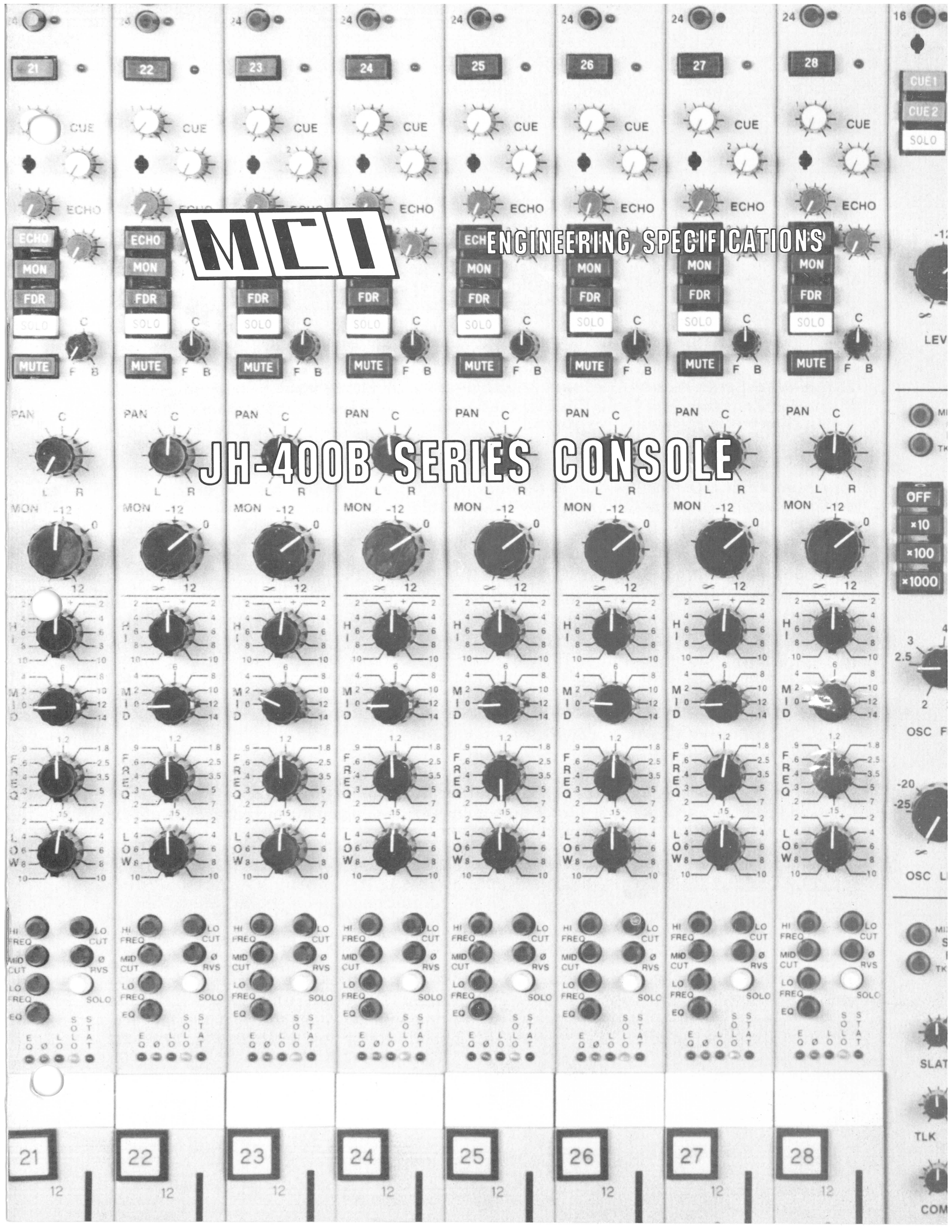




ENGINEERING SPECIFICATIONS

JH-400B SERIES CONSOLE



The JH-400B Series Console is a flexible, efficient, Professional Mixing Desk which has become the STANDARD by which all other Professional Consoles are measured. It is the most-used Console in the world with over 450 in daily use. Quantity production savings make this the "Best Buy" in the Professional Recording field. No other console can offer so many features for such a low price. There is a balance of flexibility without complexity, of sensitive musical control without frills which meets the needs of a majority of studios.

The JH-400B Series is an IN-LINE console with all of the circuits needed for one complete Mike Channel and one complete Remix Channel in each I/O module. Therefore, the number of input/output channels is completely flexible and can be adjusted to the needs of a growing business. The JH-428B is wired and tested for up to 18 I/O modules. The JH-440B is wired and tested for up to 40 I/O modules.

Any number of I/O modules—up to the maximum for each frame—may be purchased. If additional channels are needed, they may be added simply by plugging in new I/O modules.

MODES OF OPERATION

MIKE MODE feeds the Mike input to the Channel Buses via the EQ circuits and the large linear Fader. The Monitor circuits are fed through the rotary level control from the Channel Buses. The Pan and Echo Sends follow the Monitor level. The Cue levels are not affected by the Monitor level.

TAPE MODE is identical to Mike Mode except that the Monitor circuits are fed from the TAPE RETURN INPUT.

REMIX MODE connects the Tape Return Input to the large linear Fader and the EQ circuits, then to the Channel Buses, the Pan Pots and the Sends.

BUS STRUCTURE

Each of the I/O modules can be assigned to at least 16 Channel Buses. There is a total of 24 Channel buses and an additional 4 to 16 output lines (depending on the module) which can be reached via the DIRECT button on each I/O module.

EQUALIZATION

MCI's precision EQ circuits are carefully designed to musical scales, not to mathematical relationships. The switch positions define exact sound control points which are easy to find and easy to recapture—or to reproduce on another module.

Instead of the usual Variable gain—fixed "Q" circuits which change the tonal value as the amplitude is adjusted, MCI has designed Variable Gain-variable "Q" circuits to maintain the tonal balance as the amplitude is adjusted. The BANDPASS of each circuit remains relatively constant so that when the EQ is boosted or cut, the slope of the curve increases to emphasize ONLY the sound you are looking for. Thus you do not need to use excessive EQ to achieve the effects you want.

JH-50/400 AUTOMATION

The MICROPROCESSOR-based JH-50 Automation package provides a complete REMIX Automation System for the JH-400B Console. The package can be installed easily in a single day by exchanging the I/O Channel Faders for VCA-FADER assemblies. These assemblies contain all the additional controls needed to operate the Automation. The remainder of the Automation circuit boards are mounted in a metal case underneath the console. Inter-connecting cables plug all circuits together. The ONLY remotely mounted equipment is the Power Supply. When the Automation is turned OFF, the console operates as it would without Automation.

Automation data is recorded on two tracks of the multi-track tape. The two tracks are used ping-pong fashion for subsequent updates. The data rate is 9600 Baud—with a 14 kHz bandwidth.

The System operates in "real time". No "data packing" or "priority" system is used. Every automated function is scanned—and updated—each cycle. It is therefore impossible to overload the system, no matter how many controls are changed at once.

The JH-50 is the most USABLE Automation available anywhere. There are only two MODE CONTROL buttons on each VCA-FADER assembly. Group Assignment controls and indicator lamps complete the panel assembly.

One of the most important features of the JH-50 System is its AUTOMATIC NULLING. When shifting out of REWRITE mode or UPDATE mode, it is NOT necessary to null the FADER to the position it held before going into UPDATE mode. A TEMPORARY, UNSTABLE mode is entered which automatically shifts to READ mode whenever the FADER crosses the original value. This produces a smooth "joining" of the previous MIX and the new REWRITE or UPDATE section. Automatic Nulling can be easily defeated if a sudden change in level is desired.

The JH-50 Automation package adds two new capabilities to the Console:

GROUPING

VCA-FADER assemblies allow any I/O module to be assigned to LOCAL control or to any one of eight GROUPS. ANY Fader can be designated as MASTER for its Group. When being used as a Group Master, the Channel VCA value is held and added to the Group value. If the Fader is reverted to LOCAL, the Group value is held while you correct the Channel value.

QUAD-IN-PLACE SOLO

The MASTER SOLO/MUTE control switches all channel MUTES from normal operation to SOLO mode. ALL channels are muted EXCEPT the ones activated as a SOLO. This reversal produces a QUAD-IN-PLACE SOLO function which adds to the flexibility of the Console.

CONSOLE SPECIFICATIONS

FREQUENCY RESPONSE

The JH-400 Series Console is rolled off at 20Hz and 20kHz to minimize room rumble and R.F. problems in the studio. Any input to any output will measure better than;

+¼ -½ from 20Hz to 20kHz

HEAD ROOM

Careful attention has been taken to insure adequate headroom in the equalizer and MIX bus sections of the 400 Console. Output headroom will exceed the capabilities of any tape machine system. Headroom specs are defined as the number of db between normal level and the maximum 1kHz sine wave level at .5% T.H.D.

	MAX.	HEADROOM
Mike Preamp	+24dBv	30dBv
Equalizer	+24dBv	23dBv
Quad Mix Busses (ahead of fader)	22dBv	24dBv
Channel Line Out	+22dBv	18dBv
Mix Outputs	+22dBv	18dBv

OVERALL GAIN

Measured Mike input to channel line output with a 150ohm source impedance and 10k ohm output termination.

72dB.

CROSSTALK

Crosstalk will vary slightly with the size of the console. High frequency crosstalk is caused primarily by capacitive coupling between input lines and summing busses. Low frequency crosstalk is a function of power supply decoupling and transformer coupling.

I/OMODULE LINE INPUT TO MIKE CROSSTALK

This measurement is a measure of crosstalk between the monitor channel and the Mike channel of a module with the module in TAPE mode. It is made with a 150 ohm resistor terminating the Mike Input and a +4dBv signal into the channel line input.

at 1kHz, 60db below +4dBv
at 18kHz, 38db below +4dBv

BUSS CROSSTALK

This measurement gives the crosstalk between Quad Mixing busses. A module is fed with +4dBv and panned to L.F. mix all other modules are muted. The measurement is then made to the other 3 mix busses and averaged.

at 1kHz, 70db below +4dBv
at 18kHz, 57db below +4dBv

CHANNEL TO CHANNEL CROSSTALK

This measurement is made in Remix mode. One module is fed +4dBv in and adjusted for +4dBv out while and adjacent module is shorted on the input and with fader in unity gain.

at 1kHz, 80db below +4dBv
at 18kHz, 68db below +4dBv

DISTORTION:

MIKE PREAMP

Nominal level	(-40dBv In, -6dBv Out)	.04%IM	.01%TIM
High level In	(0dBv In, +20dBv Out)	.04%IM	.01%TIM
Transient	(-20dBv In, -14dBv Out)	.04%IM	.01%TIM

CONSOLE SPECIFICATIONS (continued)

LINE/MIX (Line Input to Quad Mix Output)

+4dBv In, +4dBv Out	.05%IM	.01%TIM
+10dBv In, +18dBv Out	.05%IM	.04%TIM

NOISE

Due to op Amp technology all outputs of the console are Low impedance so we are specifying absolute noise per the following:

$$\text{Noise Out In dBv} - \text{Gain In db} = \text{Equiv Noise In dBv}$$

All noise measurements are corrected by +1.05db error correction for a HP 400FL reading gaussian noise. All noise measurements are made with a 6db/octive 20Hz and 20kHz filter. All measurements are made with the following terminations: Mike Input 150 ohms, Line Input 50 ohms, Line Output 10k ohms.

Equivalent Input of Mike Preamp at full gain
- 128dBv

Equivalent Input Noise of Channel Mix buss output with No channels assigned.
(Note: 16 channel console)
Better than -88dBv

Equivalent Input Noise of Quad Mix Bus Output
Mix fader full up all channels muted less than -80dBv.
Mix fader full down all channels muted less than -86dBv.

Equivalent Input Noise of Channel in Remix Line input to Line Output gain set at +12db.
Less than -90dBv.

CHANNEL LINE INPUT IMPEDANCE	600ohm at 1kHz
MIKE INPUT IMPEDANCE	1.5Kohm at 1kHz
with pad	1.2Kohm at 1kHz
CHANNEL LINE OUTPUT IMPEDANCE	100ohm at 1kHz

TEST EQUIPMENT

All measurements were made using the following:

HP400FL AC voltmeter
HP3581C wave analyzer
Crown IMA distortion meter

TIM was measured using:

3.36kHz Square wave filtered to 3db down at 40kHz as fundamental
18.00kHz sine wave
Ratio: 4:1
For details, contact MCI

IM was measured per S.M.P.T.E. standard.
dBv is a reference to .774V used by MCI to facilitate using a 400FL
or other dBm reading meter directly for level measurement.

AUTOMATION SPECIFICATIONS

ELECTRICAL

INFORMATION STORAGE SYSTEM

Any two or more tracks of an Audio recording system which meets the following criteria:

1. is able to sync with the Master tape
2. is able to record and play back a 14kHz signal
3. has at least 15db isolation between tracks at 19kHz

FADERS, CONTROL BUTTONS AND LEDs

Self contained in Fader Retrofit packages.

SYSTEM CONTROLS

On Status module.

SYSTEM RESOLUTION

100db Fader range is divided into 250 steps of .4db/step. This translates into full 8-bit resolution.

SYSTEM ACCURACY

A-to-D and D-to-A is adjustable to better than System Resolution. System Resolution (0.4db) becomes System Accuracy when this adjustment is properly made.

DITHER (exclusive of system 0.4db maximum resolution)

0.4db maximum.

CUMULATIVE SYSTEM ERROR (unlimited passes)

Total error is 0.4db. This error does NOT accumulate. (READ mode ONLY. Other modes are subject to operator changes.)

SCAN TIME

102 milliseconds

The SCAN TIME is NOT a delay, and does NOT accumulate.

BOUNCE DELAY

1.2ms per pass.

The BOUNCE DELAY IS a delay which accumulates with each UPDATE PASS.

DATA RATE

9600 Baud (14kHz bandwidth)

COMPATIBILITY

Tapes made on a standard Automated JH-400B or JH-500 Console may be played back on any other standard Automated JH-400B/or JH-500 console.

POWER REQUIREMENTS

Separate power supply provides

+5V @ 5Amps

±15V @ 3Amps

Line Requirements

100V @ 2 Amps

120V @ 2 Amps

240V @ 1 Amp

MECHANICAL

HOUSING

The Processor, the Digitizers, and the Power Distribution boards are housed in a case which mounts underneath the JH-400B Console.

POWER SUPPLY

The Automation Power Supply mounts in a standard 19 in. relay rack. It uses 3.5 in. of panel space.

FADER PACKAGE

The retrofit fader package replaces the non-automated fader without mechanical modification in all JH-400B Consoles. Earlier Consoles may require top panel modification.

CABLES

Flat, multi-wire cables, formed to fit and terminate by computer-type connectors are supplied to inter-connect all PC boards.

LIGHT METER SPECIFICATIONS

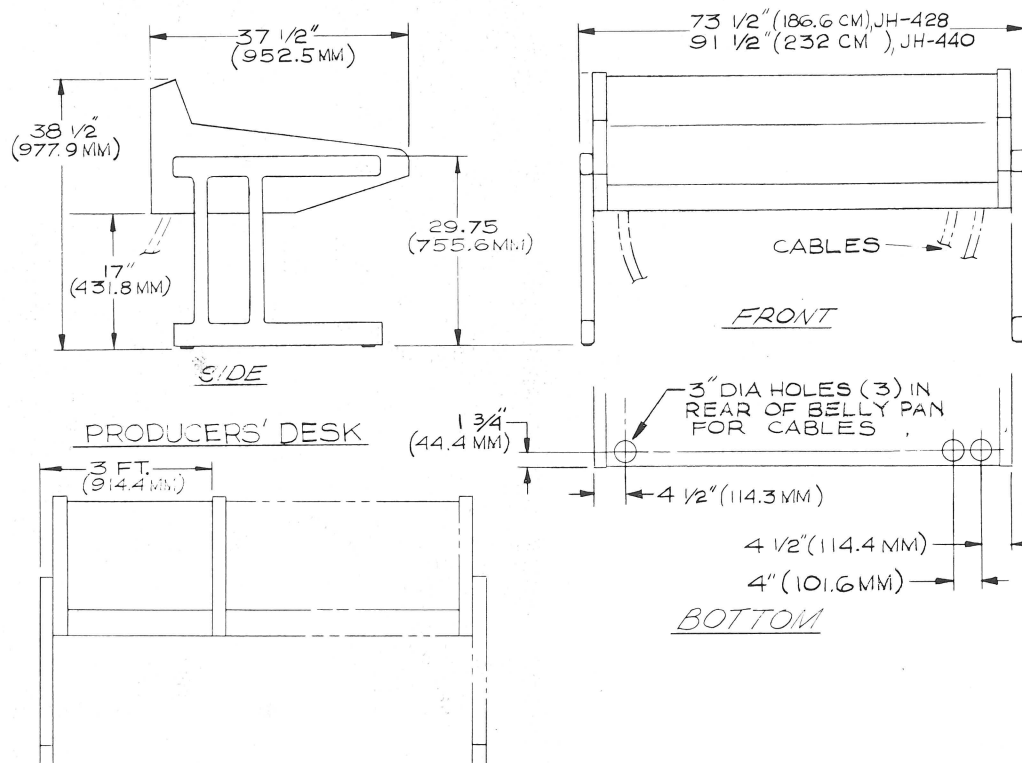
8 SEGMENTS	Indicate	+2, 0, -1.5, -3, -6, -10, -15, -20 dB
VU BALISTICS		Matched to ASA VU specifications
PEAK BALISTICS		10 ms Integration time. 2 sec. Fall time
TRACKING ERROR (between meters)		+0.1 dB (Uses a single ref. for all meters)
FREQUENCY RESPONSE		5 Hz to 18.5 kHz
POWER SUPPLY		+5v DC +15v DC
MECHANICAL		FRONT PANEL HEIGHT 3.5 in. (88.8 mm) FRONT PANEL WIDTH 19.0 in. (482.2 mm) TOTAL DEPTH 7.4 in. (187.8 mm)

OPTIONS

1	SPECTRA-VUE	Eighteen 1/2 octave filters use the console meters for a readable Spectral Analysis of the Audio signal.
2	EXTRA TIE LINES	JH-428
3	NORMALIZED MIKE PATCH POINTS	JH-428
4	EXTRA TIE LINES	JH-440
5	NORMALIZED MIKE PATCH POINTS	JH-440
6	"JOYSTICK" PANNING CONTROLS	1 control & amplifier (up to 8 ckts.)
7	"JOYSTICK" PANNING CONTROLS	Additional controls
8	EXTRA LENGTH POWER SUPPLY CABLES	
10	ADDITIONAL VU METERS	Connected and labeled per request
11	ADDITIONAL LIGHT METERS	Connected and labeled per request
12	BUILT-IN PHASE METER	
13	"SEND" METERS	Standard VU type

JH-400B-PD/L PRODUCER'S DESK
JH-400B-PD/R

3 Ft. long, mounted either left or right.
(2) 4" x 6" speakers mounted in meter type panel. 12 control buttons



PATCH BAY FACILITIES

PREAMP OUT/LINE RETURN	#1 - #28	Output from the REMIX switch (Normalized pair)
FADER INPUT	#1 - #28	Inserts signal before the Fader
TAPE MACHINE RETURN	#1 - #28	Signal from Tape before the line input trans. (Normalized pair)
CHANNEL LINE INPUT	#1 - #28	Inserts signal into the line input trans.
CHANNEL LINE OUTPUT	#1 - #28	Output from the channel output trans. (Normalized pair)
TAPE MACHINE INPUT	#1 - #28	Inserts signal into the multitrack tape input

In addition to the above patch points for each channel, the following REMIX and Console function patch points are available.

QUAD MIX OUTPUT	#1 - #4	4 TK TAPE INPUT	
2-MIX OUT	#1 - #2	2 TK TAPE IN	
MONO OUT	#1	MONO TAPE IN	
TAPE 1 IN	#1 - #2	TAPE 1 RET	
TAPE 2 IN	#1 - #2	TAPE 2 RET	
CUE SEND	#1 - #2	CUE AMP IN	
ECHO SEND	#1 - #2	CHAMBER IN	
CHAMBER RETURNS	#1 - #4	RETURN INPUTS	
4 TK TAPE RETURN	#1 - #4	2 TK TAPE RETURN	#1 - #2
MONO TAPE RETURN	#1	OSCILLATOR	#1
MULT 1	#1 - #4	MULT 2	#1 - #4
TIE LINES	#1 - #56	Specifications subject to change without prior notification.	

