
G-9 Digital Control Surface

TECHNICAL GUIDE

 *Wheatstone Corporation*

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G-9 Digital Control Surface Technical Manual - 1st Edition

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General Information



Introduction

The GENERATION-9 Digital On-Air Control Surface is the next step in the continuing evolution of Wheatstone's proven BRIDGE technology. Designed to integrate flawlessly with the Wheatstone BRIDGE digital audio network router, the Generation-9 (G-9) control surface allows you to easily create large or small platform-based systems that are exceptionally user-friendly and flexible. Wheatstone BRIDGE network cages house all I/O ports and engine cards, and may be wired in tandem within a single equipment room or interconnected to separate remote locations by means of fiber-optic or CAT-5 cables to provide single wire studio integration schemes.

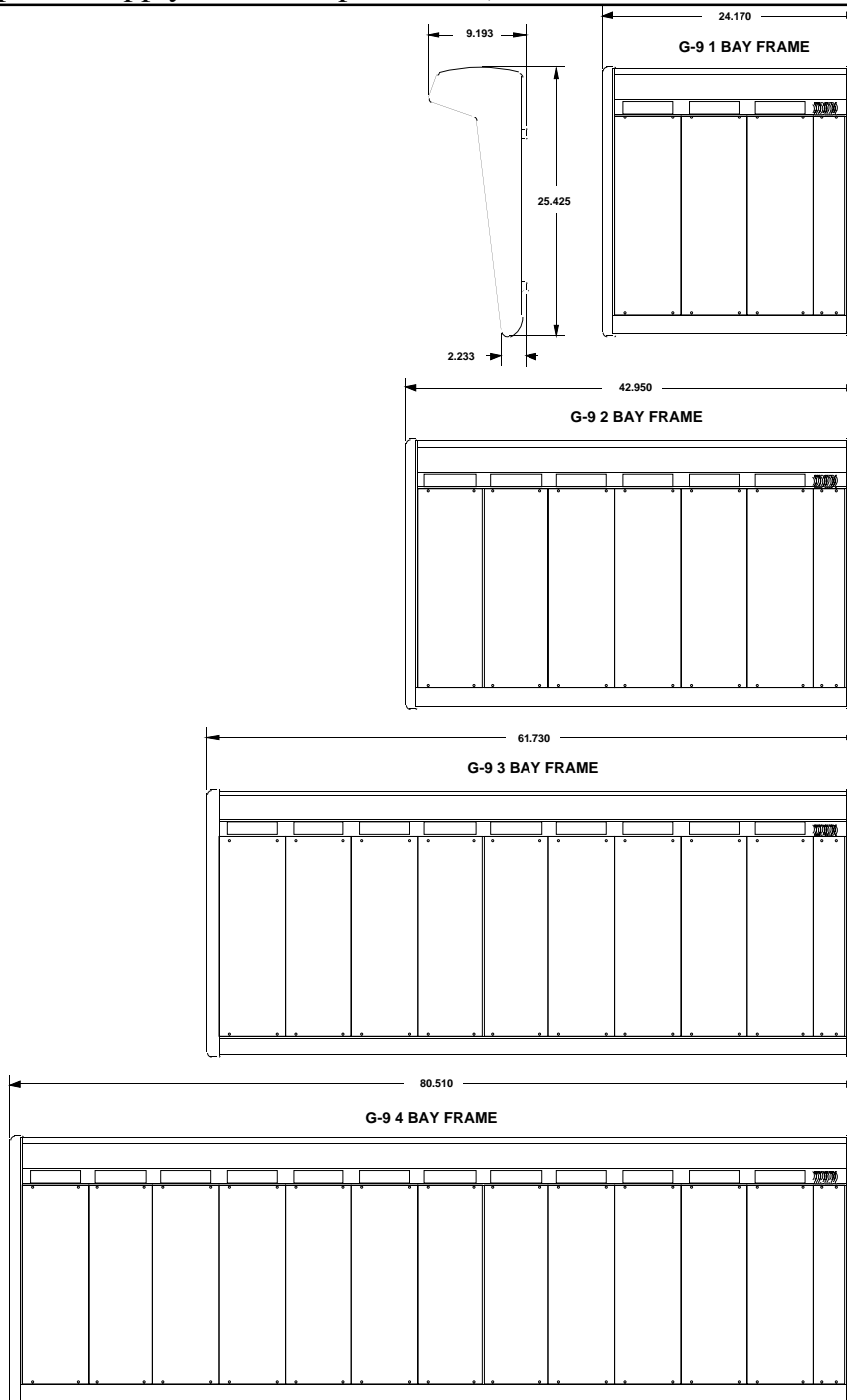
Once configured, the system operates entirely independently of external computers. Configuration itself is intuitive and carried out onsite by means of user-friendly graphic interfaces provided by Wheatstone desktop software. The G-9 system also takes full advantage of Wheatstone's exclusive VDip configuration software, so that studio functions (like mutes, fader and timer starts, tally, etc.) are easily accomplished right at your desktop. Once completed, all settings are retained in non-volatile storage, allowing the entire system to run independently. Ethernet protocol is built in, providing interface with automation, scheduling, and hardware controllers as you require.

There are two versions of the Generation-9 surface: G-9 (full version), and G-9 Air Light that comes without equalizer and bus-minus features.

Control Surface Placement

The G-9 digital audio control surface may be table-top mounted, using the holes provided in the bottom of the chassis. The control surface's handrest top would be generally located 29-30 inches from the floor. Four different frame sizes are available: 1 Bay, 2 Bay, 3 Bay, and 4 Bay (see sketches below).

Do not connect the G-9 control surface to its power supply (and do not connect the power supply to the AC power line) until instructed to do so.



Power Supply

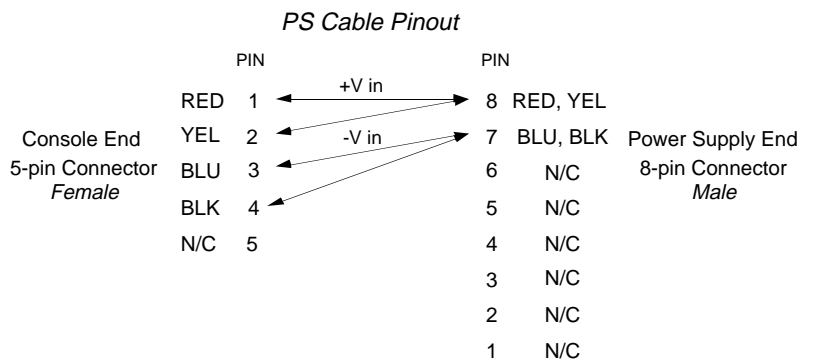
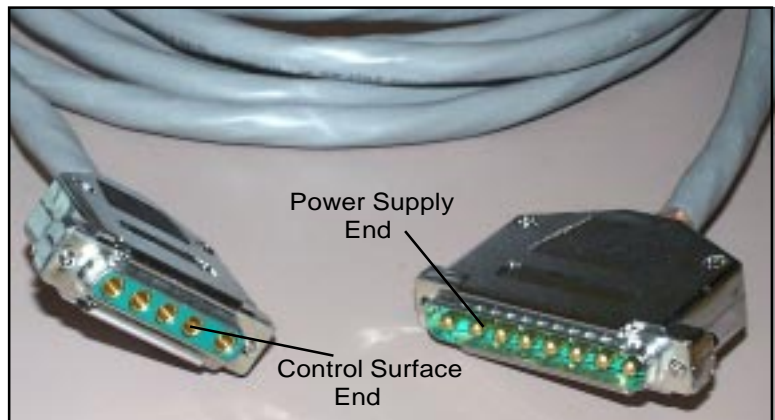


The G-9 control surface is powered by an SPS-180 or SPS-400 power supply installed in a Wheatstone Model PSR rackmount unit. Each PSR houses up to four SPS-180 or up to two SPS-400 power supply units. Mount the power supply in a standard 19" equipment rack, keeping in mind that adequate ventilation is necessary to prevent heat build-up within the rack.

If failsafe redundant supplies have been ordered, you will be installing two SPS-180 or SPS-400 units.

Note the power supply (supplies) should be mounted in an equipment rack within fifteen feet of the control surface (but no closer than 3 feet).

Once the supply is rackmounted, it should be connected to the control surface using the factory supplied cable. The cable has two different types of connectors on its end: a 5-pin female connector that connects to the control surface's power supply connector, and an 8-pin male connector that plugs into the PSR power supply. The control surface's two power supply connectors are located at the rear of the control surface, in the middle of the meterbridge bottom pan. If you are using one supply, connect it to one of the control surface connectors (it doesn't matter which one). If you are using the failsafe option, connect one end of a power supply cable to either control surface power connector and connect the other end of the cable to one of the two power supply connectors. Then use the other cable to connect the second power supply connector to the remaining control surface power supply connector. Connect the cable(s) first to the control surface, then to the rear of the rackmount power supply.



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

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

Failsafe Dual Redundant Supply

Wheatstone failsafe power supply systems use two SPS-180 or SPS-400 power supplies for each piece of powered equipment. Though either is capable of running a full load on its own, in failsafe operation both units run in tandem: if one fails, the other takes over, assuring uninterrupted operation.

In order for failsafe systems to perform as designed, always have BOTH rackmount supplies powered up and connected to their associated equipment.

Energizing

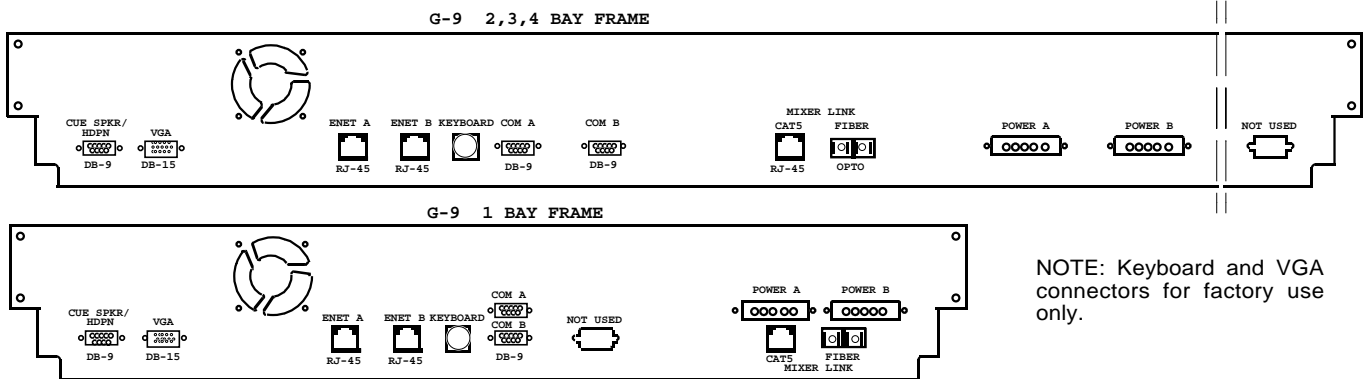
Assuming the G-9 control surface mainframe is properly placed, and its PSR power supply (or supplies) correctly rackmounted and connected to the control surface, you may now energize the PSR rackmount power supply by plugging it into the AC mains. The control surface's LCD displays will illuminate and individual module switches will assume factory default settings.

Note: To de-energize the control surface, unplug the rackmount power supply's AC cord from the AC mains. *Never de-energize the control surface by disconnecting the cable that connects the control surface and power supply together.*

Once you have verified proper power-up, unplug the rackmount power supplies to de-energize the control surface. You may now proceed to wire up audio and control connections.

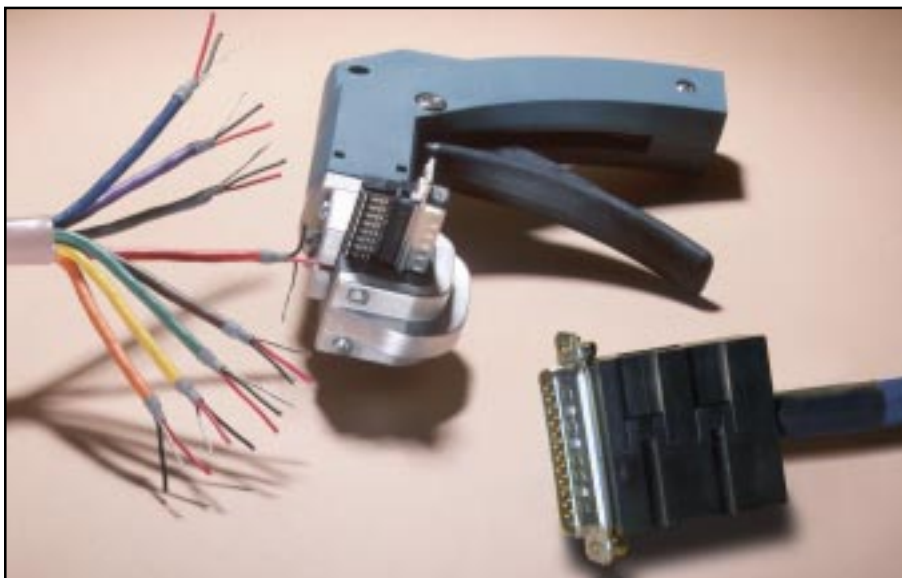
I/O Connections

All user wiring to and from the G-9 control surface is made via connectors located on the control surface's rear panel. There are two female DB-9 serial port connection for use as RS-485/RS-232 communication links to the Wheatstone Bridge 2001 Router and XY controllers. There are also two RJ-45 connectors for main and failsafe ethernet connections. CAT-5 or multi-mode optical fiber Mixer Link connections are made via RJ-45 or SC type optical connectors. Two 5-pin male connectors are for power supply connections. A cue speaker plugs into the female DB-9 connector, located at the left end of the control surface's rear. VGA connections are made via the female DB-15 connector that is mounted next to the cue speaker connector. For all wiring pinout connections refer to Chapter 6. Sketches below show connector locations.



The Insulation Displacement Connector System

The I/O wiring interface system is based on insulation displacement technology. A special AMP wiring tool is included with each control surface; it is auto-indexing, and allows individual wire connections to



The AMP tool insulation displacement connector system. Note the right angle hood with self-locking tabs. The tool, multipin connectors (with gold plated pins) and latching hoods are supplied with each control surface.

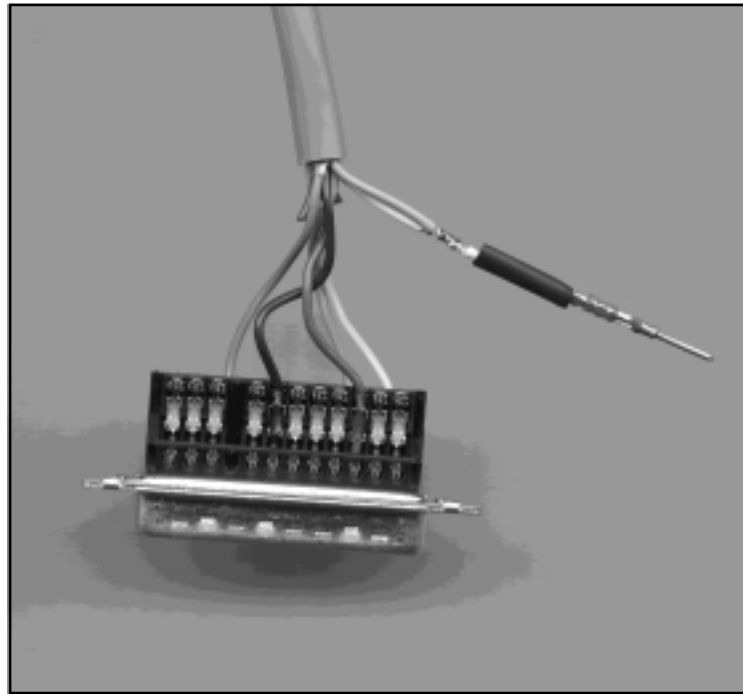
be positively made with a single squeeze of the tool's trigger. The trigger action is ratchet controlled, and will not release until a full connection is made. Once released, the multipin connector held in the tool's jaw automatically indexes to the next connector pin. The technology is such that no stripping, soldering or tinning of wire ends is required; all that is needed is for the wires destined for the connector be snub cut and laid out in order (although tubing should be used on bare drain wires). An empty DB-9 or DB-15 connector is inserted into the tool, indexed to the first pin, and the wires are inserted one by one into the jaw and the trigger squeezed. In this way a single multipin connector can be completely wired up in a minute or two. These connectors will accept wire gauge 22 - 26 AWG.

In the event of a wiring error, connector pins may easily be removed from the shell with the wire still attached, and inserted into the correct position. Observe the side of the connector, with the metal part down. You will see a row of "Vees"—simply press the top of the vee together with a scribe or other sharp instrument; this will unlock the pin from the shell, and it can be removed and inserted into the correct position. Spread the vee apart to lock the pin in the new position. It should never be necessary to discard a connector due to a wiring error.

Note that mating hoods for each connector are also supplied with the system. These have locking screws that hold the connectors securely to their mates.

Wiring Procedure - Double Connection to One Pin

ref: DB-25 male multi-pin connector



Most audio equipment machine interfaces (as well as Wheatstone consoles) use subminiature D-type connectors. Sometimes the interfaces require making two connections to a single DB pin. If the wiring has been set up using punchblocks, this is not a problem; however, for situations where direct machine-to-console wiring is used, Wheatstone recommends the following procedure:

- 1) Connect the first wire to the desired pin as you normally would.
- 2) Note connector pins may easily be removed from the DB-25 shell with the wire still attached: Hold the connector with the metal part down and observe its side. You will see a row of "Veeds"—simply press the top of the selected vee together with a scribe or other sharp instrument; this will unlock the pin from the shell, allowing it to be removed.
- 3) With the pin removed, strip out a short section of insulation from the connected wire and wrap and solder the second wire to the first as shown above.
- 4) A short piece of heatshrink tubing (pictured here before being slid into place) completes the connection.
- 5) Re-insert the pin into the DB-25 shell, spreading the vee apart to lock it in place.

Input Panel (IS-G9)

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Input Panel (IS-G9)

Controls and Functions

Each input panel of the G-9 digital audio control surface has four identical strips representing four input channels.

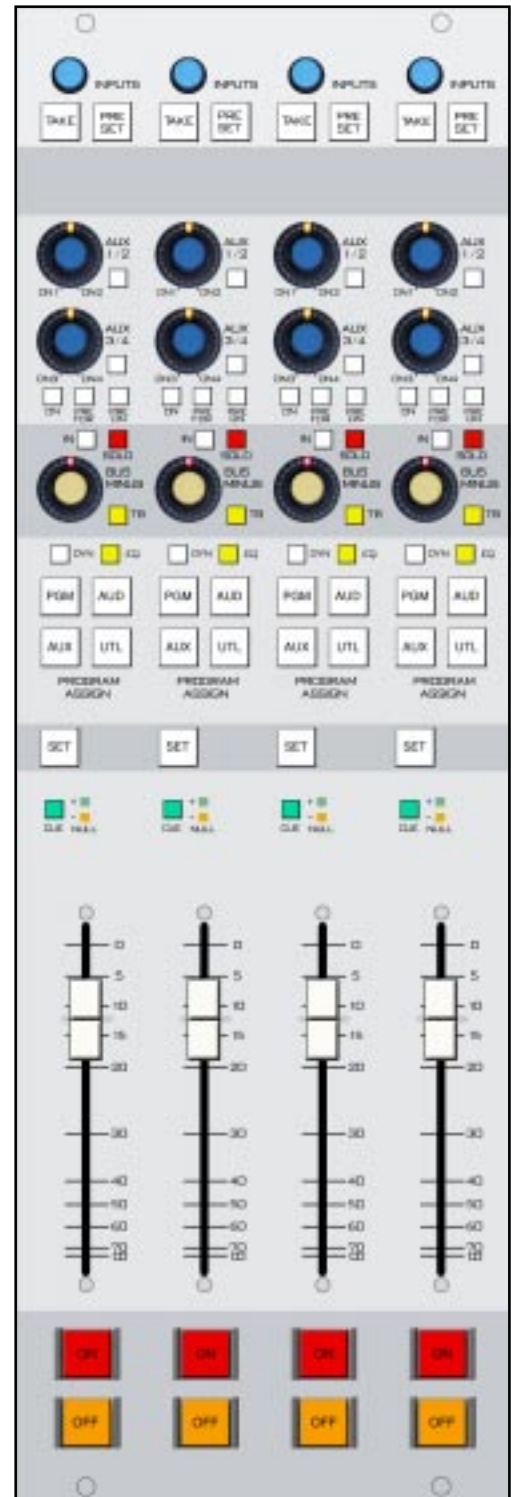
Input Sources

Each input panel controls four stereo sources. By turning input knobs, the available inputs are displayed in



the SOURCE window of the LCD screen above the channel strip. When the desired input source is scrolled into the SOURCE window, pressing the TAKE button will cause that source to be switched to the input of the channel, and the source name will be displayed in the SOURCE window of the LCD screen.

A second source can be loaded into the PRESET window of the LCD screen. Scroll the INPUT knob as above until the desired source appears in the SOURCE window, then press and hold the PRESET button until this source appears in the PRESET window. Once loaded, this source can be connected at any time by pressing the PRESET button.



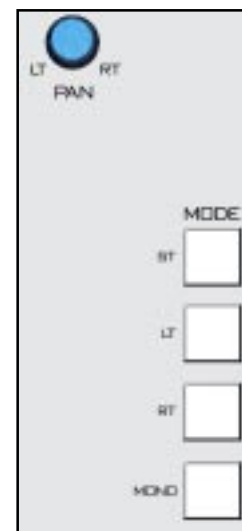
AUX

The G-9 Control Surface has (2) encoders, (2) bank select switches (AUX 1/2 and AUX 3/4), and (3) mode switches (ON, PRE FDR, and PRE ON) for controlling the (4) AUX SEND buses. Operation is as follows: first “DOBBY” or momentarily press one of the encoders to select which group of AUX SENDS (AUX 1/2 or AUX 3/4) is being worked on. The LED at the bottom center 6 o’clock position of the encoder knob will light to indicate the active group. Pressing the bank select button will select which AUX SEND within the group is being worked on. A lighted switch indicates you are working on an even numbered group (2 or 4). Once the desired AUX SEND has been selected using these controls, the ON, PRE FDR, and PRE ON switches and the encoder can be adjusted for that particular AUX SEND. Subsequently, the bank select switch can be pressed or the encoder “DOBBIED” to choose the next AUX SEND, and so on.



Mode Selector Indicator

MODE selection switches in the EFS CONTROL panel (see Chapter 3) enable input channels to operate in stereo, mono, left only, or right only. The switch lights up to indicate the selected mode. This feature is activated for a given channel by pressing the channel’s SET button (see page 2-4).



EFS-G9 Control Panel

PAN/BALANCE Knob

The PAN knob (in the EFS CONTROL panel) acts as a panpot in MONO, LEFT only and RIGHT only modes; and as a balance control in STEREO mode. Once again, this feature is activated for a given channel by pressing the channel’s SET button. To easily set the PAN to center, you can press the control twice in rapid succession, like double-clicking a mouse button.

Bus Minus

Each input channel can generate its own independent mix-minus output, called BUS MINUS; thus each anchor, each announcer, each host, each guest can have a dedicated mix-minus feed. This is accomplished by pressing the



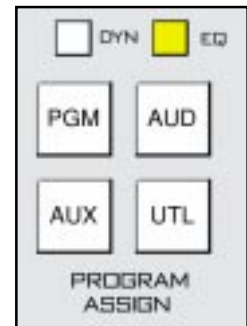
BUS MINUS IN switch, which places a summed signal of those input channels onto a special dedicated mix bus, where it becomes available to other input channels for use in their own Bus Minus functions. Each channel's input signal is omitted from the MIX at it's own direct output. A BUS MINUS encoder controls level for each of the individual IFB channel/direct outputs. A TB switch lets the control surface operator talkback to that individual IFB/direct output allowing communications between the operator and the talent receiving that mix. A SOLO switch allows the operator to solo monitor the IFB output of that individual channel's IFB feed.

This feature does not apply for G-9 Air Light version of the control surface.

Dynamics and EQ

DYNAMICS (DYN) and EQ buttons allow dynamics and EQ functions which have been set for that channel on the DCM (see Chapter 4) and EFS (see Chapter 3) CONTROL panels to be applied or not to the input channel. The buttons light up when input channel signal processing is active on the channel.

This feature does not apply for G-9 Air Light version of the control surface.

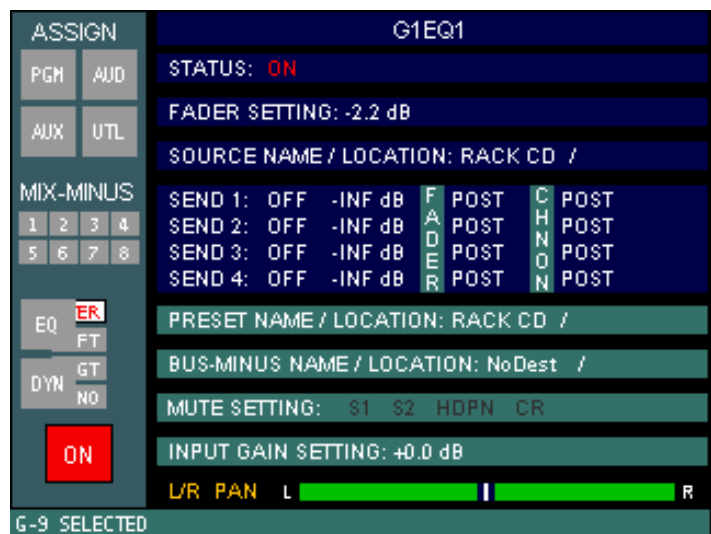


Main Bus Assign

PROGRAM ASSIGN buttons assign the input channel signal to the four main busses: PGM (program), AUD (audition), AUX (auxiliary), and UTL (utility) respectively. Note that the UTL bus can be set up during configuration to be pre/post fader or ON switch.

SET Button

This allows the operator to access various controls and displays in other sections of the control surface and apply them to the channel in question. SET can access DYNAMICS and EQ functions. To use, press the SET button and then make your appropriate section settings in other areas of the control surface. Once a SET button has been pressed, the button lights up, and all of the central section controls (EQ, MODE, DYNAMICS, etc.) remain in effect **for that input channel** until a different SET button is pressed.



CUE Switch

The CUE switch lets the operator monitor the channel's pre-fader signal. Once a CUE switch has been activated, the CUE CLEAR button on the EFS panel begins to flash and remains flashing until the CUE switch is turned off. Pressing the CUE CLEAR button will simultaneously turn off all cue switches on the control surface.

Fader

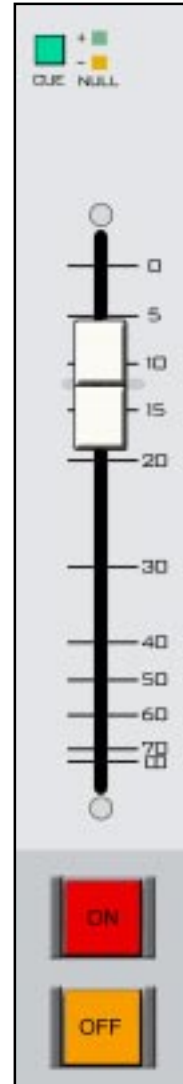
Channel output level is set by a long-throw fader. When the control surface has recalled a preset or is under external serial control from an automation system, the fader NULL LEDs light to show that the channel output level is actually different from what the fader indicates. The channel output level will remain at the computer directed value until the fader is moved to a matching level, after which the fader will control the level. The LED indicates which direction to move the fader to regain level control. Once the fader has been moved to the matching level the LED will turn off.

ON/OFF Switches

Channel ON (red) or OFF (orange) switches are at the bottom of the input section. The ON switch turns the channel signal ON and fires the channel ON/START logic; the switch LED lights to indicate the channel is ON. The OFF switch turns the channel signal OFF and fires the channel OFF/STOP logic; the switch LED lights to indicate the channel is OFF.

LCD Display

Each input section has an associated LCD display located above the input section in the control surface meterbridge. This display shows input level, selected source, preset source, channel number, channel status, gain reduction, and other information.



Input Level

The pre-fader level of the input signal is shown by the large vertical bargraph on the display. The level is indicated in DB on a calibrated scale beside the bargraph. If the channel is stereo, the bargraph shows the sum of left and right signals. The bargraph is colored, with green indicating lower levels and red indicating high levels. The nominal level position is in the middle of the range at the “0” scale marking, and shows as a thin blue band in the bargraph. The bargraph itself consists of a moving “DOT” over a solid “COLUMN” where the “DOT” indicates the peak value of the signal, and the “COLUMN” indicates the average value. On the G-9 control surface the average value column has been set to VU timing characteristics. In addition, a bright yellow rectangle will light at the top of the column if digital “OVER” or clipping is detected.

Selected Source

The currently selected source name shows on the LCD display underneath the level bargraph. This name is the 8-character name as defined in the Wheatstone Bridge Router configuration.

Preset Source

The currently loaded preset source name shows on the LCD display underneath the currently selected source. Once again, this 8-character name is as defined in the Wheatstone Bridge Router.

Channel Status

Various indicators on the LCD display will show status information for the associated channel. Above the level bargraph the words “ON”, “OFF”, or “MUTE” will appear as the channel status changes. “MUTE” indicates that the channel is ON and has a mute set. The letters “EQ” will show in the display if equalizer functions are active for the channel, and a smaller bargraph indicating gain reduction will appear if signal dynamics functions (compression, limiting) are engaged.

Channel Number

A large white number shows near the center of the display area indicating the channel number.

Control Panel (EFS-G9)

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Control Panel (EFS-G9)

Controls and Functions

The G-9 digital audio control surface is equipped with one CONTROL panel. This panel contains MONITOR, CUE, SOLO, TALKBACK, EQ, MODE, AUX/MXM MASTER OUTPUTS, EVENT, TIMER, SWITCHED METERS, and FUNCTION LOCK controller sections.

Monitors

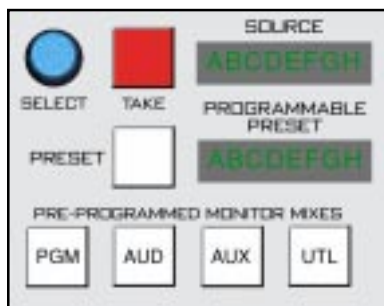
There are four monitor outputs available: CONTROL ROOM, STUDIO 1, STUDIO 2, and HEADPHONE.

Each monitor has a LEVEL control, a SET button, a DIM switch, a TB button (CR monitor does not have a TB button), and a MIX display that is located on the bottom section of the EFS-G9 panel.

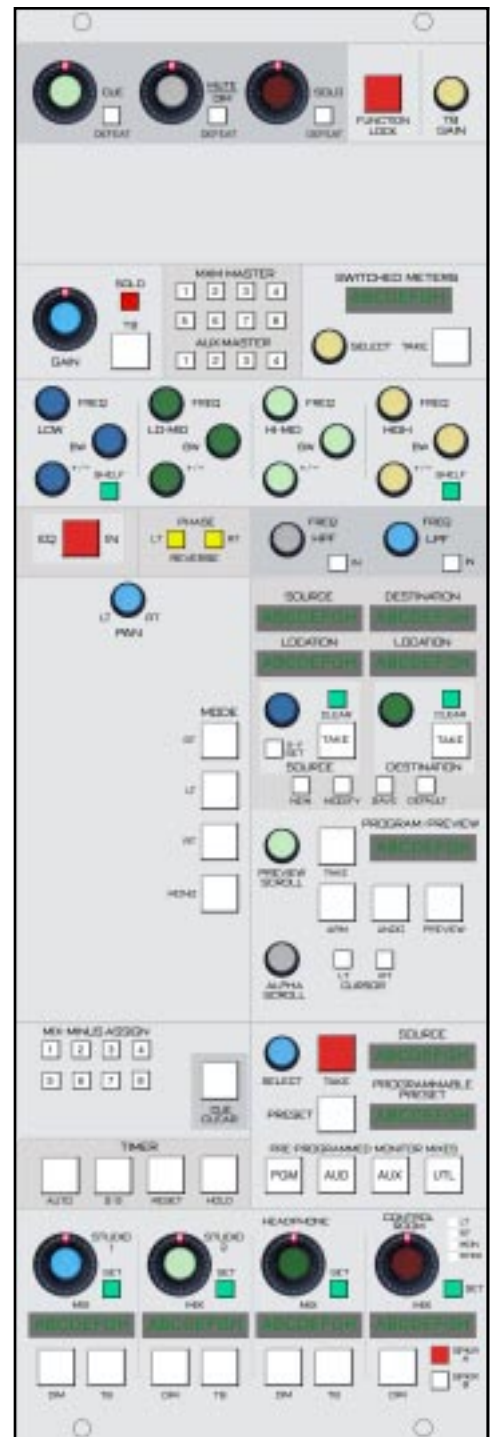


The CR monitor section also contains a mode indicator and two speaker select buttons.

Monitor sources can be selected several ways:

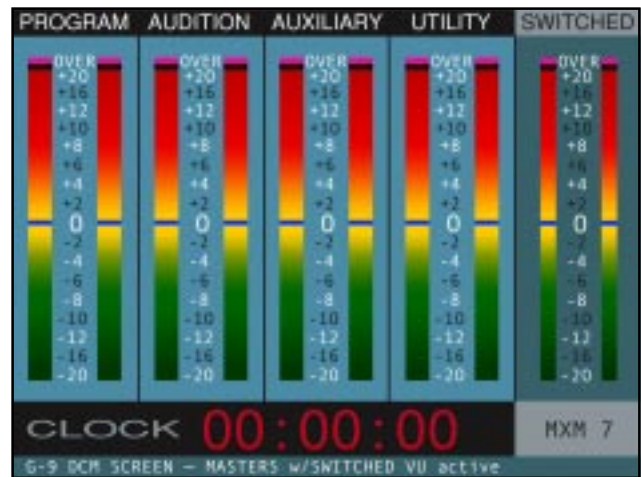


- Four PRE-PROGRAMMED MONITOR MIX switches (PGM, AUD, AUX and UTL) allow direct access to the main mixes most frequently monitored. Furthermore, sources can be randomly selected with the SELECT knob and its attendant SOURCE display and TAKE button.



- A source can also be loaded as a monitor preset by first selecting it with the SELECT knob and the SOURCE display, and then holding the PRESET button down until the source shows in the PROGRAMMABLE PRESET display. That source can then be monitored by pressing the PRESET button.

To select a source for a monitor by one of the above methods, first press the SET button next to the knob for the desired monitor. The knob will control the level of the monitor signal.



Control Room Section

In a typical radio application the control surface is located in the control room. Speakers in the control room allow the control surface operator to listen to the various control surface bus outputs to be assured that the control surface is performing as desired. These speakers are fed by a stereo signal from the control surface's control room output. In addition to the control room output, the operator may also desire to listen to specific isolated faders via the cue system and the control surface's internal cue speaker, or may want to listen via headphones.

In some instances the control surface operator may also be performing talent whose voice will be heard over the radio. The operator's microphone may thus provide a part of the signal that is going out over the air. If that signal is the one being monitored with the control room speakers, there is the potential for feedback. The amplified signal from the control room speakers is picked up by the microphone and reamplified to a new, higher, level, which then is once again picked up by the microphone. The signal quickly rises to an ear-splitting screech. To prevent this, the operator's microphone is normally set in the configuration software to MUTE the control room output to prevent the occurrence of feedback.

CR SET BUTTON - lets the operator select the source to be listened to in the control room speakers.

CR DISPLAY - the eight character display shows the source that is selected for monitoring in the control room.

CR LEVEL CONTROL - determines the overall loudness of the signal being monitored as it appears in the control room speakers.

DIM BUTTON - lets the operator dim the control room speakers (drop in level). Note the DIM function also affects the talkback interrupt.

MODE INDICATOR - a set of four LEDs indicates which mode, LEFT, RIGHT, MONO, or STEREO, the CR signal is operating in (see also page 3-5).

SPKR A, SPKR B - these two switches are used to determine which of two outputs will be fed by the CR signal. Each feed may have its mode programmed separately.



Studio Section

In addition to the control room, there may be one or two studios in which one or more performers will be assembled, usually with microphones so that their voices can become part of the mix. Speakers may be provided in the studio to allow the talent to listen to the various control surface bus outputs at times that they are not actually on air. These speakers are fed from one of the control surface's stereo studio outputs.

As in the control room, the potential for feedback also exists in the studio. The talent microphones will usually provide a part of the signal that is going out over the air. If that signal is the one being monitored with the studio speakers, feedback will occur. To prevent this, the studio mic faders are usually set to MUTE the studio output in the configuration software to prevent the occurrence of feedback.

ST SET BUTTON - lets the operator select the source to be listened to in the studio.

ST DISPLAY - the eight character display shows the source that is selected for monitoring in the studio.

ST LEVEL CONTROL - determines the overall loudness of the signal being monitored as it appears in the studio speakers.

DIM BUTTON - lets the operator dim the studio speakers (drop in level). Note the DIM function also affects the talkback interrupt. Note also if the studio is muted, talkback cannot be heard. However, if the studio is dimmed, talkback audio could presumably make it from the studio monitor speakers to the open studio mic.

TALKBACK (TB) BUTTON - there may be times when the control surface operator wants to talk to one of the talent in the studio. When the TB button in the studio monitor section is pressed, a predefined signal, usually the operator's mic, will "interrupt" the speaker feed that is normally heard in the studio.

If there is a live mic in the studio which has activated the mute feature, talkback will also be muted in the speakers.

On the top right corner of the EFS control panel is **TB GAIN** master level control that sets the talkback output and the level of the talkback interrupt signal. The normal studio feed, which is interrupted by the TB signal, will fall to a level set by the DIM control.

Headphone Section

HDPN SET BUTTON - lets the operator select the source to be listened to in the headphones.

HDPN DISPLAY - the eight character display shows the source that is selected for monitoring in the headphones.

HEADPHONE LEVEL CONTROL - determines the overall loudness of the headphone output signal.

DIM BUTTON - lets the operator dim the headphone output signal (drop in level).

TALKBACK (TB) BUTTON - takes the assigned TB signal and feeds it to the headphone output, allowing direct communication between the operator and talent. The normal headphone feed falls to a level set by the DIM control.

Monitors outputs are normally subject to the control surface's muting and solo/cue interrupt circuits; however, these may be defeated by front panel switching (DEFEAT button - see below and page 3-6).

Mode Control and Indicators

These switches and LEDs give local visual control and indication of the selected mode for that monitor (stereo, mono, left only or right only). Note that the mode status of the CR monitor can always be seen on its mode indicator LEDs next to the CR level control.

Mode may be changed in the following way: press the SET button for the desired monitor and select the allowed MODE button in the center of the panel. Similarly, the mode of an input source is selected by these controls by first pressing the SET button for the desired input channel.



CUE/MUTE/DIM/SOLO Section

The CUE master level control and defeat switch are located on the top section of the EFS panel. The CUE signal is pre-fader, and is normally used to check signals. When a channel is CUEd, its pre-fader signal will appear in the cue speaker, and the switched meter array in the master LCD display will show the level of the pre-fader signal.

The CUE level control determines the overall loudness of the cue signal (normally wired to the cue speaker in the meterbridge).

Similar to the control room speakers, the cue speaker also has the potential for feedback and should be muted (using the configuration software—VDIP menu) whenever the control room speakers are. The cue mute defeat switch allows for temporarily overriding, or cancelling, the mute function.

The SOLO master level control and defeat switch are also located on the top of the EFS panel. The SOLO signal is after fader, and is normally used to check a mix. When an output (such as an AUX SEND) is SOLOed, its post-fader signal will appear in the solo output (and usually, the control room speakers). The switched meter array in the master LCD display will show the level of the mix. The solo defeat switch allows for disabling the control room solo interrupt function.



The DIM master level control and defeat switch are also located on the top of the EFS panel. The DIM level control sets the amount of attenuation applied to a monitor signal (such as control room output) when its DIM switch engaged, and also sets the level of the normal feed when it is interrupted by the TB signal. The dim defeat switch allows for temporarily overriding the attenuation to bring all DIMmed signals back to their normal level.

CUE Clear

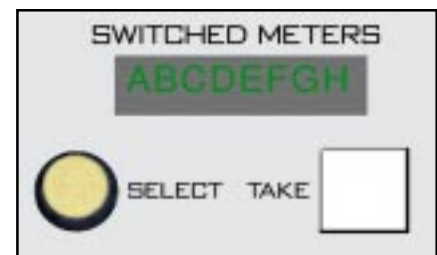
Whenever a CUE or SOLO is activated anywhere on the control surface, the CUE CLEAR button begins flashing and remains flashing as long as any CUE or SOLO on the surface is active. Pressing the CUE CLEAR button will cancel all active CUE and SOLO selections on the entire control surface.



Switched Meters Section

The control surface has provision for a switched meter.

To select a signal to meter, rotate the encoder SELECT. Available sources will be displayed in the eight character SWITCHED METERS display. When the desired signal is displayed, press the TAKE button. The switched meter array will then display the signal level. If, however, after a timeout period of 5 seconds, the TAKE button is not pressed, the array will revert back to its previous selected program.



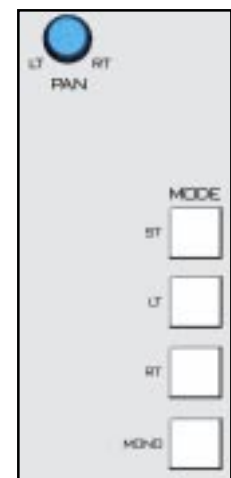
Any time a channel SOLO/CUE button is pressed, the SOLO/CUE level will be temporarily shown in the switched meter display until the SOLO/CUE button is deactivated.

Mode Select Section

The mode selector switchbank (ST, LT, RT, MONO buttons) and mode knob (PAN) are located in the center of the Control panel. There are four available channel modes: STEREO, LEFT ONLY, RIGHT ONLY and MONO. When pressed, the switch will light up to indicate the selected mode.

The PAN knob acts as a panpot in MONO, LEFT ONLY and RIGHT ONLY modes, and as a balance control in STEREO mode. The PAN knob is only used with input channels, and has no effect when setting the mode of the monitor signals.

Mode selection is set centrally. To select a MODE, press the SET button of the desired channel or mix; the SET button will illuminate, and the current mode setting for that channel will be displayed on the MODE switches. MODE can be reconfigured by pressing any allowable button.



AUX/MXM Master Outputs

This section is used to control the master GAIN, SOLO, TB, Mode selection, and DESTINATION routing (see Event Section) for the four AUX SEND mixes and the eight MXM mixes. It is comprised of a shared GAIN knob, TB button and SOLO switch. Additionally, there is a bank of four AUX MASTER buttons and a bank of eight MXM MASTER buttons.

To set a GAIN, press any of the four AUX MASTER or eight MXM MASTER buttons and rotate the GAIN knob.

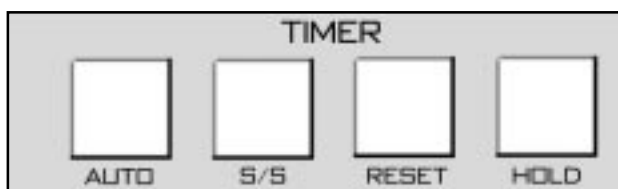
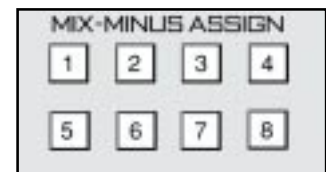
To set a SOLO, again press any of the four AUX MASTER or eight MXM MASTER buttons and then press the SOLO button.

To interrupt a signal with the TB signal, press any of the four AUX MASTER or eight MXM MASTER buttons and then press the TB button.



MIX-MINUS Assign

These buttons are used to control the makeup of the eight MIX-MINUS buses. Press the SET button on any input. If that input is assigned to feed an MXM bus, the corresponding MIX-MINUS ASSIGN switch will be lit. Pressing a MIX-MINUS ASSIGN switch will toggle that input's signal into or out of the corresponding MXM bus.



Timer Section

The control surface timer is provided with an AUTO-RESTART function so programmed (via GUI) input modules can automatically reset the timer display to zero and start a new count (if the timer is currently running), allowing the announcer to easily track his own pace.

The START/STOP button halts the timer, holds the last count, and then restarts and accumulates the count when depressed again—perfect for compiling tapes of desired duration.

RESET has a dual-mode capability:

- if you depress it while the timer is counting, the display will instantly reset to zero and start a fresh count;
- if the timer is already stopped, depressing this button will reset the timer to zero, where it will hold until start is pressed.

The HOLD button allows you to hold the display for a longer viewing duration, while still allowing the counter to continue in the background. Releasing the button will then display the current count.

Time of Day Clock

The MASTER LCD SCREEN includes the display of a time of day clock. To set the time on this clock you run a Wheatstone utility program, WSTimeSet.exe, on a network computer. The program allows you to set the clocks on multiple control surfaces by specifying the IP addresses of the control surfaces in a list. A single command then updates all specified clocks. Program options allow auto updating at midnight or at the top of the hour.

Events Section

This section provides a means of selecting sources for input channels, destinations for output mixes, storage and retrieval of control surface settings, and naming those settings as “events”. In this manner complete configuration and setting information that is used repeatedly (for example, morning show) can be saved and recalled. Up to 100 different events can be stored.

Selecting Input Channel Sources

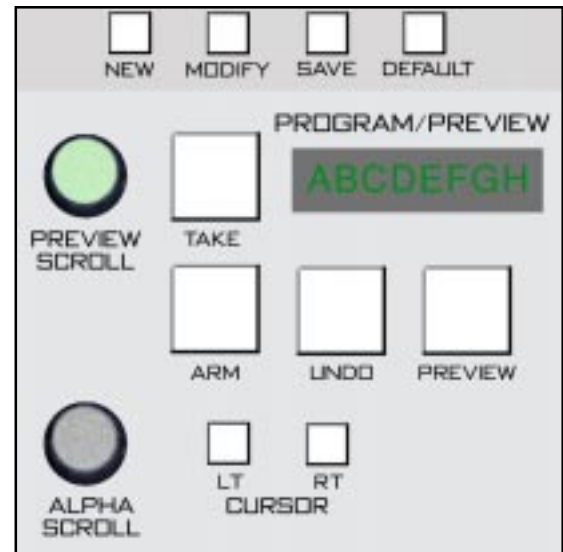
The operator designates the desired input channel by pressing its SET button in Input section. Its current input source is shown in the SOURCE display and the location of that source shown in the LOCATION display. Input channel meterbridge LCD displays will mirror that same information. A different input source may be chosen by rotating the SOURCE knob. When displaying the current source the CLEAR button lights; when displaying any other source the TAKE button lights. When the desired source is shown in the SOURCE display, pressing the TAKE button will execute the take command on the downstroke, and the new input will be shown in the SOURCE display and in the meterbridge LCD display. This function operates the same as the SOURCE knob on the input panels. To remove the input source from the input channel and leave nothing connected, press the CLEAR button. The connection will be broken and the display will show “NO SOURCE”.



Selecting Output Mix Destinations

When a SET button on an output mix channel (i.e., any of the auxes, monitors, or MXM masters) is pressed, its most current destination will be shown in the DESTINATION display, and the location of that destination will be shown in the LOCATION display. A mix is capable of being sent to one or many outputs. To see all the destinations that the mix feeds, rotate the DESTINATION knob. If the mix feeds the displayed destination the CLEAR button will light; if the mix doesn't feed the displayed destination the TAKE button will light.

EXAMPLE: An example might be a MXM feed routed to several listeners participating in the program.



Changing Output Mix Destinations

Rotate the DESTINATION knob until the desired destination is shown in the DESTINATION display. When the knob is rotated, the CLEAR button will light if the displayed destination is being fed by the mix, and the TAKE button will light if the displayed destination is not being fed by the mix. If the operator wishes to add the destination shown, press the TAKE button to execute the command and the new destination will become the current destination, shown in available displays elsewhere on the control surface. Disallowed destinations (established in the configuration software) will not be shown.

Removing Output Mix Destinations

Press the mix channel's SET button, rotate the DESTINATION selector knob, and the TAKE and CLEAR buttons will indicate which destinations are currently being fed by the mix (see above). When the required destination to be deleted is shown in the DESTINATION display, press the CLEAR button.

X-Y SET Button

Pressing the X-Y SET button allows the source and destination controls to act as a standard X-Y type router controller for making connections between sources and destinations that are not associated with the control surface.

Previewing an Event

Rotate the PREVIEW SCROLL encoder (push knob in while rotating for faster scrolling) and available EVENT names will be shown in the 8-character PROGRAM/PREVIEW display. When the desired event is shown in the display, press the ARM button, then press the PREVIEW button. This will cause the entire control surface to

display all settings associated with that event, without disturbing the current operative event. The preview status will be indicated by illumination of the PREVIEW button and flashing of all source and destination displays, to remind the operator that these would be the intended settings when the change is made. Pressing the PREVIEW button a second time will cancel the preview. *It should be noted that no audio signals are changed in any way by the preview feature.*

Taking an Event

Rotate the PREVIEW SCROLL encoder until the desired event is shown in the PROGRAM/PREVIEW display. To prevent accidental takes, the ARM button must be pressed to arm the function. The TAKE button will now flash indicating that the panel is ready to act on a take. Then press the TAKE button to execute the EVENT.



Undoing an Event

To recover from a premature or erroneous EVENT take, press the ARM and UNDO buttons. This will return the system to its status prior to the last take, with the last program event being once again the current program event, and the last preview event (the one just taken) becoming the preview event once again. There is only one level of undo. If undo has been done and a subsequent take has not been done, the undo function will do nothing.

Event Default Button

This control allows rapid access to a default or home control surface setting. Push it, and the TAKE button in the Preview section will flash. Hit the TAKE button and the default setting will be executed.

Establishing the Default Setting

This setting would normally be set only once. For example, it may be desirable to have all controls set to zero, or everything programmed to typical nominal settings. To establish the default setting, adjust all the control surface controls to their desired settings, press the MODIFY button and then the DEFAULT button. The default setting is stored.

Storing an Event

When an event is stored, all of the control surface's current settings are saved and will be recalled when that event is executed through the TAKE command. To create a new event from current control surface settings, hit the NEW button, and then hit the SAVE button.

Naming an Event

When events are saved, they receive a default event designation number. This way events can be saved quickly without having to name them. However, an event may be custom named when saved, or at a later time. To rename the displayed event, press the ALPHA SCROLL knob. The CURSOR LT and CURSOR RT buttons will light and the cursor, indicated by a flashing character, will be at the beginning of the name. Also, the SAVE button will begin to flash. At any time you can use CURSOR LT and CURSOR RT to move to a character you want to change. Once the cursor is at the desired character, rotate the ALPHA SCROLL encoder until the desired new character is displayed. Once all desired characters have been changed, simply press SAVE to save your changes. The event is stored with the desired name. At any time you can cancel the name edit by pressing the ALPHA SCROLL knob. Also, if you stop making name changes but fail to press the SAVE button, the name edit process will automatically cancel after a delay of several seconds.

Modifying an Event

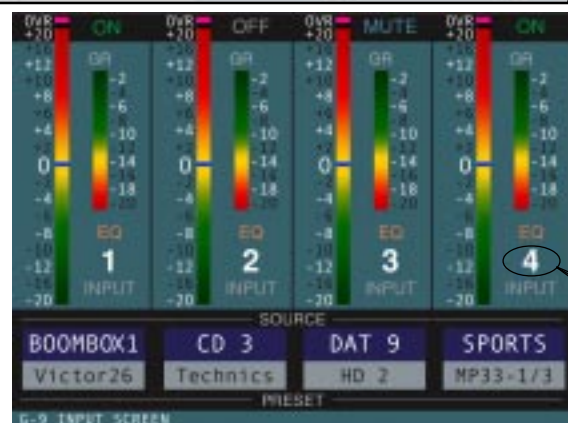
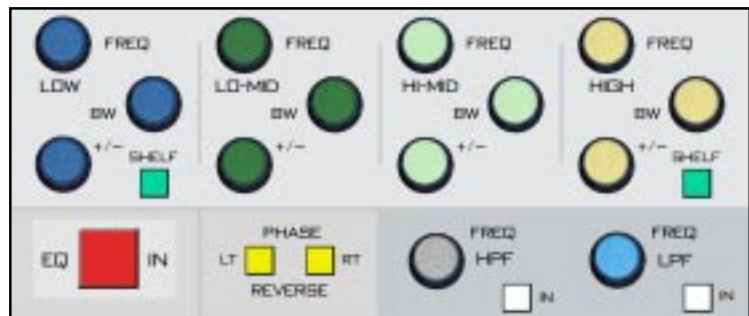
It is presumed an event has already been executed on the control surface. Modifications to that event can be accomplished by simply adjusting the controls and switches as desired and then pressing the MODIFY button, then the SAVE button. In this way the modified event will overwrite the old event setting and be saved, with the same name, in its place.

EQ Section

This feature does not apply for the G-9 Air Light version of the control surface.

The EQ section consist of a bank of knobs and various associated switches. The EQ system consists of a four-band parametric EQ with low band and high band PEAK/SHELF switching, plus variable frequency high and low pass filters. As any of the controls are adjusted, a real time color-coordinated graphic display is presented on the LCD monitor panel showing the resulting frequency response curves.

To access EQ on individual input channels, press the appropriate channel's SET button and make the desired adjustments in the EQ Section. To actually place the adjusted EQ in the signal chain, press the EQ IN button. The input channel's EQ button will light, and its LCD display will show "EQ". Either the input channel EQ switch or the master EQ switch on the EFS panel can be used to engaged/disengaged the EQ functions on a channel.



EQ Status Indicator

High-Pass Filter

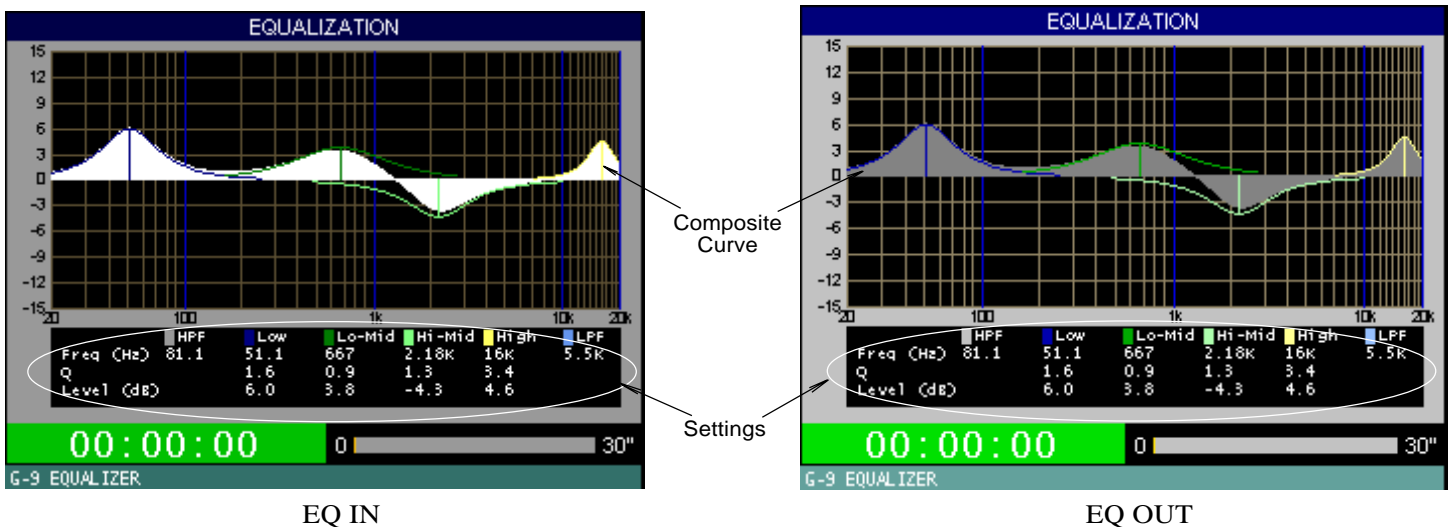
This is a 24dB/octave variable high-pass filter with Butterworth characteristics, tunable between 16Hz and 500Hz, and with a separate in/out switch (“HPF” switch). The relatively high order of filter is necessary to allow definite and decisive removal of unwanted low-frequency artifacts (air-conditioning rumble, line hum, traffic or foot-step impacts) with minimal effect on the required program.

Low-Pass Filter

This is a 24dB/octave variable low-pass filter with Butterworth characteristics, tunable between 1Hz and 20KHz. This filter is used to remove unwanted high frequency artifacts (noise, squeaks, etc.) with minimal effect on the required program.

Equalizer

This consists of four bands of parametric control used for modifying the sonic qualities of a signal. Each band has +/-14dB of BOOST/CUT capabilities (+/- knob), sweepable center frequency over the range of 20Hz to 20kHz, and with a filter “Q” or sharpness [BW (Band Width) knob] sweepable between 0.3 and 4.0. The LOW and HIGH bands also have a shelving function. The composite affect of any EQ adjustments as well as text describing the equalizer settings are shown on the LCD screen.



Phase

A pair of switches, one for left and one for right, are provided to cause the reversal of absolute phase of the signal path.

Function Lock

It is a necessity under some circumstances that non-technical personnel be prevented from adjusting a control surface's signal processing; even with qualified personnel at the helm, locking out the controls can prevent an inadvertent mid-show disaster.

This is achieved by the FUNCTION LOCK switch located on the upper right corner of the EFS panel. The control surface operator can lock out functions that may be undesirable to accidentally activate. To lock out a function, first press the FUNCTION LOCK button, then press the control you wish to lock out. Both the target control and FUNCTION LOCK button will flash rapidly. To activate the lock, press the FUNCTION LOCK button again.

When you press a locked control, both that control and the FUNCTION LOCK button will flash rapidly in unison to let you know you have accessed a locked control. To unlock, press the FUNCTION LOCK button once. The locked control is released.

NOTE: Certain controls *cannot* be locked. These include the FUNCTION LOCK button itself and all TALKBACK buttons.

Dynamics Processing Control Panel (DCM-G9)

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Display Buttons	4-5
Programmable Buttons	4-5

Dynamics Processing Control Panel (DCM-G9)

Controls and Functions

The DCM panel provides for compression and limiting for individual input channels. The section can be accessed by means of SET buttons on the desired input channels. As you turn the knobs in this section, the LED display next to the DYN IN button displays the current relative settings of that knob for the channel currently in SET mode. The knobs may also be pressed to obtain a display reading without actually turning them. Any current settings of the active channel will also be graphically shown in real time on the flat panel display.

Also this panel contains the talkback preselects section, and the display and programmable buttons.

Compressor/Limiter

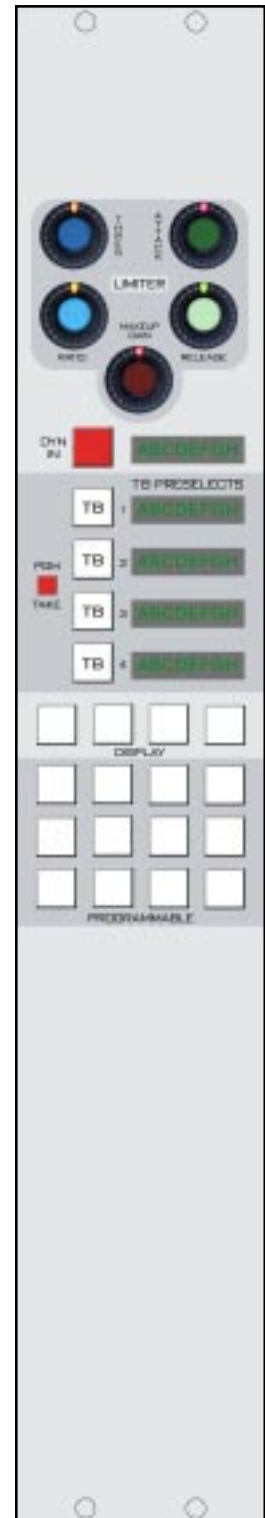
This feature does not apply for the G-9 Air Light version of the control surface.

The compressor algorithm used in the G-9 control surface is designed to:

- allow smooth, inaudible and unobtrusive level control on uneven sources;
- be able to act as a peak limiter for inadvertent overload control;
- enable deep effects if required.

The DCM-9 panel compressor section is a compound of many diverse dynamics elements.

The level detector is a pseudo-RMS averaging type with its own symmetrical-in-time attack-and-release characteristic adjustable between 1mS and 330mS (“Attack” control). At the slower end of its range, by itself it achieves a nouveau-classic “dbx” style syllabic-rate level control. As the time-constant is shortened, it becomes progressively shorter in relation to the lower audio frequencies themselves; the effect is to turn the detector into more of a peak-level detector, necessary for limiting or wilder effects. A secondary effect at intermediate to fast attack-times is that low frequencies are peak sensed while high frequencies are average sensed resulting in an effective high-frequency bias (up to as much as 6dB differential) which helps to mitigate the detrimental limiting effect of the resulting audio seeming “bottom heavy” normal to most compressors.



While the overall gain-reduction scheme is “feed-forward”, the heart of the detector stage itself is a feedback limiter; this allows for this carefully-contrived loosely-damped servo-loop to permit far more interesting dynamic effects.

The compressor is “soft-knee”, meaning the compression ratio increases slowly with increasing applied level, greatly easing the sonic transition into full compression; it helps avoid the “snatching” and “pumping” at threshold that many “hard-knee” dynamics units exhibit.

A full range of controls is available over the compressor’s behavior:



DYN IN

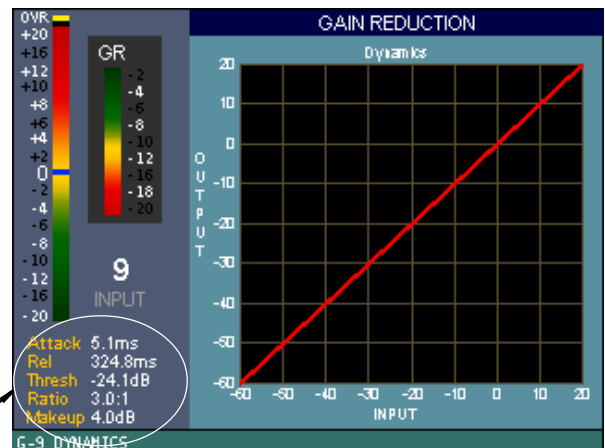
A DYN IN button toggles the settings in and out of the signal path. Each input channel also has its own “DYN” button to allow engaging these functions directly from the input panel. Whenever dynamic functions are engaged, the input channel LCD display will show a gain reduction bargraph meter, indicating both that the dynamics functions are active, and the amount of gain reduction being generated.

In addition, the DCM master LCD display will show a diagram of the gain reduction functions and text for the various knob settings.



Input LCD Display

Bargraph



Dynamics LCD Display

Settings

THRESHOLD

Sets the level at which the compressor is fully into compression of whatever ratio is set.

ATTACK

Determines how quickly (between nominally 1mS and 300mS) the compressor reacts to signals. Faster attack times result in “tighter” and more obvious control; longer attack times lend themselves well to gentler automatic volume control.

RATIO

Determines how much the compressor’s gain is reduced in relation to the applied signal. For instance, if the ratio is set at 3:1 and the input level above threshold changes by 12dB, the output level will be changed by 4dB. Normal usage is between approximately 2:1 and 4:1; anything greater than, say, 7:1 may be considered “limiting”.

RELEASE

Determines the nominal time the compressor takes to recover after excitation (between 33mS and 3.3 Seconds). Short release times make for more intense, denser, obvious processing; longer release times are better suited to automatic gain control.

MAKEUP GAIN

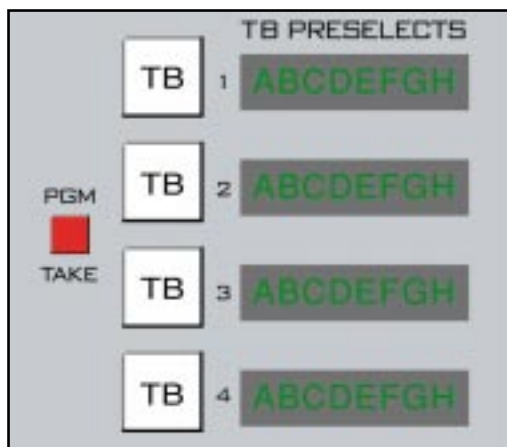
When fairly deep compression is invoked (large gain reduction) it can be necessary to increase the compressor’s output level back up to nominal system signal level; up to 14dB of output gain is available to allow this.

Talkback Preselects

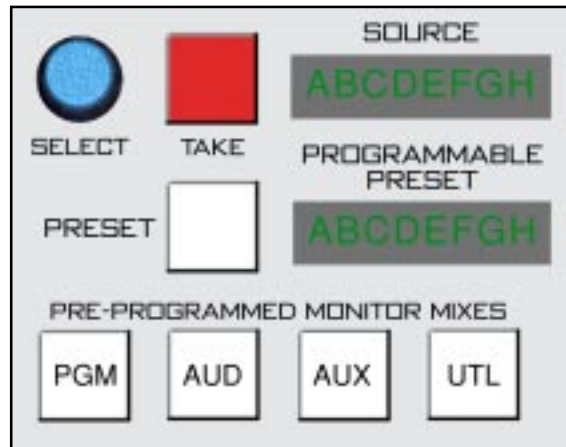
These four switches allow for a dedicated Bridge 2001 Router output to be designated as a destination for the talkback signal. Once a specific output has been programmed into the preselector, the talkback signal can be sent to that output at any time by pressing the corresponding switch.

Each of the four TB buttons can be individually programmed, and then the entire programmed bank of four can be stored and recalled in the EVENT section (see pages 3-8 to 3-10). Each individual TB button is programmed as follows: press the PGM/TAKE button, then press the TB button you want to program. Then rotate the SELECT knob (programmable section on the EFS-G9 panel) and available destinations will be shown in the SOURCE display. When the desired channel is shown, press TAKE button located next to the SELECT knob (EFS-G9 panel), and the appropriate TB PRESELECTS display will then match what is shown in the SOURCE display on the EFS-G9 panel. Repeat this procedure for each of the four TB buttons.

When EVENTS are stored, the four TB preselects as displayed at the time of the EVENT SAVE action will be also stored and can be recalled with that EVENT.



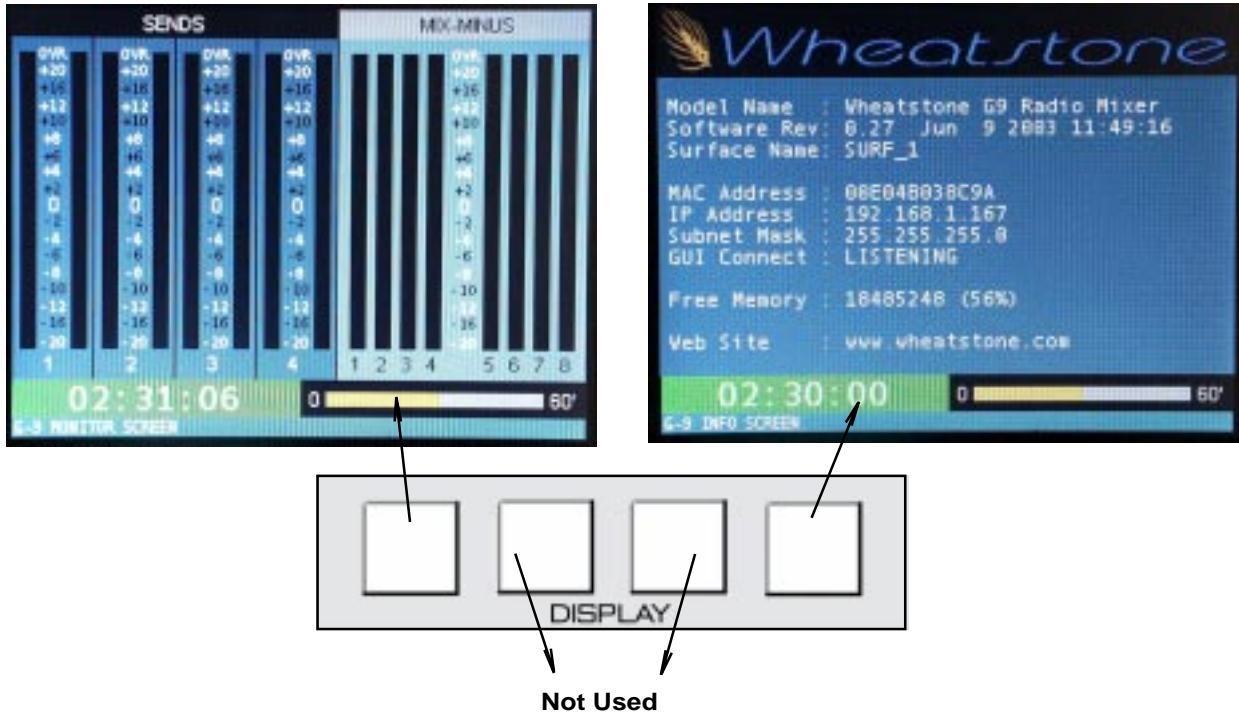
DCM-G9 Panel



EFS-G9 Panel

Display Buttons

These switches control the display modes for the LCD monitor.



Programmable Buttons

These (12) momentary switches and indicating LEDs are designed for user accessible external functions (GPIs). They can be mapped with the configuration software to any available logic I/O ports within the Bridge 2001 Router system, and used to control external devices.

Phone Panel (TEL-G9)

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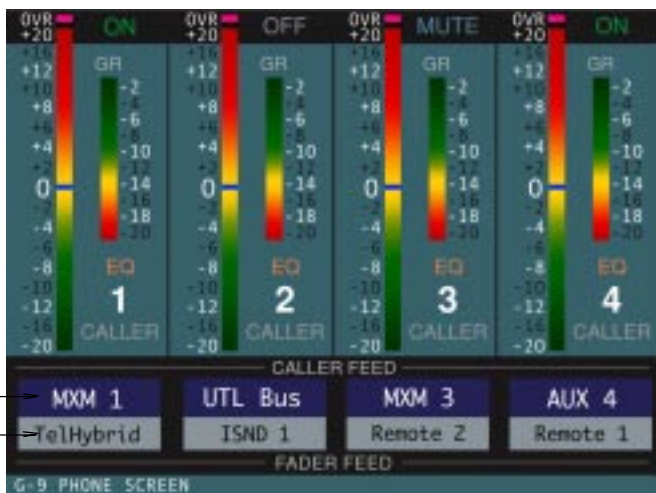
Phone Panel (TEL-G9)

Controls and Functions

The TEL panel is used for telephone call-ins. Each panel can handle four callers. Caller signals enter the control surface's associated Bridge 2001 Router from your station hybrid; each caller has his own fader. Output switches assign callers to any combination of the control surface's four stereo outputs: PGM (program), AUD (audition), AUX (auxiliary) and/or UTL (utility).

Input Sources

By turning the FADER FEED knob the LCD display will show various sources available to use for inputs on the fader. When the desired source name appears, pressing the TAKE button routes that source to the fader.

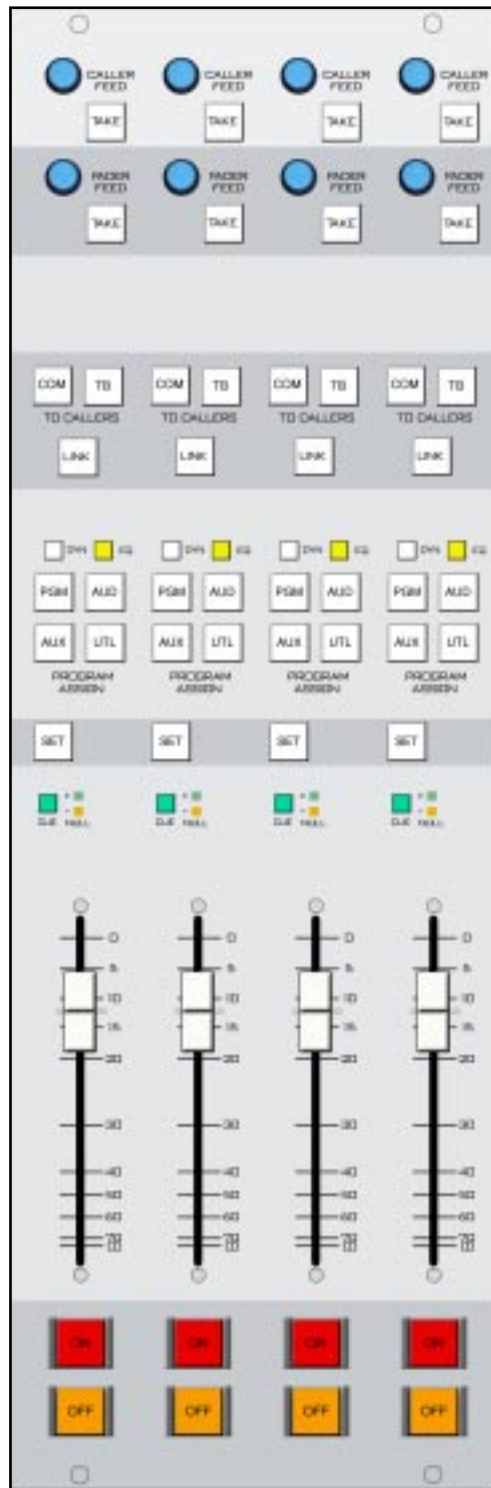


Caller Feed Mix

Input Source

Caller Outputs

By turning the CALLER FEED knob the LCD display will show various signals available for the caller feed output. When the desired signal name appears, pressing the TAKE button routes the signal to the caller feed destination. This caller output is the sum of the selected signal and the other caller channels, provided that the LINK button has been pressed. The caller himself is subtracted from this sum. If the LINK button has not been pressed, then only the selected signal is sent to caller.



The LINK button acts to conference two or more caller together. For example, if you have callers on 1, 2, and 3, and you want 1 and 3 to here each other but 2 to remain isolated from 1 and 3, press the LINK buttons on 1 and 3.

Caller Preview and Talkback

Pressing the COM button places the pre on, post fader, caller signal into SOLO, so that the control surface operator can hear them for set-up purposes before the caller is ON AIR. Pressing the TB button sends the control surface operator's talkback signal to the caller feed, so that the caller can hear the control surface operator for set-up purposes.

Dynamics and EQ

These buttons allow dynamics and EQ functions, which have been set on the CONTROL panel, to be applied or not to the caller channel. The buttons light up when the processing is active.

This feature does not apply for the G-9 Air Light version of the control surface.

Main Bus Assign

As on input channels, these buttons are used to assign the caller signal into any or all of the main stereo mixes: PGM, AUD, AUX, and/or UTL. Note that the UTL bus can be set up during configuration to be pre/post fader and ON switch.

SET Switch

The SET button allows the operator to access controls in other sections of the control surface, such as EQ Dynamics, MODE, etc., and apply them to the caller channel in question.

CUE Switch

This switch allows the control surface operator to monitor the caller's pre on, pre fader, signal. Once a CUE switch has been activated, the CUE CLEAR button on the EFS panel begins to flash and remains flashing until the CUE switch is turned off. Pressing the CUE CLEAR button will simultaneously turn off all cue switches on the control surface.

Fader

Channel output level is set by a long-throw fader. When the control surface has recalled a preset or is under external serial control from an automation system, the fader NULL LEDs light to show that the channel output level is actually different from what the fader indicates. The channel output level will remain at the computer directed value until the fader is moved to a matching level, after which the fader will control the level. The LED indicates which direction to move the fader to regain level control. Once the fader has been moved to the matching level the LED will turn off.

ON/OFF Switches

Channel ON (red) or OFF (orange) switches are at the bottom of the phone section. The ON switch turns the caller signal ON and fires the channel ON/START logic; the switch LED lights to indicate the channel is ON. The OFF switch turns the caller signal OFF and fires the channel OFF/STOP logic; the switch LED lights to indicate the channel is OFF.

LCD Display

The phone section has an associated LCD display located above the phone section in the control surface meterbridge. This display shows caller level, selected input source, caller feed output mix, channel number, channel status, gain reduction, and other information.



Input Level

The pre-fader level of the caller signal is shown by the large vertical bargraph on the display. The level is indicated in DB on a calibrated scale beside the bargraph. If the channel is stereo, the bargraph shows the sum of the left and right. The bargraph is colored, with green indicating lower levels and red indicating high levels. The nominal level position is in the middle of the range at the “0” scale marking, and shows as a thin blue band in the bargraph. The bargraph itself consists of a moving “DOT” over a solid “COLUMN” where the “DOT” indicates the peak value of the signal, and the “COLUMN” indicates the average value. On the G-9 control surface the average value column has been set to VU timing characteristics. In addition, a bright yellow rectangle will light at the top of the column if digital “OVER” or clipping is detected.

Selected Source

The currently selected source name shows on the LCD display underneath the level bargraph. This name is the 8-character name as defined in the Wheatstone Bridge Router configuration.

Caller Feed Output Mix

The currently loaded caller feed output mix name shows on the LCD display underneath the currently selected mix. Once again, this 8-character name is as defined in the Wheatstone Bridge Router.

Channel Status

Various indicators on the LCD display will show status information for the associated channel. Above the level bargraph the words “ON”, “OFF”, or “MUTED” will appear as the channel status changes. “MUTE” indicates that the channel is turned ON and has a mute set. The letters “EQ” will show in the display if equalizer functions are active for the channel, and a smaller bargraph indicating gain reduction will appear if signal dynamics functions (compression, limiting) are engaged.

Channel Number

A large white number shows near the center of the display area indicating the channel number.