is limited.

All control wiring routes through an opening on the console’s rear panel. We recommend that custom wiring terminate in a connector to ease installation and future servicing.

Custom remote panels can also be fabricated by Harris, contact a sales representative for pricing and availability.

Guest Panels

Two Guest Mic Control Panels are available for Impulse: cabinet-mounted (99-949-1) and turret-mounted (99-949-2).

Each panel has four engraved illuminated buttons (On, Off, Cough, Talkback). The Guest Panel schematic and the connecting cable drawing (99-716-CU) are shown on page 20.

LOGIC CONTROL CABLES

To help in logic cable design and construction, logic wiring diagrams for many popular peripherals are available from PR&E. The most common cable diagrams are also included on the Impulse Technical CD-ROM.

Pre-made logic cables for many peripherals are also available, contact a sales representative for pricing and availability.

Parts & Repair Services

All of the switches, button caps and faders on Impulse are easily field replaceable.

Although schematics are available in the Impulse Technical CD-ROM (sold separately), it is recommended that circuit boards be returned to PR&E for component servicing due to their surface mount construction.

PARTS & REPAIR INFORMATION

Spare parts and accessories are available from Harris' Technical Services Department. Most repair parts are shipped within 24 hours, but circuit boards and other assemblies may have lead times exceeding two weeks, so order spare parts accordingly.

Parts returned to Harris for service, exchange or credit must have a Return Authorization (RA) tracking number assigned to them by Technical Services. Items returned without an RA number written on the outside of the packaging are subject to customer return or to additional handling fees.

To order parts or request an RA, contact Technical Services by phone, fax, e-mail or post:

Harris
Attention: Technical Services
4240 Irwin Simpson Road
Mason, OH 45040 USA
Phone: 513.459.3503 8:00 to 5:00 ET
Fax: 513.701.5309
E-mail: service@pre.com

All items are shipped FOB Mason, OH using two-day service, unless otherwise specified at time of order. Overnight or Next Day A.M. delivery is also available for most items. Orders must be placed before 2:00 P.M. Eastern Time for parts to ship the same day (applies to in-stock items only).

Parts or repair services can be shipped COD, or charged to American Express, VISA or Mastercard, if company is not on-account with Harris. Contact your sales representative regarding your company's account information.

SPARE & REPLACEMENT PARTS INFORMATION

All PR&E parts are categorized using PRE, a two-digit part type prefix, a dash, and a multiple digit part ID number (a second dash and a suffix number may also be used to identify part variations). The Replacement Parts table lists the various Impulse components and assemblies that are available.

Impulse Replacement Parts

Parts marked with an * are those typically subject to usage wear and tear. It is recommended that one or more of each be kept in the on-site spares stock.

Harris #	Description or Use
PRE12-95	Lamp & housing—On, Off & Talkback
PRE12-101 *	Lamp only—On, Off & Talkback
PRE23-1	Talkback Microphone
PRE23-2	Cue speaker
PRE24-98	Cue Pot
PRE24-100 *	Monitor levels and H/P Pot
PRE25-853 *	Pgm, A/B, RLS, Monitor switch
PRE25-854	Autofeed switch
PRE25-855 *	Cue switch
PRE25-856 *	Off-Line switch
PRE25-858 *	On switch w/red button cap
PRE25-859 *	Off switch w/yellow button cap
PRE25-860	Talk switch w/white button cap
PRE25-870	White button cap
PRE25-871	Red button cap
PRE25-872	Yellow button cap
PRE50-21	Power Supply assy.
PRE80-1121	Clock/Timer bezel
PRE80-1500-4	1.5" wide blank cover
PRE80-1500-5	3" wide blank cover
PRE80-1500-6	4.5" wide blank cover
PRE95-1044 *	Channel fader assy.
PRE99-1041	Analog Input PCA
PRE99-1042-1	Digital Input PCA
PRE99-1042-2	Optical Input PCA
PRE99-1045-1	Mic Preamplifier
PRE99-1045-2	Remote Line Selector PCA
PRE99-1045-3	Output amplifier PCA
PRE99-1046-1	RLS/Timer switchboard
PRE99-1046-2	Monitor/Meter switchboard
PRE99-1048-1	Main DSP Board, left
PRE99-1048-2	Main DSP Board, center
PRE99-1049-1	Dual Input Control PCA
PRE99-1049-2	Dual Telco Control PCA
PRE99-1050	Bargraph/Timer/Clock assy
PRE99-1051	Main DSP Board, right

Installation Kit Parts

The Tool and Connector kits supplied with each console contain these parts:

Harris #	Description	Quantity
PRE76-899	Impulse-12 Connector Kit	
PRE14-482	3-pin AMP housing	3
PRE14-484	6-pin AMP housing	58
PRE14-486	8-pin AMP housing	2
PRE14-500	24-pin AMP housing	12
PRE15-938-1	Receptacle contacts	549
PRE76-900	Impulse-20 Connector Kit	
PRE14-482	3-pin AMP housing	3
PRE14-484	6-pin AMP housing	74
PRE14-486	8-pin AMP housing	2
PRE14-500	24-pin AMP housing	20
PRE15-938-1	Receptacle contacts	770
PRE76-901	Impulse Tool Kit	
PRE50-2	AA Alkaline Battery	2
PRE70-126	Crimp Tool	1
PRE70-129	Contact Tool	1
PRE90-151	Clock Magnet Tool	1

SERVICING

Refer to the Impulse Technical CD-ROM (sold separately) for complete servicing instructions and parts listings.

Operator Panel

To place the operator panel into its service position:

- Loosen the two rear-corner 1/4-turn screws.
- Pull up on the Pull Handle (middle rear of operator panel) to tilt the panel forward to its service position.

Circuit Board Replacement

The Dual Input Channel circuit boards can be removed or installed with the console powered, and with it on-air, without causing audio interruption or noises in the program audio. Removal or installation of any other circuit board requires that the console power be turned off.

When the console is first turned on, all Inputs come up in their default turn-on state—no bus assignments active, the channel turned Off. Each pair of channel controls (1 & 2, 3 & 4, etc.) are on one Dual Input circuit board.

Note: Prior to removing any Input board from the operator panel, turn off all bus assignments.

Dual Input Channel Board Removal

- Unplug the flex cable connecting that board to the Main board.
- Remove the fader screws from the front surface of the operator panel. The two faders are removed along with the Dual Input board.
- Remove the flat head Phillips screws holding the circuit board to the underside of the operator panel and remove the circuit board and faders.

Monitor Pot or Switch Removal

Note: Impulse uses sealed pots that cannot be "cleaned."

- Unplug the pot, or the flex cable, connecting the component to the Main board.
- To replace a pot, remove the colored end cap from the knob by prying it loose. Use a 70-44 Sifam Knob Removal Tool or hex driver to loosen the lock nut so the knob assembly can be removed from the pot shaft. Use a 7/16 inch nutdriver to remove the shaft nut.
- To remove the monitor selector circuit board, remove the flat head Phillips screws holding the circuit board to the operator panel and remove the circuit board.

Main Board Removal

- Unplug the flex cables connecting the Input boards, or the pots and Monitor board to the Main board.
- Unplug all external cables from the audio and logic connectors on the rear panel.
- Unplug the Input Cards from the Main board.

Installation

The Impulse console sits on top of the studio furniture countertop. A minimum of 15 inches of vertical clearance above the countertop is required to open the operator control surface to its service position.

- The Impulse console consists of:
- The 12- or 20-input mainframe
 - The standard configuration of Input Cards installed into the Input channels
 - The Impulse Tool Kit: AA batteries, AMP MOD IV crimper and removal tools and clock set magnet tool
 - Audio and Logic Connector Kit for the mainframe ordered. The kit contains all the AMP MOD IV connector housings and receptacle contacts needed for installation.

To simplify console interconnection, logic cable drawings for specific peripheral devices are available from the Harris Technical Support Department (the most popular are also on the Impulse Technical Service CD-ROM).

Custom engraving on the channel On/Off button caps and colored fader knobs are also available. See *Accessories*, page 19 for details.

INSTALLATION NOTE: Do not set Impulse near intense electromagnetic hum fields, such as those from power transformers and audio amplifiers using inexpensive power transformers operating in or near saturation, as this can impair console performance. Route audio cables to achieve maximum practical distance from all AC mains wiring.

CONSOLE CONFIGURATION

Impulse continues PR&E's design philosophy of positioning the input channels in the physical center of the console. This gives the operator equal reach to peripheral equipment located to the sides of the console.

Channel Assignment

Any Input channel can be assigned as a line input or a microphone input. This is done through a DIP switch setting on the processor boards mounted on the floor of the chassis. See page 11 for details on setting these DIP switches.

The Meter Panel

Two bargraph meters provide stereo level monitoring for Pgm-1 and either Pgm-2 or Pgm-3 with momentary Cue bus metering selection. The meter scale

(VU or PPM) is set via a DIP switch on the processor board prior to power up. The cue/talkback speaker, a clock and event timer are also on this panel.

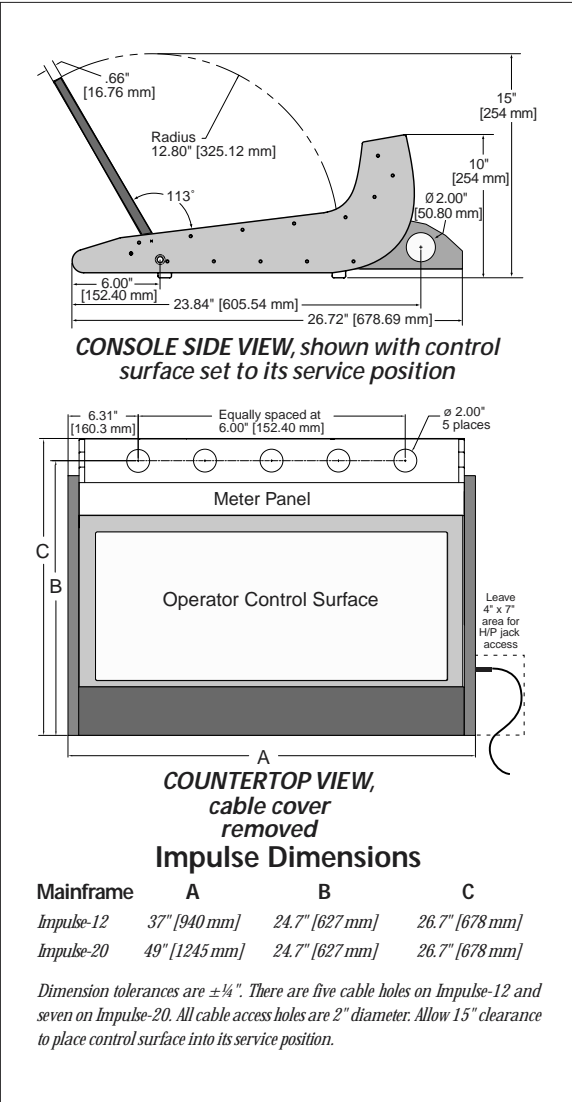
Connector Access

All audio and logic connectors are located along the rear of the console mainframe, normally hidden by the wire tray and cosmetic cover. To ease initial wiring, the cosmetic cover can be removed from the wire tray. The cover is fastened to the wire tray using Phillips screws.

In most installations, the wiring is dropped into the cabinetry through 2-inch access holes in the floor of the wire tray. A 2-inch access hole is also available at each end of the wire tray for countertop wiring. Console and wiring access dimensions are shown below.

Internal Control Access

To access the console's trimpots and DIP switches, the control surface must be opened to its service position. To do this, loosen the two quarter-turn fasteners at



the rear corners of the control surface, then lift using the pull handle at the rear center of the panel.

Power Supply

The console power supply is mounted inside the meter panel. A power entry module (with power switch and IEC power connector) is mounted on the meter panel's rear cover, behind the Cue speaker.

The power entry module plugs into an isolated ground AC outlet using an eight-foot IEC power cord. Ensure that the cord is not under tension and that it does not parallel any audio wiring during installation.

AC GROUND NOTE: Do not defeat the AC safety ground in any way. Doing so may provide a potentially dangerous condition to the operator.

GROUNDING & SHIELDING

The broadcast facility's *technical ground* should only connect to the mainframe chassis ground stud located on the mainframe rear panel. Terminate the facility's technical ground wire in a crimped lug.

Connect the audio shields at both the console and the peripheral when all system components share a common ground potential and are using isolated-ground AC outlets individually tied back to the main technical ground.

If isolated-ground AC outlets are not available, connect the cable shields at the console end only. The shields should be floated (left unconnected) at the peripheral device. Ensure the peripheral devices connect to a clean ground through their power cords, or through separate ground wires to the facility's technical ground.

AUDIO GROUND NOISES: Buzz pickup is generally electrostatic—such as capacitive coupling between an audio line and a power line. Do not route audio lines in the same wireway as an AC power line.

BACKUP BATTERIES

Two AA alkaline batteries are supplied in the Impulse Tool Kit. They supply a "Keep Alive" voltage that holds each channel's logic state during momentary power outages. They mount in battery clips on the right hand processor board (see page 11 for location).

Observe the correct polarity (as marked on the circuit board) when installing the batteries.

CAUTION: Replace only with same or equivalent type batteries.

Replace batteries yearly to ensure continuous backup protection. Remove batteries if the console is unplugged for an extended period.

SETTING THE CLOCK

The digital time-of-day clock is part of the Meter Panel PCA mounted inside the meter panel.

The clock operates in one of two modes: Free Run or ESE. In Free Run mode, the default setting, clock timing comes from a temperature-controlled quartz crystal oscillator. In ESE mode, clock timing comes from a coaxial TC89 or TC90-format ESE time code reference signal.

The operating mode is set by DIP switch DS1, #2. To access the DIP switch, open the hinged Meter Panel rear cover after removing the screws.

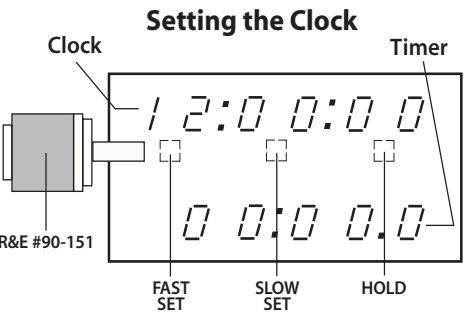


Switch DS1 on the Meter Panel PCA, as viewed from the rear of the console. Factory default settings shown.

Clock/Timer Option Switches

With Free Run mode selected, the clock can be set to display time in either 12 or 24-hour format (set through DS1, #4). Free Run mode requires the clock time to be set manually. Three magnetically-activated Hall-effect sensors, below and between each pair of 7-segment displays just behind the bezel, adjust or hold the time. The Clock Set Magnet Tool (90-151, included in the console Tool Kit) activates the Hall-effect sensors.

To set the time, place the end of the magnet tool directly against the bezel over the appropriate sensor. Use *Fast Set* to rapidly advance the time to the nearest hour and *Slow Set* to advance the time a bit slower. To synchronize the clock display to real time, set the clock a few seconds ahead and use *Hold* to freeze the display. To start the clock, move the tool away from *Hold*. An accurate source to synchronize the clock can be found by calling the WWV clock at 303.499.7111 (in the USA).



Note: The plastic clock/timer bezel may be scratched if the tool is moved while in contact with the lens.

When an ESE coaxial time code signal is connected to BNC connector, J3, on the Meter Panel PCA, and ESE mode is selected (DS1, #2), the clock follows the ESE time code and is not set manually. Should the ESE time code signal fail, the clock automatically defaults to its internal crystal reference oscillator, blinking an LED decimal point in the clock display to indicate the loss of time code.

The Impulse clock can sync to either TC89 or TC90 format time code. Set DS1, #1 for the ESE signal being used.

Master clocks are available from:
ESE
142 Sierra St.
El Segundo, CA 90245.
Telephone: 310.322.2136
www.ease-web.com

Clock Backup Battery

A 9-volt battery can be installed in J5 on the Meter PCA. This battery powers the clock during any momentary power outages so that it doesn't have to be set again after power is restored. The battery will power the clock for about four hours total and should be changed yearly. When the console will be left turned off for an extended period, remove the battery.

Timer Display

The Event Timer displays time in minutes, seconds and tenths of seconds. The tenths display is normally turned off while the timer runs. It can be turned on while running by setting DS1, #3, to the left. The tenths of seconds will always be displayed while the timer is in the Stop or Hold modes, regardless of the setting of switch DS1, #3.

Cabling & Wiring

To simplify console connection, draw up a facility wiring plan listing the console's audio and logic connections with peripheral devices. Identify and create tags for each cable and then list each connection in a master facility wiring logbook. This facilitates initial wiring installation and future system wiring changes, equipment updates or system troubleshooting. Refer to *Console Connections* on page 9 for descriptions of the audio and logic connections.

Analog audio connections require two-conductor stranded, insulated, foil-shield cable containing a separate shield drain wire (equivalent to Belden 8451, 9451 or 8761).

AES/EBU connections require 110 ohm two-conductor stranded, insulated, foil-shield cable containing a separate shield drain wire (equivalent to Belden 1806).

S/PDIF connections, which are unbalanced use coaxial cable connected between the + and GND connects on the inputs.

Optical connections use EIAJ RC-5720 fiber cables.

Logic control cables require stranded, 22 AWG, multiple conductor, non-shielded, jacketed cable (equivalent to Belden 9423, 8457 or 9421). The number of conductors needed is determined by the application. Typically five and eight conductor cables are used for logic cabling, even though there are 18 distinct signals on the Logic Interface connector, since only a handful are actually used for any given application.

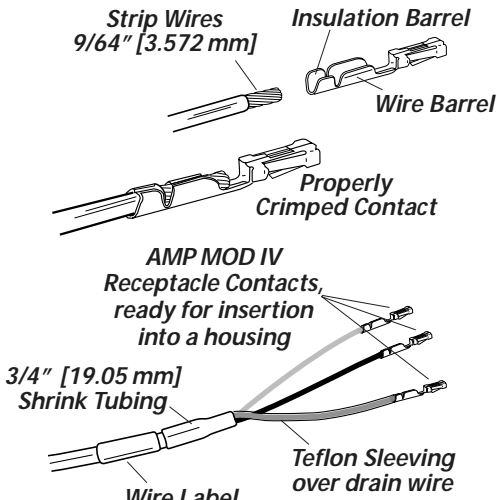
Wire Preparation

All Impulse audio and logic wiring terminates in AMP MOD IV receptacle contacts. Stranded wire of 22 to 26 AWG, with insulation diameters of .040 to .060 inch, can be used with the AMP MOD IV receptacle contacts.

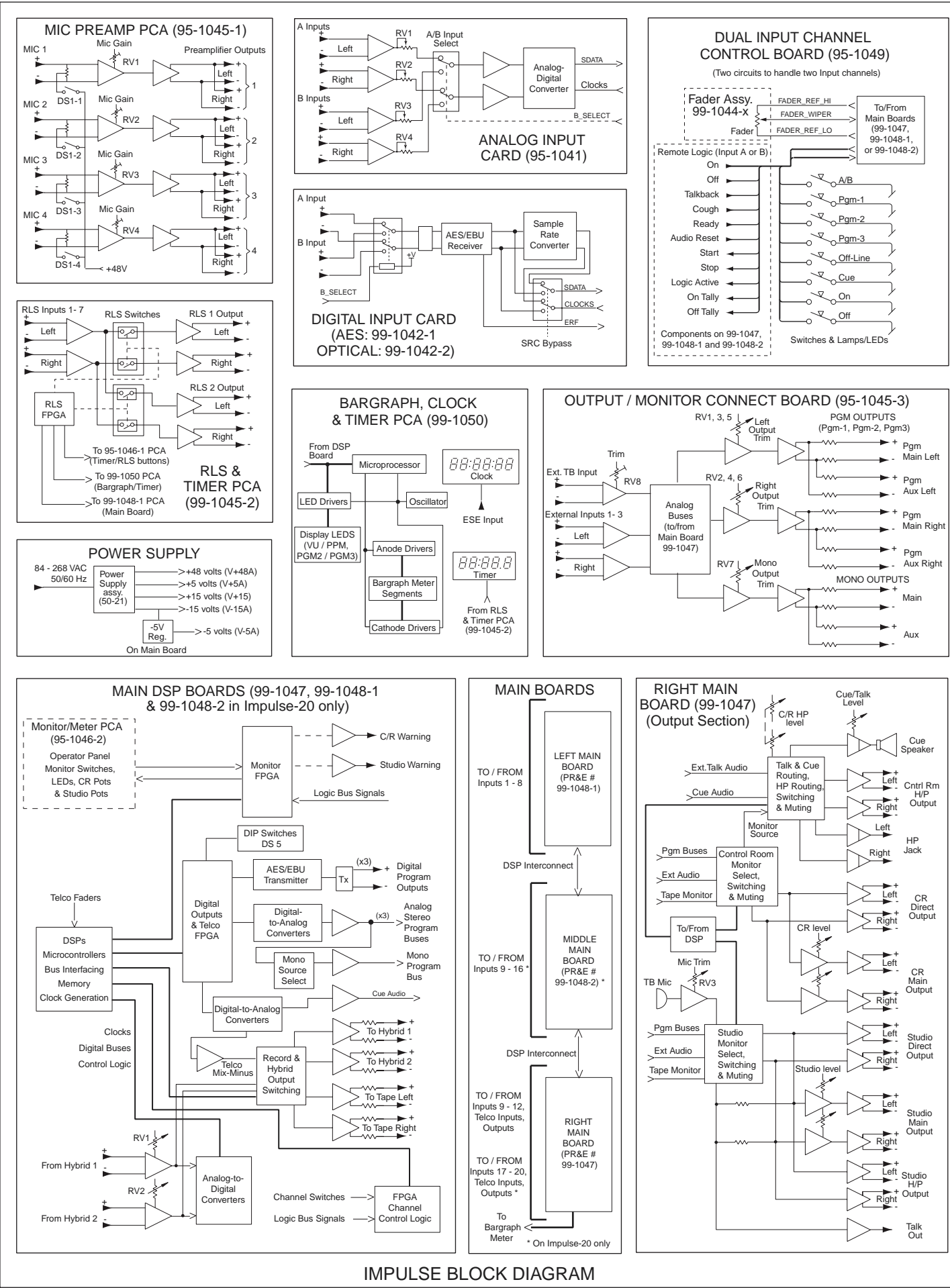
Follow these steps for wire preparation:

- 1 Strip the cable insulation jacket back 1 1/2" [38.10 mm].
- 2 Remove the foil shield from audio cables.
- 3 Sleeve the audio drain wire with Teflon sleeving, leaving 9/64" [3.572 mm] of the drain wire exposed.
- 4 Use 3/4" [19.05 mm] of heat-shrink tubing to sleeve the end of the jacket, centered on the cut. Shrink the tubing to hold any drain wire sleeving in place.
- 5 Strip the insulation back from all signal wires 9/64" [3.572 mm].

Audio Cable Shield Note: To follow recommended grounding procedures, sleeve all drain wires with Teflon sleeving and put heat shrink tubing over all cable jacket cuts to insulate the shield wire.



Prepped Wire Details



other Telco channel. The Telco mix-minus audio also goes to the right channel of the TAPE output. The caller audio from the second hybrid may be summed with the mix-minus or with the other caller, following the setting of DIP switch DS5, #3.

Auto-Feed

When the Auto-Feed function is active, the mix-minus output of the selected bus with the highest priority is fed back to both callers. When both Telco channels are Off, the Off-line bus audio is automatically sent to the callers.

When Auto-Feed is not selected, the mix-minus for the assigned bus with the highest priority is sent to both callers regardless of which condition (On or Off) the Telco channels are in.

Note:With Off-Line selected and Auto-Feed turned off, neither caller will go on-air when the Telco channel is turned On since there is no Program bus assignment.

MAIN DSP BOARDS

Each Main Board fastens to the bottom of the main-frame, plugging directly into the adjacent Main Board. The power supply cable plugs onto the right-hand Main Board.

Digital Signal Processing

Impulse’s digital processing is based on Motorola’s 24-bit fixed point DSPs. 24-bit data words provide 144 dB of dynamic range. The DSP operates at a nominal sample rate of 48 kHz with on-board crystal synchronization. The internal resolution of 56-bits provides 336 dB of computational dynamic range.

The left-hand Main DSP Board handles the first eight Input channels on both the Impulse-12 and the Impulse-20. Each of the first eight Input channel positions connect their serial data outputs, along with their switch outputs and fader wiper voltage, directly to the DSP on this board. On the Impulse-20, the next eight channels (input channels 9 - 16) are handled by a second “left-hand” Main DSP Board centered between the left- and right-hand Main DSP Boards.

The right-hand Main DSP Board handles the remaining four Input channels for each size console and the two Telco channels. This DSP also creates the main digital program, Cue and Talk outputs and the meter outputs. Each board generates its own DSP reference signals with the right-hand Main DSP Board generating the system clocks and system reset signals.

OUTPUTS

An FPGA on the 95-1047 PCA divides the single multiplexed data stream output from the DSP into its component data parts to create digital Cue, Off-line, Pgm-1, Pgm-2 and Pgm-3 buses. The digital Program signals go through AES/EBU transmitters to create the transformer-coupled Digital Pgm-1, Pgm-2 and Pgm-3 outputs. There are no level adjustments on the digital outputs.

These signals also go through DACs (Digital-to-Analog Converter) and buffer amps to create the six analog outputs (Analog Pgm-1, Pgm-2, Pgm-3). The DACs’ left and right outputs are capacitively-coupled through buffers and output trim controls (RV1 - RV7), which

set the output levels to a nominal +4 dBu output. The three PGM MAIN outputs are also connected to the CR and Studio source selectors.

The MONO outputs (Main and Aux) are selected from between the three program buses by Output board Jumper J63-J65. RV7 sets the MONO output level to +4 dBu.

A single stereo DAC converts the combined CUE/TEL bus output from the FPGA into the analog Cue and Telco mix-minus signals. The Cue signal goes to the Cue speaker while the Telco mix-minus signal goes to the Telco channels.

The 99-1047 PCA also has a board-mounted DIP switch (DS5) that sets whether the global Fader Start Enable function is on or off (#6) and whether the meters display VU or PPM (#7).

MONITORING

The left hand row of monitoring controls (the Source Select buttons, Cue, Headphone and Monitor level pots) are for the Control Room. The right hand row has the Source Select buttons, the Studio monitor speaker level control and the studio Talkback button.

Control Room Functions

The selected CR monitor source is coupled to both the CR Monitor Pot and to the CR headphone signal assignment switcher. The output of the CR monitor pot goes through mute switch, controlled by the CR Mute logic bus, before being buffered and balanced for output to create the main CR Monitor Output.

Studio Functions

The selected Studio monitor source is coupled to both the Studio Monitor Pot and to the Talent headphone circuit. Talkback is inserted into the studio monitor signal under control of the Talkback command.

Cue/Talkback

The Cue/Talkback audio (after it is converted from digital by a DAC) is coupled to the Cue pot and to the headphone audio assignment switcher. The output of the Cue pot connects to the Cue speaker amplifier IC which is muted by the Cue Mute logic signal.

The built-in electret Talkback microphone is gain controlled by trimpot (RV3) on the right-hand Main Board. The Talkback mic audio is switched into the Studio outputs and the EXT TKBK output by the Talkback switch.

CR Headphone

The CR headphone audio is either the selected source monitor or the Cue/Talk bus. When a channel has Cue active, or when a Guest panel is activating the Talk logic, the monitor audio is cut off and Cue/Talk audio is fed to the console headphones. The CR Headphone Level control sets the level to the internal headphone amplifier for the headphone jack on the right side of the console and to the balanced CONTROL ROOM HD/PH output.

TIMER CONTROLS

The operator panel timer control switches (Start, Stop, Reset, Hold) manually control the timer section of the clock/timer assembly. The Auto button controls

whether the timer reset bus logic is connected to the timer. When Auto is active (button lit) the timer automatically resets at channel On for any channel with the Timer Reset logic function turned on (Logic Settings switches 5 or 6 set to On).

CLOCK/TIMER ASSEMBLY

Eleven 7-segment displays are used in the clock and timer. Three Hall-effect switches are used to set the time when the clock is in Free Run mode (DS1, #2). In ESE mode, the clock timing signal comes from an ESE TC89 or TC90 time code signal on BNC connector, J3. If ESE time code is lost, the microcontroller reverts to using the internal oscillator, flashing a decimal LED to indicate time code loss.

The timer is controlled through the console’s timer reset bus when the Auto function is active, and manually through the timer control buttons. DIP Switch DS1, #2 controls whether the tenths of seconds display is turned on while the timer is running. The tenths of seconds are always displayed when the timer is stopped.

BARGRAPH METERS

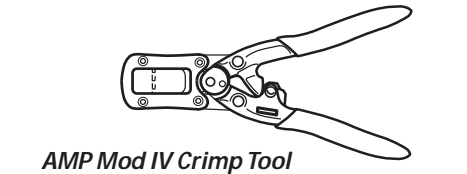
The two meter inputs come from the right-hand Main DSP Board (99-1047). Each of the four meters has three 10-segment LEDs with a dual LED Full Scale Peak Indicator. Both meters display in either Volume Units (VU) or Peak Program (PPM) following the setting of DIP switch DS5, #7.

IMPULSE POWER SUPPLY

The switching supply outputs four DC voltages: +5 volts at 7.5 A for the console’s logic circuitry, ±15 volts at 1.0 A each for the audio circuitry and +48 volts at 0.100 A for phantom powering of condenser microphones.

CRIMP TOOL OPERATION

A ratcheting AMP MOD IV hand crimper is included in the tool kit. The tool crimps the insulation and wire barrels on the AMP MOD IV receptacle contacts in one crimp action.

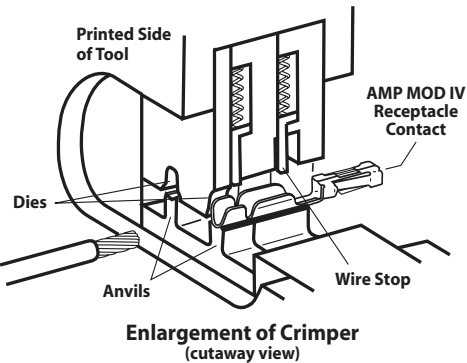


Follow these instructions for using the ratcheting crimp tool:

- 1 Hold the crimp tool with the printed side up. Insert the contact from the opposite side, with the barrel openings up, until the insulation barrel end is flush to the opening of the die. Close the tool only until the anvil holds the contact in place. Refer to the cut-away view.
- 2 Insert the stripped wire into the contact until it hits the tool’s wire stop. Hold the wire in place while squeezing the tool handles to crimp the contact onto the wire. The tool handles automatically release and spring open after the crimp cycle is complete.

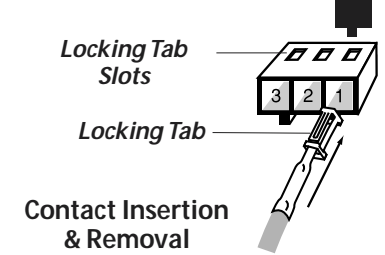
A properly crimped receptacle contact is inserted and locked into the appropriate connector housing following the pin-out diagrams found on this page and on pages 6 to 12.

The receptacle contact must be inserted with its locking tab side facing the locking tab slots on the side of the connector housing. A light “click” will be felt as the contact’s locking tab engages the locking tab slot.



For wiring changes, use a Contact Removal Tool (70-129) to depress the locking tab while pulling the contact and wire out of the connector.

**PRE70-129
Contact Removal Tool
(supplied with console)**



AUDIO CONNECTIONS

The Impulse audio connector pin assignments take visual advantage of the three-pins-per-row design of the three-pin and six-pin AMP MOD IV connectors.

For analog stereo, the left channel cable connects to the bottom row of pins and the right channel to the top row of pins.

Analog Connections

There are no analog interstage patch points within the Impulse channels or outputs. To use a patchbay, connect the line level outputs from the peripheral devices directly to the patch bay and then normal these to the appropriate Input channels. Likewise, Impulse’s outputs may also be routed through a patchbay normalled to standard peripherals such as On-Air processing gear, recorders, telephone hybrids, etc.

The Microphone Preamplifiers’ line-level outputs (+4 dBu, nominal, balanced, mono) can also be routed through a patchbay normalled to an Input channel. If mic processing is required, the Preamplifiers’ outputs may be routed through line-level mic processing equipment and then to an Input channel. When processors requiring mic-level inputs are used, the microphone should connect to the mic processor directly, with the processor’s line-level output directly connected to an Input channel.

3-pin Connector Signals
Digital Outputs

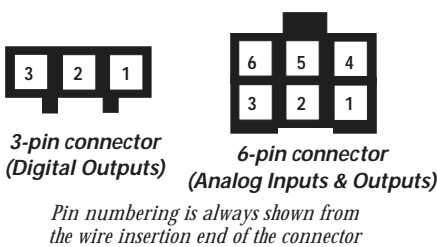
Pin	Signal Description
1	Shield (connects directly to the chassis)
2	Low (-) AES-3
3	High (+) AES-3

6-pin Connector Signals
Analog Ins & Outs

Pin	Signal Description
1	Shield, for left channel or source 1
2	Low (-), left channel or source 1
3	High (+), left channel or source 1
4	Shield, for right channel or source 2
5	Low (-), right channel or source 2
6	High (+), right channel or source 2

NOTE: Digital inputs use the source 1 connections on a 6-pin connector.

Analog & Digital Connectors,
pin out orientation



Digital Connections

The 99-1042-1 Digital Input Card is required for AES-3 inputs. The two balanced digital signals connect using pins 1, 2 & 3 of each six-pin AMP MOD IV connector. There is no connection on pins 4, 5 and 6 in this application.

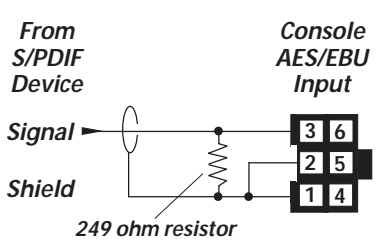
Optical inputs use EIAJ RC-5720 fiber cables. Two optical inputs (A & B) are supplied per Optical Input Card (99-1042-2).

All digital outputs use three-pin AMP MOD IV connectors. These connections output AES-3 (AES/EBU) compatible signals.

S/PDIF Signals

To connect a S/PDIF digital device to an Impulse digital input, use a 249 ohm resistor to properly terminate the S/PDIF cable. Install the resistor onto the connector per the following illustration. Alternately, an unbalanced-to-balanced line transformer may be used.

Connecting S/PDIF Devices to
Impulse AES/EBU Inputs



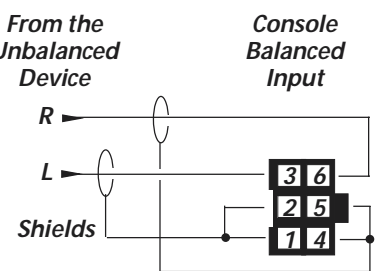
Digital Connection Notes: AES/EBU outputs cannot connect directly to S/PDIF inputs, a signal conversion interface must be used.

Some S/PDIF devices may not work with the Impulse’s digital inputs, even with the additional load resistor, due to nonstandard signal levels or protocols in the S/PDIF device.

Unbalanced Analog
Connections

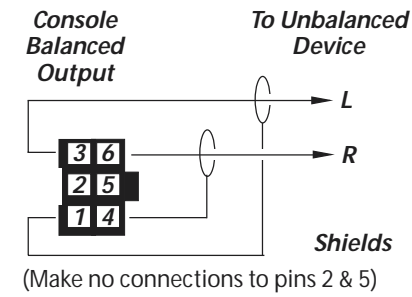
Even though all analog inputs and outputs are active and balanced, unbalanced consumer or “semipro” equipment can be connected to Impulse. For best results use an IHF-PRO match box. If a match box is not available, unbalanced analog devices can connect per the following illustration. Keep unbalanced cable lengths as short as possible.

Connecting Unbalanced Devices
to Impulse Analog Inputs



When an unbalanced device must be connected to an Impulse analog balanced output, and an IHF-PRO match box is not available, do not tie the low (-) and shield pins together to “unbalance” the signal. The low pin must always be left “floating,” as shown below.

Connecting Unbalanced Devices to Impulse Analog Outputs
(Nominal Output level is -2 dBu)



LOGIC CONNECTIONS

Each channel has one 24-pin logic connector to interface a peripheral device or Guest Panel for use with either the A or B input. The active input is set by switch 8 on each channel's Logic Settings Switch, located on the main boards (see page 11 for switch locations).

With a peripheral device connected, one of the main functions of the logic interface is to start the peripheral at module on. The peripheral device logic can, in turn, control the Input channel; turning the audio off at the end of an event and then controlling the Off lamp to indicate the peripheral device status.

When a Guest Panel is connected, its remote On, Off, Cough and Talkback buttons control the channel functions while the logic control outputs from the console control the button tallies in the Guest Panel.

THE LOGIC INTERFACE

A simplified schematic for the logic interface is shown adjacent. Logic outputs (shown on the right side of the illustration) are isolated from peripheral devices by five solid-state devices that function like single-pole mechanical relays. The “relay contacts” can switch external voltages of up to 60 volts at 350 mA.

The top two relays use momentary logic to create a 220 ms Start Pulse when the channel On button is pressed and a 220 ms Stop Pulse when the channel Off button is pressed. These Pulses are normally also generated when external logic commands On or Off are received. To disable the Start and Stop Pulses when receiving an external On or Off command, set Logic Settings Switch #7 to the On position.

The “C” or common contacts for the two Pulse outputs tie together at Command Common. The other three output relays; Logic Active Tally, On Tally and Off Tally, are “commoned” together at Tally Common.

The six logic inputs (shown on the left side of the illustration) are opto-isolated and current limited for logic voltages from +5 to +40VDC.

The On, Off, Cough and Talkback inputs allow remote Guest Panel switches to control the Input channel through active low logic signals (pull to ground). These

inputs are enabled by jumpering External Control In (+) to +5 Logic.

The Audio Reset and Ready inputs can use either active low logic (pull to ground) or active high logic (pull to +VDC) from peripheral devices. With active high logic, Ready (-) and Audio Reset (-) are tied to logic ground on the peripheral device. Ready (+) and Audio Reset (+) then connect to the appropriate logic outputs on the peripheral device.

When active low logic (pull to ground) is used by the peripheral device, Ready (+) and Audio Reset (+) connect to the logic supply voltage on the peripheral. Ready (-) and Audio Reset (-) connect to the appropriate logic outputs.

Impulse Quick Logic Guide

Page 7 offers a quick guide to configuring the console logic. Page 8 has example connection diagrams for a Guest Panel (remote mic control panel) and a Denon CD player.

Note: To completely isolate the console from a peripheral device, use only the control input and output connections. These are decoupled from the console's ground and power supply through opto-isolator devices.

The Logic Ground and +5 Logic connections are referenced to the console's logic power supply and ground. Connect these only to a peripheral device with isolated logic connections or to a Guest Panel. Connecting these to a non-isolated peripheral device can cause a ground loop between the console and the peripheral.

Microphone Logic

The two main functions of microphone logic are to automatically mute the monitor speakers in the room with the “hot” mic and to command the appropriate hot mic warning light.

It is the first four Logic Settings switches for each channel that tell the console logic whether the A and/or B input is a control room or a studio microphone.

At the microphone position, an optional Guest Panel, with illuminated On, Off, Talkback and Cough buttons, can be used to control the mic channel. To activate the Guest Panel functions, jumper External Control In (+) to +5 Logic on the logic connector and set switch 8 for the appropriate A or B input.

Momentary SPST switches can be used to construct a remote mic control panel like that shown on page 8. Connect one side of each control panel switch to the appropriate logic connector pin. Common the other side of each switch (Switch Common on the control panel illustration) to Logic Ground.

The Logic Active Tally output controls the lamps for the Cough and Talkback switches. The On Tally and Off Tally outputs control the On and Off switch lamps. The other side of each lamp (+5V) connects to +5 Logic. Use 6.3 volt lamps, with less than 50 mA current draw, for all remote panels supplied by the console.

Peripheral Device Logic

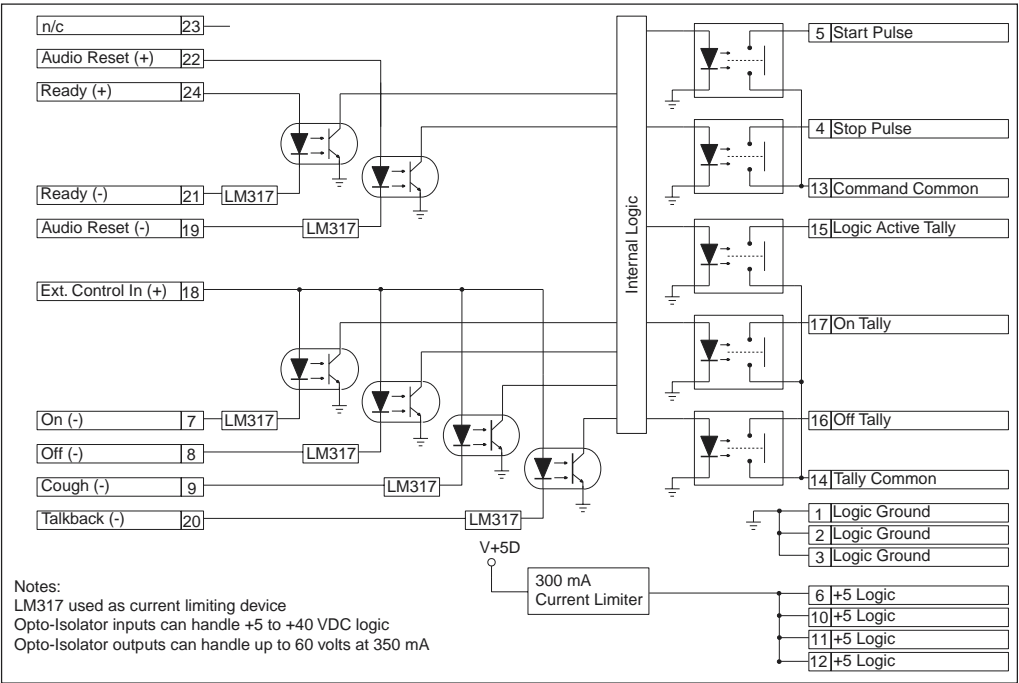
Peripheral devices are controlled through the Start, Stop and Command Common logic outputs, which follow the channel On and Off switches.

In the connection example shown on page 8, active low logic is used. This means Command Common is connected to the logic ground on the peripheral device (also labeled command common by Denon).

On peripherals requiring an active high logic, the Command Common is tied to the + logic voltage. To prevent a ground loop, this voltage must be supplied by the peripheral rather than by the console's +5 Logic.

The peripheral device can also control the channel through the Audio Reset and Ready logic inputs. As shown in the Peripheral Device example on page 8, the

(text continues on page 9)

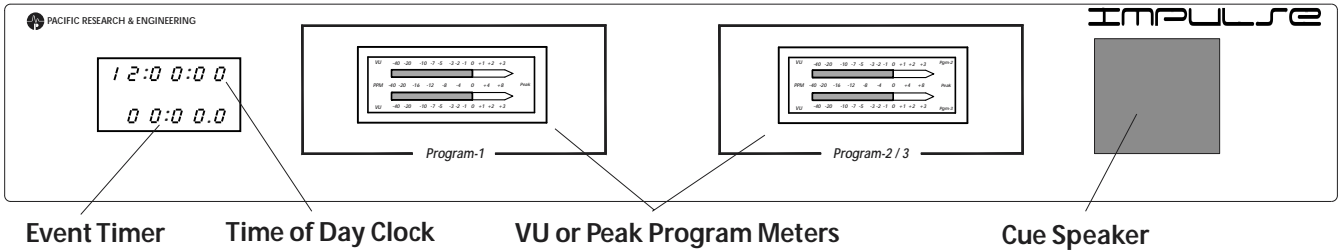


Input Channel Logic Block Diagram & Connections

Meter Panel

The meter panel holds the Clock/Timer assembly, the two sets of bargraph level meters and the Cue/Talkback speaker.

The clock has no external controls. Clock time setting requires the use of the Clock Setting Magnet Tool (supplied in the Tool Kit) when the clock is set for master mode. In slave mode, where clock timing is derived from an ESE time code signal, the clock does not need to be set. See page 4, *Setting the Clock*, for information on setting the time.



Equipment Description

This section has a general technical description of the Impulse console components with a console block diagram on page 17.

For a complete description of the circuitry, along with schematics, parts lists and servicing information, refer to the Impulse Technical Service CD-ROM (sold separately).

MAINFRAME

The Impulse mainframe consists of a welded all-steel zinc-plated bottom chassis with an operator panel and meter panel made of the same material. The operator panel is hinged for installation/service access to the internal DIP switches and trimpots. The metal operator panel completes the mainframe enclosure by fastening to the bottom chassis through its two hinge pins and two quarter-turn fasteners.

To ensure high RFI shielding, all audio wiring shields are grounded directly to the chassis at each connector. A ground screw near the AC power cable connection point ties the mainframe chassis to the technical ground reference.

Impulse-12 has two Main DSP Boards (holding the channel logic, switching and Digital Signal Processing), while Impulse-20 has three Main DSP boards. Each board sits on insulated supports on the bottom of the chassis. The Main DSP Boards connect to the individual operator panel switch and control boards through flex cables.

There are no meter calibrations on the electronic meter movements. The meters use IEEE standard #152-1991 (standard audio program level measurement). When set for PPM display mode (a board mounted DIP-switch), the PPM indications light and a +4 dBu sine wave output signal displays -8 on the PPM scale.

When set for displaying VU, the VU indications light and a +4 dBu sine wave output displays 0 on the VU scale. Each of these settings corresponds to -20 dBFS (decibels below Full Scale digital output). A Peak indicator lights up when the output signal reaches -3 dBFS.

The meters display the left channel audio output on the top row and the right channel audio on the bottom row of each meter. The right hand meter shows either the Pgm-2 or Pgm-3 output. It also can momentarily show the Cue bus level by pressing the Cue button (see the illustration on page 13). While this button is pressed the top row of LEDs show the Cue bus output level.

The Cue/Talkback speaker's impedance is 45 ohms with a 3-watt power-handling capacity. The speaker volume is controlled by the Cue volume control. A 3-watt amplifier IC drives the speaker.

Mic Preamps & RLS

The four mic preamps and dual 7-input RLS are located on separate circuit boards that plug into the left-hand Main Board.

Each balanced microphone input uses a precision surface-mount microphone preamplifier IC to amplify the mic signals. Buffer amplifier ICs, along with the gain trimpots (RV1 - RV4), boost the mic signals for a nominal output level of +4 dBu on the MIC OUT connectors.

Phantom power switch DS1 controls whether +48 volts is applied, via a pair of 6.81k resistors, to any MIC IN connector. The switches ship from the factory set in the off position.

6-pin MIC OUT connectors simplify connection to Input channels by paralleling the microphone signal to both the left and right outputs.

The analog RLS has seven line-level inputs with two outputs in a 7 x 2 matrix. Pressing a front panel RLS button routes the selected input audio through solid state switches to op-amps that buffer the audio for the appropriate output (RLS OUT 1 and RLS OUT 2).

INPUT CHANNELS

Each channel's two balanced inputs (A and B) connect directly to an Input Card. Three Input Cards are available: Analog Input (99-1041), Digital Input (99-1042-1), for two AES/EBU or S/PDIF inputs, or Optical Input (99-1042-2).

The channel “faders” use control voltages only, getting their reference voltages (both High and Low) from the Main DSP boards. Each fader's wiper output connects via a separate line to a DSP board for individual channel level control. All of the channel controls (switches and fader) for a pair of Input channels (1 & 2,

3 & 4, 5 & 6, etc.) are mounted onto a single control circuit board. All six, or ten, Input control boards are identical. Each connects to the DSP using a plug-in flex cable.

The channel assignment switches are momentary SPST switches with integral LED indicators. The channel's On/Off switches are also momentary SPST switches, but they are illuminated with incandescent lamps.

When any Program select button is active, fader-controlled audio for that channel is connected to the selected digital Program bus(es). When the Cue or Off-Line function is active, the input audio signal is applied to the appropriate digital summing bus. A DAC (Digital-to-Analog Converter) converts the digital bus into analog audio for the Cue and caller Return Feed.

Ten-position Logic Settings DIP switches (DS2 - DS21) set whether logic control is active on the A or the B input for each channel. There are five logic control outputs and six logic control inputs on each logic interface. All control inputs and outputs are optically coupled for isolation and to prevent ground loops in addition to being current limited so logic levels from +5 to +40VDC can be accommodated.

TELCO CHANNELS

The two Telco channels are located next to the Monitor controls. Each Telco channel connects to one telephone hybrid. All of the caller mix-minus audio and caller audio program assignment is built into the channel switching.

The Telco faders and the switches, like those on the Input channels, connect directly to the main DSP boards.

The To Hybrid audio outputs carry a sum of the Telco mix-minus audio and the caller's audio from the

Telco Channel Modes

There are two operating modes for the Telco channels: Autofeed or Manual.

Autofeed Mode

This is active when the red **Autofeed** button is lit. Any combination of buses can be selected (Off-Line, Pgm-1, Pgm-2, Pgm-3). When either Telco channel is On, the callers' Return Feed is the mix-minus of the lowest number bus that is selected.

When both Telco channels are Off, the callers' Return Feed is automatically changed to the Off-Line bus and the Off-line button is lit. The selected Pgm buttons **wink** to indicate their assigned status.

If no program bus has been assigned, then all three Pgm buttons **flash together** to indicate no bus is selected. In such a case, the caller will not go on-air when their channel is turned On.

Manual Mode

In this mode the **Autofeed** button is NOT lit. Any combination of assignment buttons can be selected (Off-Line, Pgm-1, Pgm-2, Pgm-3), but these buttons also determine the callers' Return Feed in a prioritized order, with Off-line taking precedence.

Thus, anytime Off-Line is lit in manual mode, the callers' Return Feed is the Off-Line bus, regardless of the Telco channels' On/Off status.

When the Telco channels are assigned to Pgm-1, and the Off-Line button is NOT lit, then both callers hear the Pgm-1 mix-minus feed (even if Pgm-2 and Pgm-3 are also selected). When Pgm-2 is lit, but Off-Line and Pgm-1 are NOT lit, then the Return Feed is the Pgm-2 mix-minus bus. When only Pgm-3 is lit (Off-Line, Pgm-1, Pgm-2 are NOT lit), the Pgm-3 bus is the Return Feed

Assigning a bus while either channel is already On immediately adds that caller onto the assigned bus. Turning the channel Off removes the caller from the assigned bus, but does not change the caller's return Feed (it remains the mix-minus from the assigned bus with the highest priority).

Monitor Controls

The Monitor controls are located on the right side of the Operator Panel. They hold the control room (CR) and studio monitor source selectors and monitor volume controls and the Talkback mic and Talk switch.

Monitor Controls

Control Room and Studio Monitor Source Selectors *Selects the audio sent to the Control Room and Studio outputs from three external audio inputs, **PGM-1**, **PGM-2**, **PGM-3** and the **Telco Mix** (mix-minus feed on one channel, callers on the other). Multiple sources can be selected for simultaneous monitoring.*

Meter Select *Cue, while pressed, routes the Cue audio to the left channel of the right hand meters. Pgm-2/Pgm-3 selects which program bus feeds the right hand meters.*

Cue *Controls the level of the Cue speaker.*

Talkback Mic *Allows communication to the studio and an external location while the **Talkback** button is pressed.*

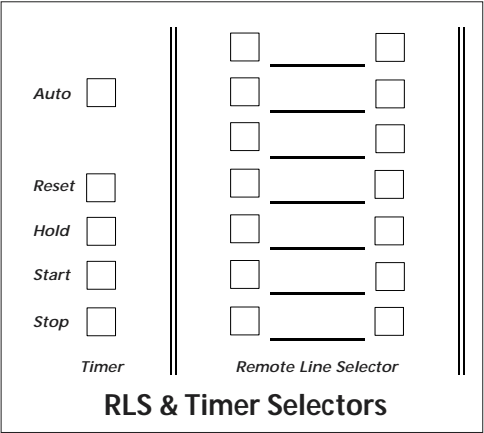
Headphone *Controls the volume of the headphone audio sent to the **headphone jack** and to the **CONTROL ROOM HD/PH** output.*

Control Room Monitor *Controls the volume of the **CONTROL ROOM MAIN** output.*

Studio Monitor *Controls the level of the **STUDIO MAIN** output.*

Talkback *Sends the Talkback mic to the **STUDIO MAIN**, **HD/PH** and **EXT TALK** outputs, while pressed.*

Headphone *Low- or high-impedance stereo headphones can be plugged into the jack mounted on the right side of the console. To prevent headphone or hearing damage, always turn the **Headphone** control fully counterclockwise before plugging in headphones.*



RLS & Timer Selectors

Timer Control

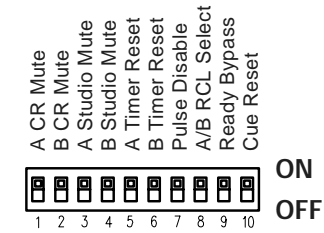
The Timer Control is pre-wired to the Clock/Timer assembly in the meter panel. The Timer may be manually operated by the Timer control buttons. Automatic timer operation occurs through the console's Timer Reset bus when the Auto button is lit.

In Auto mode, when an Input channel has been set for Timer Reset (its Logic Settings switches 5 or 6 have been set to On), the Timer resets and counts up from 00:00 when that Input channel is turned on. Any number of Input channels can be set for Timer Reset.

Remote Line Selector (RLS)

The RLS has two switch banks which share seven common input sources. This creates a 7 x 2 switcher. The seven sources are independently selectable between the two outputs. Often one output will connect to an Input channel, while the other will be connected to a patch bay or recording device.

Impulse Quick Logic Guide



Logic Settings Switch
(one per channel, as viewed from the operator position)

Logic Settings Switch Definitions

#	Switch Name	ON Function (set away from operator)	OFF Function (set toward operator)
1*	A CR Mute	Input A mutes CR speakers at channel On	No CR monitor mute while A is on
2*	B CR Mute	Input B mutes CR speakers at channel On	No CR monitor mute while B is on
3*	A Studio Mute	Input A mutes studio spkrs. at channel On	No Studio mon. mute while A is on
4*	B Studio Mute	Input B mutes studio spkrs. at channel On	No Studio mon. mute while B is on
5+	A Timer Reset	Input A resets timer at channel On	No timer reset when A is turned on
6+	B Timer Reset	Input B resets timer at channel On	No timer reset when B is turned on
7	Pulse Disable	No Pulses output with ext. On or Off	Pulses output with external On or Off
8#	A/B RCL Select	Logic active when A input is selected	Logic active when B input is selected
9	Ready Bypass	Off lamp illuminates at channel Off	Off lamp controlled by ready logic
10	Cue Reset	Cue function resets at channel On/Off	No cue reset at channel On/Off

Notes: RCL=Remote Control Logic
* Both inputs can mute either or both rooms.
+ Both inputs can reset the Timer when Auto is active on the timer controller.
Only one input (A or B) can be set for external logic.

See page 11 for switch locations

Logic Connector

(Contact insertion end view)



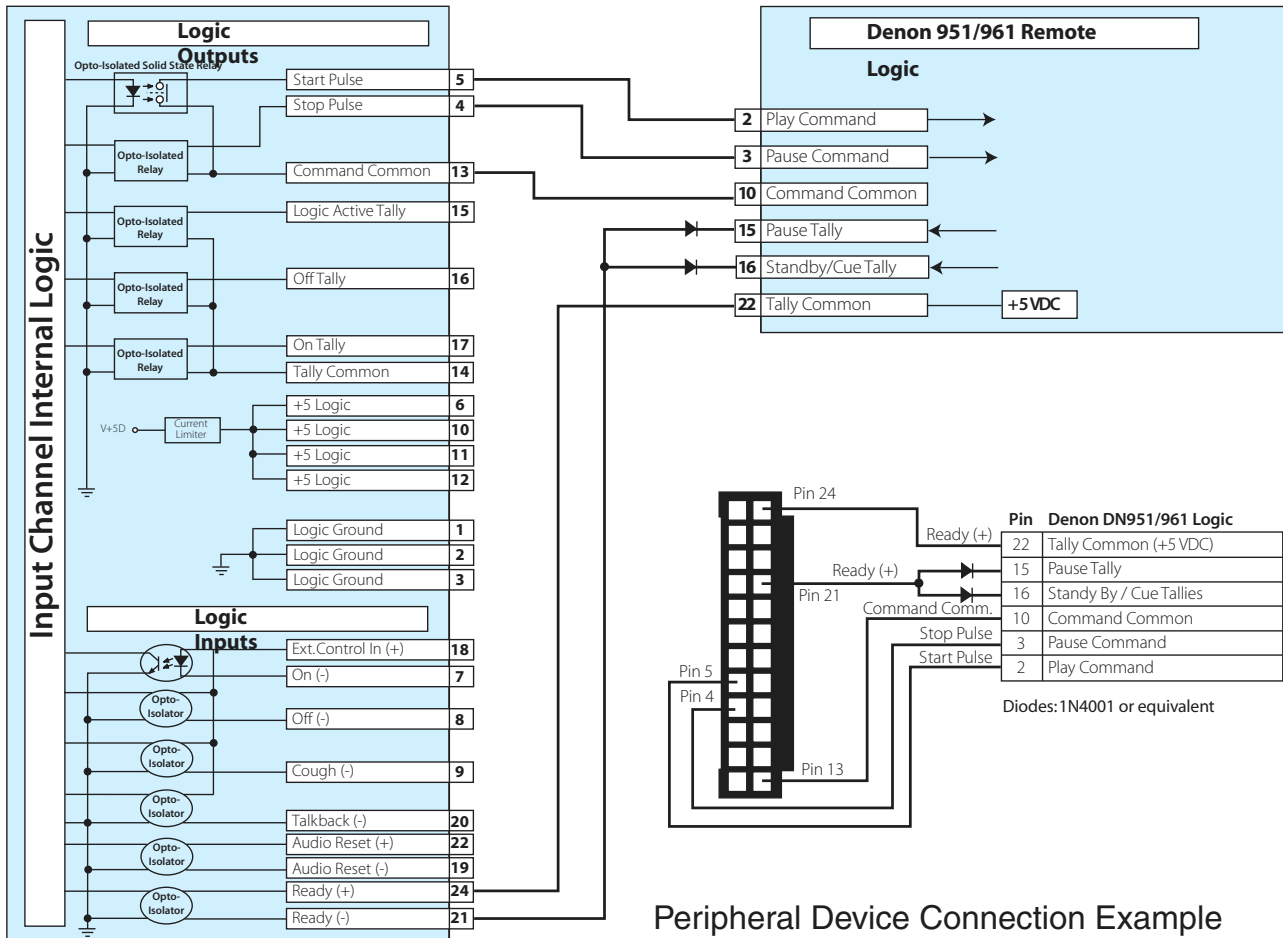
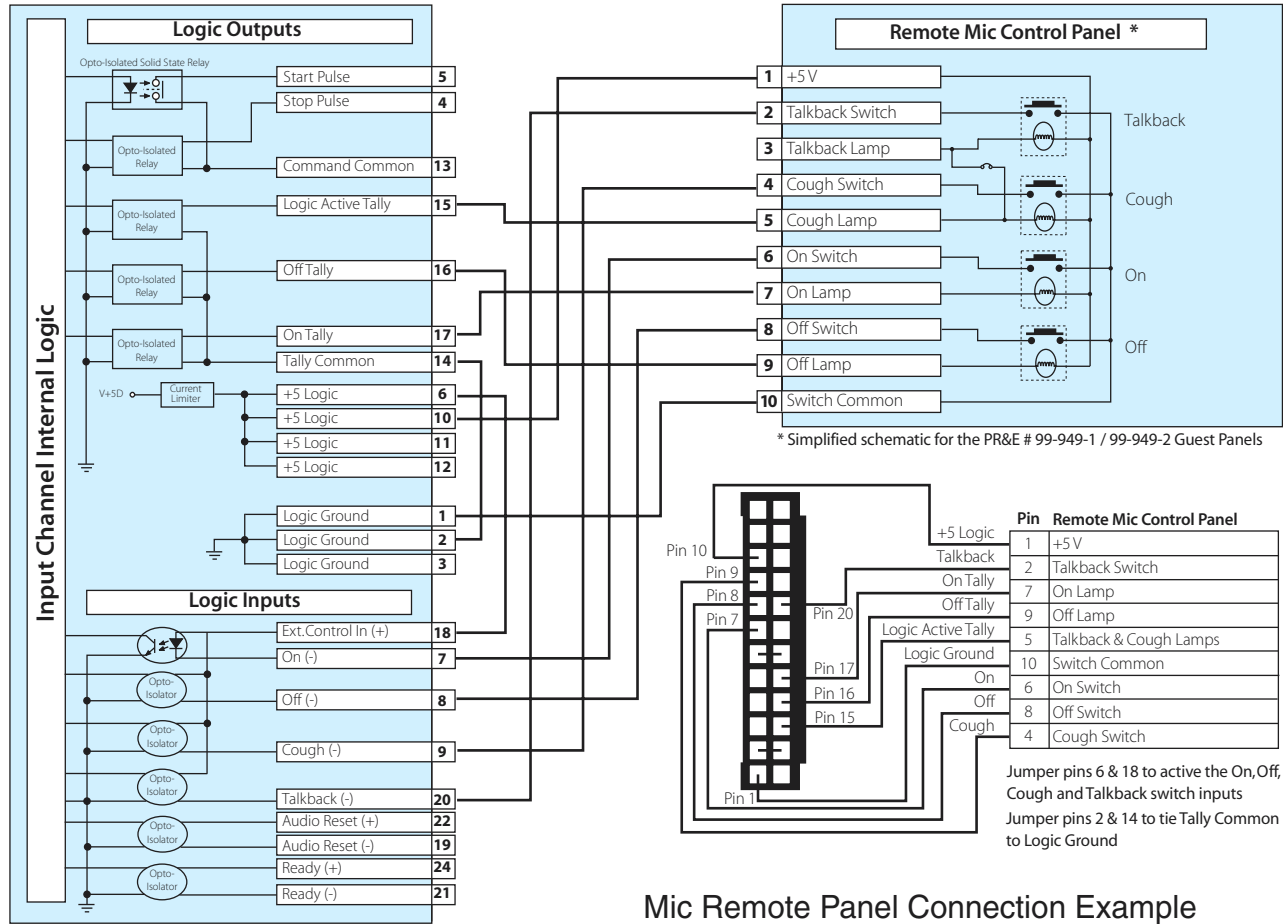
Logic Connector Signals

PIN #	SIGNAL	FUNCTION	PIN #	SIGNAL	FUNCTION
1	LOGIC GND	Console logic ground	13	COMMAND COMMON	Start & Stop commands common
2	LOGIC GND	Console logic ground	14	TALLY COMMON	Tally relays common connection
3	LOGIC GND	Console logic ground	15	LOGIC ACTIVE TALLY	Logic active tally output
4	STOP PULSE	Stop command output	16	OFF TALLY	Off tally output
5	START PULSE	Start command output	17	ON TALLY	On tally output
6	+5 LOGIC	5 volt source	18	EXT. CONTROL IN (+)	Tie to +5 to enable external inputs
7	ON (-)	Remote On switch input	19	AUDIO RESET (-)	Remote Audio Off input
8	OFF (-)	Remote Off switch input	20	TALKBACK (-)	Remote Talkback input
9	COUGH (-)	Remote Cough switch input	21	READY (-)	Remote Ready input
10	+5 LOGIC	5 volt source	22	AUDIO RESET (+)	+VDC to enable Audio Reset
11	+5 LOGIC	5 volt source		function	
12	+5 LOGIC	5 volt source	23	spare	no connection
			24	READY (+)	+VDC to enable the Ready function

Notes: +VDC is between +5 and +40 VDC.
Output relays can switch voltages up to +60 VDC

Impulse Logic Interface Glossary

REMOTE SIGNAL (pin #)	FUNCTIONAL DESCRIPTION OF CONNECTION
START PULSE (pin 5) STOP PULSE (pin 4)	Normally Open (N/O) relay contact outputs. A momentary "contact closure" of 220 ms is generated each time the channel On button is pressed (START) or Off button is pressed (STOP). Command Common is the Common (C) relay contact output. Typically connects to the Remote Start logic input on the peripheral device.
COMMAND COM. (pin 13)	The Common (C) relay contact output for the Pulse relays. For active high logic, connect Command Com. to the logic voltage on the peripheral device. For active low logic, connect this pin to logic ground on the peripheral device.
EXT. CTRL IN (+) (pin 18)	Connect +5 to +40 VDC to enable the active low external control inputs (On, Off, Cough, Talkback). When the control inputs are isolated from other devices (e.g., mic control panel), jumper pin 18 to pin 6 on the Logic Connector to supply +5 VDC.
ON (-) (pin 7) OFF (-) (pin 8)	When pulled low, ON turns the channel On from Off, generating a Start Pulse. When pulled low, OFF turns the channel Off from On, generating a Stop Pulse.
COUGH (-) (pin 9)	The channel audio is muted from all assigned buses for as long as this input is pulled low.
TALKBACK (-) (pin 20)	Channel audio is fed to the Talkback bus, but is muted from the assigned buses, as long as this input is pulled low.
OFF TALLY (pin 16) ON TALLY (pin 17) LOGIC ACTIVE (pin 15)	The three tally outputs are N/O "dry contact" outputs. Typically used to drive indicator lamps, the outputs can sink or source up to 60 volts at 350 mA. While the channel is Off, and the channel logic Ready Bypass switch is set to on, the Off Tally is connected to Tally Common. With Ready Bypass off, the Off Tally is controlled by the Ready input logic while the channel is Off. While the channel is On, the On Tally output is connected to Tally Common. Anytime the logic is enabled (Logic Settings switch #7 is on and switch #8 is true), the Logic Active Tally output is connected to Tally Common.
TALLY COM. (pin 14)	The "C" or common relay contact for the Tally relays. Typically connects to the lamp supply voltage (up to 60 volts). If the tallys use 6.3 volt, 40 mA lamps, and are isolated from peripheral devices as in a remote mic control panel, then the Tally Common can be jumpered to +5 Logic.
READY (+) & (-) AUDIO RESET (+) & (-)	These complementary logic inputs require +5 to +40 VDC on the (+) input and ground on the (-) input for activation. This can be done by connecting an active high logic to the (+) input and grounding the (-) input, or by supplying +5 to +40 VDC to the (+) input and an active low logic to the (-) input.
READY (pins 21 & 24)	When activated while the channel is On, the channel turns Off without generating a Stop Pulse. While the module is Off (and Logic Settings switch #7 is On and #9 is Off), the Ready logic controls the Off lamp illumination to indicate device status. Typically, lamp off indicates the peripheral is not ready to play, lamp on indicates the device is ready, and a flashing lamp indicates the device has already played or is not cued (or ready).
AUDIO RESET (pins 19 & 22)	When activated while the channel is On, turns it Off without generating a Stop Pulse. Ignored if the channel is already Off.
+5 LOGIC (pins 6, 10, 11, 12)	Channel logic voltage source. Can deliver up to 300 mA. Pins 6, 10 and 12 are opposite likely termination pins to minimize jumper lengths. Pin 11 is an extra power connection pin.
LOGIC GND (pins 1, 2, 3)	Channel logic ground. Pins 1 and 2 are opposite likely termination pins to minimize jumper lengths. Pin 3 is an extra ground connection.



Impulse Operation

Console operation is covered in this section.

Input Channels

Impulse has five types of inputs: Microphone Preamplifier, analog Input, digital Input, Telco Input and analog Remote Line Selector (RLS).

MICROPHONE PREAMPLIFIERS

The four microphone preamplifiers have no user-accessible controls. A processor board-mounted DIP switch allows the engineering staff to turn phantom power on or off to each microphone. Four Mic Gain

Input Channel Controls

A/B Input Selector Selects the active input (A or B). The button is lit while the B input is selected. Changing inputs while the channel is On forces the channel Off.

PGM-1, PGM-2, PGM-3 Assigns the channel to any combination of buses. The buttons are lit when the channel is assigned to a bus.

Off-Line When active (button lit), the pre-fader and pre-On/Off audio is sent to the Telco channels' off-line telephone Foldback bus.

Cue Sends the pre-fader audio to the Cue speaker and to the operator's headphones. The button is lit while Cue is active.

Fader Set the fader to the reference line (-12 dB) to achieve 0 VU on the program output meters with a nominal +4 dBu analog input signal (and properly adjusted input level trimpots). This position provides unity gain on digital input signals.

Red On Button Turns the channel on, applying the channel's audio to the selected program buses. It may also initiate logic control commands Start Pulse, Timer Reset, On Tally, Cue Off as well as mute the control room or studio speakers (and turn on the appropriate warning lamp), depending upon the settings of the channel's Logic Settings DIP switches.

Yellow Off Button Turns the channel off, removing the channel's audio from all program buses. May also initiate the logic control commands Stop Pulse and Off Tally, depending upon the settings of the channel's Logic Settings DIP switches.

trimpots, located adjacent to the DIP switch, set the individual gain as required for each microphone.

INPUT CHANNELS

Each Input channel can be set to control a pre-amplified microphone, analog line-level source or a digital source. Each of the 12 or 20 Input channels has its own fader level control with separate channel on and off push-buttons and program bus selections.

A Cue function allows the channel's pre-fader and pre-switched audio to be auditioned through a cue speaker mounted in the meter panel. The Off-line button sends this same audio (pre-fader and pre-switch) to the caller's Off-line mix-minus bus.

TELCO CHANNELS

These two channels are dedicated as Telco inputs/ outputs in order to assign the callers together to one or more buses, and to control the Return Feed (also called

Telco Channel Controls

Autofeed When lit, the callers' Return Feed is automatically switched between Off-Line and the PGM mix-minus, as described under Telco Operation, Autofeed Mode. When unlit, the Return Feed comes from the selected bus with the highest priority, as selected by the Operator.

PGM-1, PGM-2, PGM-3 Any one bus or combination of buses can be selected and the Return Feed mix-minus is determined by a preset priority structure as follows: 1) Off-line, 2) PGM-1, 3) PGM-2, 4) PGM-3. When any PGM button is lit and the channel is On, the caller is assigned to the selected buses while the selected bus with the highest priority is fed back to the callers.

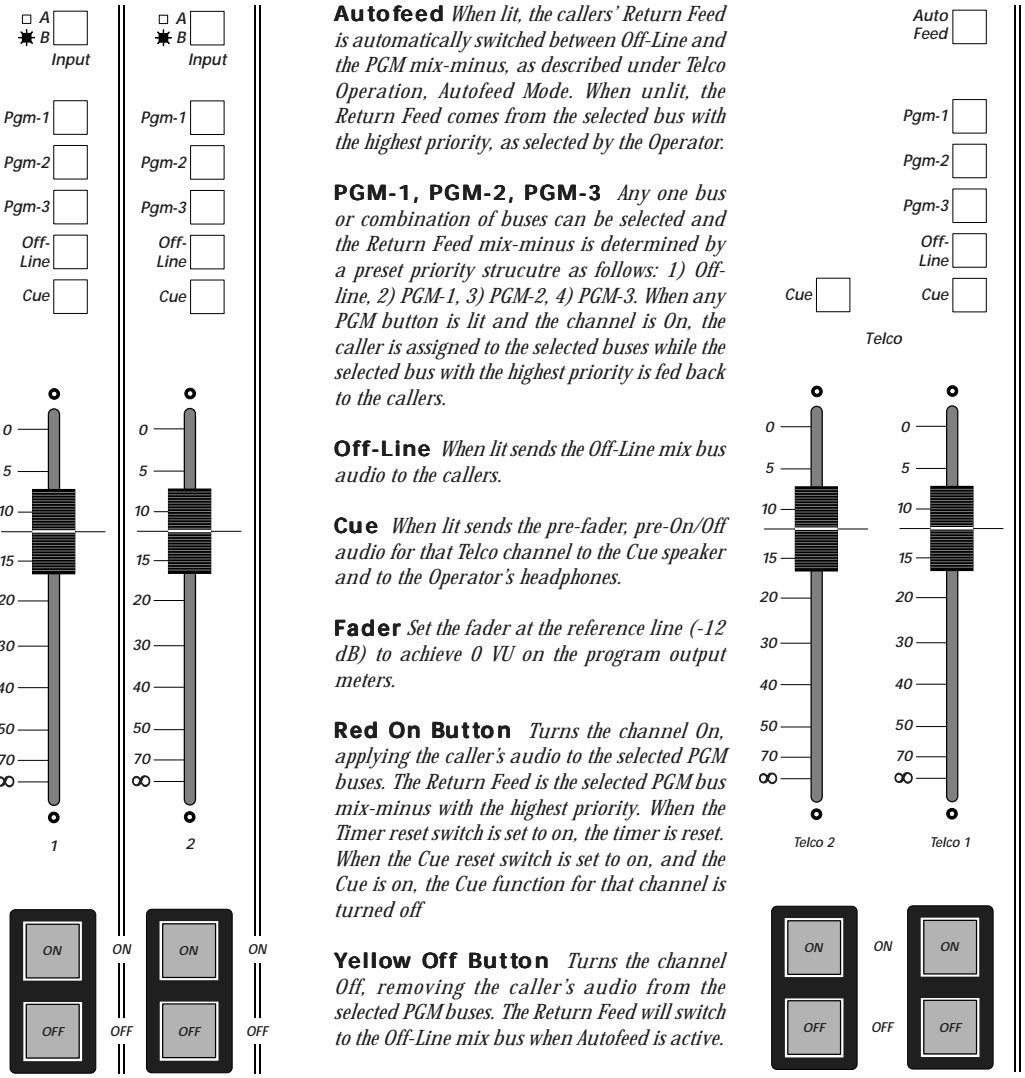
Off-Line When lit sends the Off-Line mix bus audio to the callers.

Cue When lit sends the pre-fader, pre-On/Off audio for that Telco channel to the Cue speaker and to the Operator's headphones.

Fader Set the fader at the reference line (-12 dB) to achieve 0 VU on the program output meters.

Red On Button Turns the channel On, applying the caller's audio to the selected PGM buses. The Return Feed is the selected PGM bus mix-minus with the highest priority. When the Timer reset switch is set to on, the timer is reset. When the Cue reset switch is set to on, and the Cue is on, the Cue function for that channel is turned off

Yellow Off Button Turns the channel Off, removing the caller's audio from the selected PGM buses. The Return Feed will switch to the Off-Line mix bus when Autofeed is active.



Monitor Connections

Two direct (fixed level, non-muting) outputs are available: CONTROL ROOM DIRECT follows the control room monitor selector and STUDIO DIRECT follows the studio selector. These can drive headphone amplifiers when a Guest Volume Control and Headphone Jack Panel (99-952) is used.

The CONTROL ROOM MAIN output feeds the amplifier for the control room monitor speakers. This output is controlled by the control room monitor level control and the control room mute logic.

The CONTROL ROOM HDPH output may be used to drive an outboard headphone amplifier. This output may be controlled by the CR Headphone level control, which also controls the internal headphone amplifier that drives the operator headphone jack located on the console's right end panel.

The STUDIO MAIN output feeds the amplifier for the studio monitor speakers. The STUDIO HDPH output may be used to drive an outboard headphone amplifier having level control. The STUDIO MAIN output is level controlled by the studio monitor control and muted by the studio mute logic.

The 8-pin CR/ST WARN connector drives the appropriate warning/On-Air light controller through solid-state relay contacts. See page 9 for their connection information.

The three EXT MON IN connectors are for three +4 dBu balanced stereo or mono audio sources that are selected for monitoring in the Control Room and/or Studio.

Remote Line Selector (RLS)

The seven RLS inputs (RLS IN) are for analog balanced line-level devices. The seven inputs are independently selected between the two outputs (RLS OUT).

Although input levels from -10 dBu to +4 dBu can be used, all RLS sources must use the same level as the RLS is a unity gain device with no trim adjustments.

The two RLS OUTs are typically connected to analog Input channels or to recording devices. Refer back to page 5 for unbalanced device connection information.

Note: The RLS is an active device, therefore, the inputs and outputs *cannot* be swapped to make a 2 x 7 router device.

Alignment lines between each pair of buttons allow a Brother P-Touch™ or similar labeler (using either 3/8 inch or 1/2 inch clear tape) to be used to identify the input sources.

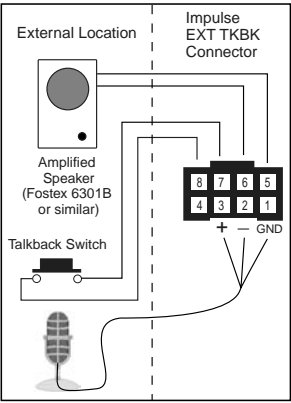
External Talkback

An 8-pin connector (EXT TKBK) has the Talk To and the Talk From audio connections and the Talk To CR logic control from an external location.

The external Talk To CR mic (or line input) is connected to pins 1, 20 & 3. The audio is switched into the Cue speakers as long as the External Talkback control logic on pin 8 is held low (typically by connecting it through a talk switch to pin 7, Logic Ground, on the same connector).

A switched, unbalanced audio output of the CR Talkback Mic is on pin 6 with the audio shield on pin 5. This is activated whenever the Talk button is pressed on the operator panel.

To use a line level External Talkback signal, an internal pad must be used to avoid overloading the input. Jumper pads J1 and J2 together and remove two 0 ohm resistors (R1 and R2) on the Output/Monitor PCA (99-1045-3).



External Talkback Connections

Configuration Jumpers

Several three-pin configuration jumpers are on the right-hand DSP Board (99-1051). These set operating conditions for Cue, Ext. Talk and the Mono output. Refer to the page 11 illustration for the jumper locations.

Note: Do NOT change the jumpers on J31, J32, J33, J51 or J52.

Cue Routing

Jumper J50 sets how the Cue audio is sent to the CR headphone jack and the CR HDPH output. The default setting (pins 1 & 2 jumpered) routes Cue to the right headphone channel and sums the monitor audio into the left headphone channel, while Cue is active. With the jumper on pins 2 & 3, Cue feeds both headphone channels, cutting off monitor audio, while Cue is active.

J48 and J49 select whether the CR HDPH output is fixed level (PRE) or comes after (POST) the CR Headphone volume control. The default setting is POST (pins 2 & 3 jumpered on J48 & J49). When CR HDPH feeds a Headphone Panel with Volume Control, move the jumpers to pins 1 & 2 on both J48 & J49 for an output that is not volume controlled.

Note: External Talk can be independently set to bypass the CR volume control regardless of the J48/J49 jumper settings.

Talk to Control Room Routing

Talkback from a Studio microphone is routed onto the Cue bus and is therefore only affected by the Cue Routing jumpers (J48, J49 & J50).

Talkback from an External location is routed separately and is controlled by five jumpers (J43, J44, J45, J46, J47). These jumpers set how External Talk is added to the Cue speaker and CR headphone feed—either before (PRE) or after (POST) the respective volume control. Because the jumpers interact, they must be set per the following Table.

Cue Talk:	Pre *	Post	Pre	Post
CR H/P Talk:	Pre *	Post	Post	Pre
Jumper J43	2 & 3	1 & 2 #	2 & 3	1 & 2 #
Jumper J44	2 & 3	2 & 3 #	2 & 3	2 & 3 #
Jumper J45	1 & 2	2 & 3	1 & 2	2 & 3
Jumper J46	2 & 3	1 & 2	1 & 2	2 & 3
Jumper J47	no jumper	2 & 3	2 & 3	1 & 2
* Default Settings				
# Nominal Talk into Cue speaker gain setting shown. For +4 dB gain: set J43 to 2 & 3 and J44 to 1 & 2. For +8 dB gain: set both J43 and J44 to 1 & 2.				

External Talk Routing (Pre or Post Volume Control) into the Cue Speaker & the Control Room Headphones

Mono Output Selection

The Mono outputs can be fed by one or more Program buses. Jumpers J63, J64 and J65 control which bus feeds the Mono outputs (by jumpering pins 2 & 3 together). The unused buses must be grounded through jumpering pins 1 & 2 together.

The default jumper settings route Pgm-1 to the Mono outputs (J63 has pins 2 & 3 jumpered, while J64 and J65 have pins 1 & 2 jumpered).

To route Pgm-2 to the Mono outputs, jumper pins 2 & 3 of J64 and jumper pins 1 & 2 on J63 and J65.

To send Pgm-3 to the Mono outputs, jumper pins 2 & 3 of J65 and jumper pins 1 & 2 on J63 and J64.

Ready logic both performs an Audio Reset, turning off the channel without generating a Stop Pulse, and then controls the Off lamp illumination to indicate device status.

In most applications, the Audio Reset (+) and Ready (+) inputs connect to + Logic on the peripheral. The Ready (-) command and the Audio Reset (-) command are then pulled low by the active low logic outputs on the peripheral to trigger the Impulse logic.

When a peripheral uses active high logic, tie the Ready (-) and Audio Reset (-) lines to the logic ground on the peripheral. The Ready (+) and Audio Reset (+) lines connect to the logic outputs. Logic voltages of +5 to +40 can be used.

For peripheral devices that require a steady On or Off signal, the On and Off tallies can be used. When the Off Tally is used in this manner, Logic Settings switch #9 (Ready Bypass) must be set on so that the Off lamp is not controlled by the Ready logic.

Warning Lamp Connector Pin Definitions

PIN	SIGNAL	FUNCTION
1	Logic Ground	Console logic ground
2	+5 Logic	+5 volt supply
3	C/R Relay	*N/O relay contact*
4	C/R Relay	*C relay contact*
5	Logic Ground	Console logic ground
6	+5 Logic	+5 volt supply
7	Studio Relay	*N/O relay contact*
8	Studio Relay	*C relay contact*

8-pin Logic Connector



(wire insertion end view)

Monitor Logic

There is one 8-pin logic connector (CR/STWARN) for the "hot mic" logic command outputs for the Control Room and Studio on-air warning lamp systems.

Each logic command output is isolated by a solid-state relay with a pair of normally open "dry-contacts." These *relay contacts* can switch external voltages of up to 60 volts at 350 mA for direct interface to most lamp control devices.

If a five volt lamp relay is used, one side of the interface relay can be jumpered to +5 Volts (pins 2 and 6) or to Logic Ground (pins 1 and 5) to create an active high or active low output, respectively.

The connection example below shows the logic outputs for the Control Room and Studio warning lamp interface externally jumpered to yield an active high output from the relay.

When an active low logic output is needed on the Control Room, jumper pins 1 and 3 together and use pin 4 as the Control Room warning output. Jumper pins 5 and 7 together and use pin 8 when the Studio warning output requires an active low logic output.

Note: Jumpering the solid-state relay to either +5 Volts or Logic Ground defeats ground isolation between the console and the warning lamp interface.

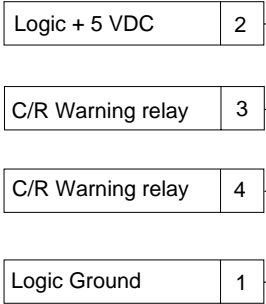
Console Connections

The Impulse sits on a countertop. The integral cable tray, with a cosmetic cover, is attached to the rear of the console mainframe. The cosmetic cover, held in place by Phillips screws, is removed during installation.

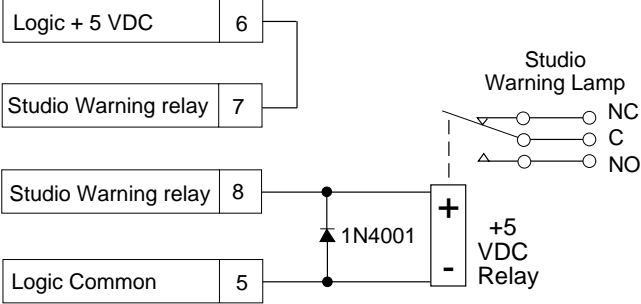
The cable tray has multiple two-inch (76.20 mm) cable access openings for routing wiring up from within the cabinetry or from peripherals located to either side of the console on the countertop. There are five openings on the Impulse-12 cable tray bottom and seven on the Impulse-20, with an additional hole on each end of the cable tray.

Warning Lamp Interface Connections

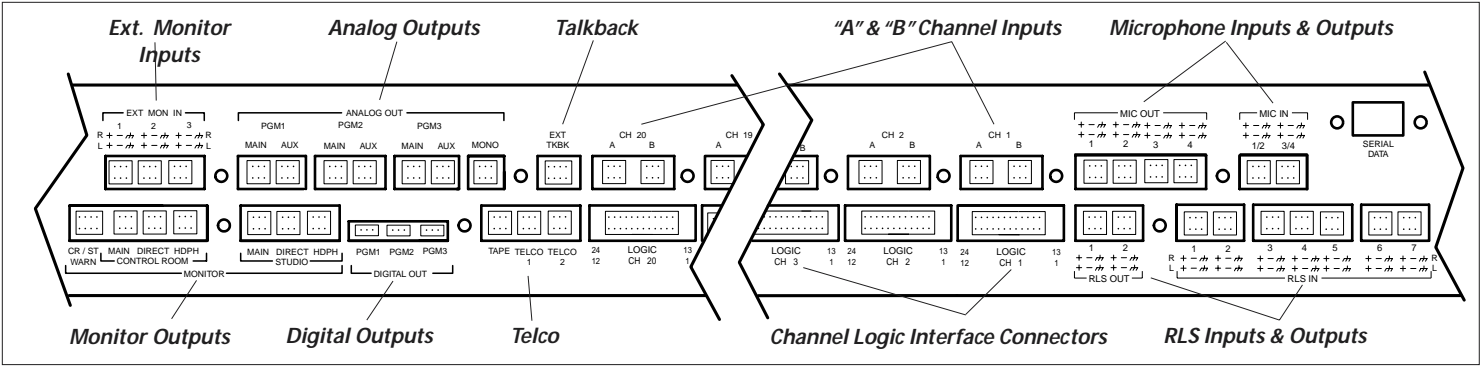
CR MONITOR CONNECTION



STUDIO MONITOR CONNECTION



Note: Do not use the solid-state relay "contacts" to directly switch the AC line voltage to a lamp.



Impulse Rear Panel Connectors

With a Digital Input Card (99-1042-1) installed, the module accepts AES-3 and most S/PDIF co-axial inputs. Digital signal connection is to pins 1, 2 & 3 only. There are no digital connections to pins 4, 5 & 6. There are no trim controls when a Digital Input Card is installed.

With a S/PDIF Optical Card (99-1042-2) installed, the module accepts EIAJ RC-5720 fiber optic cables for the A and B inputs.

Each Analog or Digital Input Card has two 6-pin audio input connectors (A and B) and one associated 24-pin logic interface connector (LOGIC). The Optical Card has two EIAJ connectors along with the 24-pin logic connector. A ten-position DIP switch for each channel sets whether the logic is active for the A or B input, along with other channel logic functions (Control Room or Studio Mut-ing, Timer and Cue Resetting, etc.).

Refer back to page 5 for connection information on using unbalanced analog or digital devices with an Input module. Typical logic connections are shown on page 8.

Telco channels

Impulse includes two dedicated Telco channels for interfacing one or two telephone hybrids on the HYBR TEL1 and HYBR TEL2 connectors. A simplified block diagram of the Telco connections is shown below.

Each 6-pin HYBR connector connects the caller audio from the telephone hybrid to pins 1, 2 & 3 and the mix-minus audio returning to the caller on pins 4, 5 & 6.

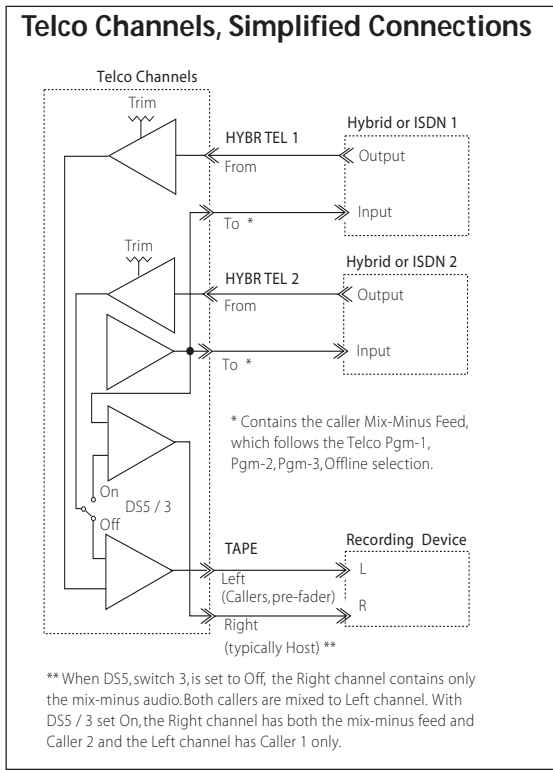
A host and caller recorder connection (TAPE) is used to record one or both callers. When only one hybrid is used, the caller is routed to the left Tape channel and the mix-minus return feed to the caller (typically only the host) is routed to the right Tape channel.

With two Telcos being used, Caller 2 can be routed to either the left or right Tape channels. When the Main processor board DIP switch, DS5, #3, is set to Off (as shown above), both callers are summed together onto the left channel. When DS5, #3 is set to On, Caller 1 remains on the left Tape channel and Caller 2 is routed to the right Tape channel, being summed with the mix-minus audio.

Outputs

The digital outputs for the three program buses (DIGITAL OUT — PGM1, PGM2 and PGM3) use 3-pin AMP MOD IV connectors.

The seven analog bus outputs (ANALOG OUT) are derived from the digital program buses through precision Digital-to-Analog converters (DAC) on each digital output. Each analog output is on a single 6-pin connector.



PGM1 MAIN is the primary balanced analog stereo on-air output. The PGM1 AUX output is an additional isolated PGM1 stereo output.

The PGM2 MAIN and AUX outputs are the balanced analog outputs of the PGM2 bus. The PGM3 MAIN and AUX outputs are the balanced analog outputs of the PGM3 bus.

Two MONO analog outputs are carried on a single 6-pin connector. Pins 1, 2 & 3 have the Main Mono audio while pins 4, 5 & 6 have an isolated Aux Mono output.

(text continues on page 12)

DIP SWITCHES & TRIMPOTS

Multiple miniature DIP switches are used for setting the Input channel logic and other console parameters. Most of these are found on the Main DSP (Digital Signal Processor) Boards mounted on the bottom of the chassis. There are two DSP boards in the Impulse-12 and three in the Impulse-20.

The DIP switches that turn phantom power on or off are on the Mic Preamp PCA. The Clock/Timer DIP switches are on the Timer & Bargraph PCA.

Four mic gain trimpots are on the Mic Preamp PCA. Trimpots for the Talkback Mic and External Talk Input are found on the Main PCA. Analog input trimpots are on the Analog Input PCAs. Analog output trimpots are on the Analog Output PCA.

Metering & Fader Start

DS5, DIP switch 7, sets the style of metering between VU (Volume Unit, USA standard) and PPM (Peak Program, European standard).

DS5, DIP switch 6, sets whether the Fader Start function is active. Fader Start allows channel fader movement to automatically control channel on and off. When the fader is moved from full-off the channel is turned on. When the fader is moved back to full-off the channel turns off. The On/Off buttons continue to function even with Fader Start enabled.

DIP Switches & Trimpots by PCA

- 99-1041, Analog Input PCA
 - RV1 - A Input, left level trimpot
 - RV2 - A Input, right level trimpot
 - RV3 - B Input, left level trimpot
 - RV4 - B Input, right level trimpot

- 99-1042-1 or -2, Digital Input PCA
 - E1 & E2: Jumper to bypass Sample Rate Conversion. Normally these are NOT jumpered together.

- 99-1045-1, Mic Preamp PCA
 - RV1 - Mic 1 level trimpot
 - RV2 - Mic 2 level trimpot
 - RV3 - Mic 3 level trimpot
 - RV4 - Mic 4 level trimpot

- 99-1045-1 (cont.)
 - DS1: phantom power switches
 - DS1, #1 - Mic 1
 - DS1, #2 - Mic 2
 - DS1, #3 - Mic 3
 - DS1, #4 - Mic 4
 - DS1, #5 - no connection

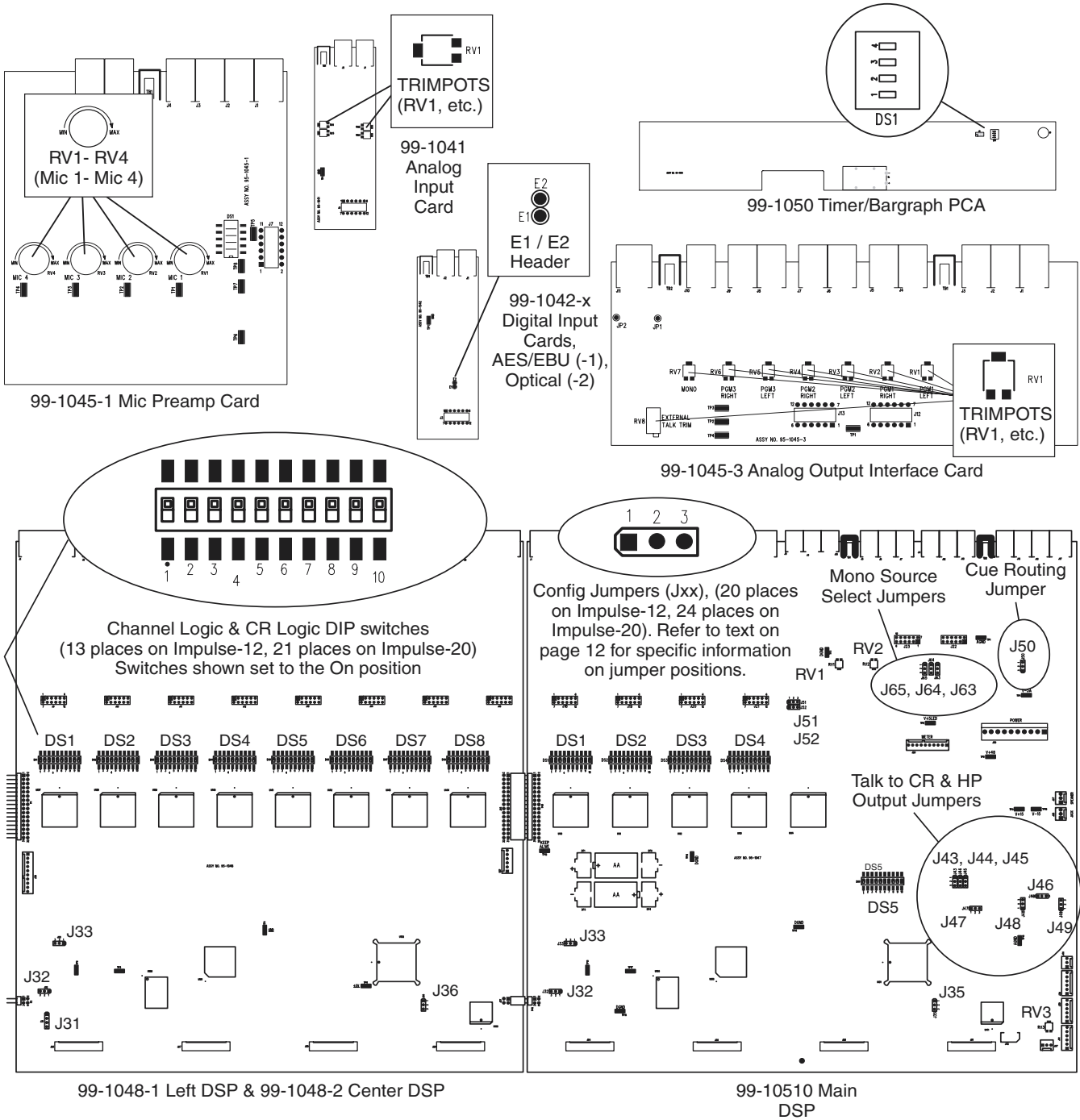
- 99-1045-3, Output PCA
 - RV1 - PGM-1, left level trimpot
 - RV2 - PGM-1, right level trimpot
 - RV3 - PGM-2, left level trimpot
 - RV4 - PGM-2, right level trimpot
 - RV5 - PGM-3, left level trimpot
 - RV6 - PGM-3, right level trimpot
 - RV7 - Mono level trimpot
 - RV8 - Ext. Talkback level trimpot

- JP1 & JP2 - Jumper to add line-level pad on the External Talk Input.

- 99-1048-1 & -2, Left & Center DSP
 - DS1 - Logic Select for Input 1 or 9
 - DS2 - Logic Select for Input 2 or 10
 - DS3 - Logic Select for Input 3 or 11
 - DS4 - Logic Select for Input 4 or 12
 - DS5 - Logic Select for Input 5 or 13
 - DS6 - Logic Select for Input 6 or 14
 - DS7 - Logic Select for Input 7 or 15
 - DS8 - Logic Select for Input 8 or 16

- 99-1050, Meter & Bargraph
 - DS1, see page 4 for DIP switch listing.

- 99-1051, Right-hand DSP
 - DS1 - Logic Select for Input 9 or 17
 - DS2 - Logic Select for Input 10 or 18
 - DS3 - Logic Select for Input 11 or 19
 - DS4 - Logic Select for Input 12 or 20
 - DS5 - System Logic Selector (as set to On:
 - #1 - Telco 1 resets timer at On
 - #2 - Telco 2 resets timer at On
 - #3 - Telco 2 goes to record out, left
 - #4 - Telco 2 channel is active
 - #5 - Cue resets at either Telco On
 - #6 - Fader Start feature enabled
 - #7 - Metering style is VU
 - #8 - Cue is routed to CR headphones
 - #9 - no connection
 - #10- no connection



DIP Switch, Trimpot & Header Jumper Locations