

PCM 80
Digital Effects
Processor User Guide

lexicon

Unpacking and Inspection

After unpacking the PCM 80, save all packing materials in case you ever need to ship the unit. Thoroughly inspect the PCM 80 and packing materials for signs of damage. Report any shipment damage to the carrier at once; report equipment malfunction to your dealer.

Precautions

Save these instructions for later use.

Follow all instructions and warnings marked on the unit.

Always use with the correct line voltage. Refer to the manufacturer's operating instructions for power requirements. Be advised that different operating voltages may require the use of a different line cord and/or attachment plug.

Do not install the unit in an unventilated rack, or directly above heat producing equipment such as power amplifiers. Observe the maximum ambient operating temperature listed in the product specification.

Slots and openings on the case are provided for ventilation; to ensure reliable operation and prevent it from overheating, these openings must not be blocked or covered. Never push objects of any kind through any of the ventilation slots. Never spill a liquid of any kind on the unit.

This product is equipped with a 3-wire grounding type plug. This is a safety feature and should not be defeated.

Never attach audio power amplifier outputs directly to any of the unit's connectors.

To prevent shock or fire hazard, do not expose the unit to rain or moisture, or operate it where it will be exposed to water.

Do not attempt to operate the unit if it has been dropped, damaged, exposed to liquids, or if it exhibits a distinct change in performance indicating the need for service.

This unit should only be opened by qualified service personnel. Removing covers will expose you to hazardous voltages.

This triangle, which appears on your component, alerts you to the presence of uninsulated, dangerous voltage inside the enclosure... voltage that may be sufficient to constitute a risk of shock.



This triangle, which appears on your component, alerts you to important operating and maintenance instructions in this accompanying literature.

Notice

This equipment generates and uses radio frequency energy and if not installed and used properly, that is, in strict accordance with the manufacturer's instructions, may cause interference to radio and television reception. It has been type tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designated to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause interference to radio or television reception, which can be determined by turning the equipment OFF and ON, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient the receiving antenna
- Relocate the computer with respect to the receiver
- Move the computer away from the receiver
- Plug the computer into a different outlet so that the computer and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The user may find the following booklet prepared by the Federal Communications Commission helpful:

"How to identify and Resolve Radio/TV Interference Problems."

This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.

Le présent appareil numérique n'émet pas de bruits radioélectriques dépassant les limites applicables aux appareils numériques de la class B prescrites dans le Règlement sur le brouillage radioélectrique édicté par le ministère des Communications du Canada.

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Dansk

Vigtig information om sikkerhed

Gem denne vejledning til senere brug.

Følg alle anvisninger og advarsler på apparatet.

Apparatet skal altid tilsluttes den korrekte spænding. Der henvises til brugsanvisningen, der indeholder specifikationer for strømforsyning. Der gøres opmærksom på, at ved varierende driftsspændinger kan det blive nødvendigt at bruge andre lednings- og/eller stiktyper.

Apparatet må ikke monteres i et kabinet uden ventilation eller lige over andet udstyr, der udvikler varme, f.eks. forstærkere. Den maksimale omgivelsestemperatur ved drift, der står opført i specifikationerne, skal overholdes.

Der er ventilationsåbninger i kabinettet. For at sikre apparatets drift og hindre overophedning må disse åbninger ikke blokeres eller tildækkes. Stik aldrig noget ind igennem ventilationsåbningerne, og pas på aldrig at spilde nogen form for væske på apparatet.

Dette apparat er forsynet med et stik med jordforbindelse. Denne sikkerhedsforanstaltning må aldrig omgås.

Udgangsstik fra audioforstærkere må aldrig sættes direkte i apparatet.

Apparatet må ikke udsættes for regn eller fugt og må ikke bruges i nærheden af vand for at undgå risiko for elektrisk stød og brand.

Apparatet må aldrig bruges, hvis det er blevet stødt, beskadiget eller vådt, eller hvis ændringer i ydelsen tyder på, at det trænger til eftersyn.

Dette apparat må kun åbnes af fagfolk. Hvis dækslet tages af, udsættes man for livsfarlig højspænding.



Denne mærkat på komponenten advarer om uisolert, farlig spænding i apparatet ... høj nok til at give elektrisk stød.



Denne mærkat på komponenten advarer om vigtig drifts- og vedligeholdelsesinformation i den tilhørende litteratur.

Suomi

Tärkeitä turvallisuusohjeita

Säilytä nämä ohjeet tulevaa käyttöä varten.

Seuraa kaikkia yksikköön merkittyjä ohjeita ja varoituksia.

Käytä aina oikeaa verkkojännitettä. Tehovaatimukset selviävät valmistajan käyttöohjeista. Huomaa, että eri käyttöjännitteet saattavat vaatia toisenlaisen verkkojohdon ja/tai -pistokkeen käytön.

Älä asenna yksikköä telineeseen jossa ei ole tuuletusta, tai välittömästi lämpöä tuottavien laitteiden, esim. tehovahvistimien, yläpuolelle. Ympäristön lämpötila käytössä ei saa ylittää tuotespesifikaation maksimilämpötilaa.

Kotelo on varustettu tuuletusreillä ja -aukoilla. Luotettavan toiminnan varmistamiseksi ja ylläpitämisen välttämiseksi näitä aukkoja ei saa sulkea tai peittää. Mitään esineitä ei saa työntää tuuletusaukoihin. Mitään nesteitä ei saa kaataa yksikköön.

Tuote on varustettu 3-johimisella maadoitetulla verkkopistokkeella. Tämä on turvallisuustoiminne eikä sitä saa poistaa.

Älä kytke audiotehovahvistimen lähtöjä suoraan mihinkään yksikön liittimeen.

Sähköiskun ja palovaaran välttämiseksi yksikkö ei saa olla sateessa tai kosteassa, eikä sitä saa käyttää märässä ympäristössä.

Älä käytä yksikköä jos se on pudonnut, vaurioitunut, kostunut, tai jos sen suorituskyky on huomattavasti muuttunut, mikä vaatii huoltoa.

Yksikön saa avata vain laitteeseen perehtynyt huoltohenkilö. Kansien poistoa alustaa sinut vaarallisille jännitteille.



Tämä kolmio, joka esiintyy komponentissasi, varoittaa sinua eristämättömän vaarallisen jännitteen esiintymisestä yksikön sisällä. Tämä jännite saattaa olla riittävän korkea aiheuttamaan sähköiskuvaaran.



Tämä kolmio, joka esiintyy komponentissasi, kertoo sinulle, että tässä tuotedokumentoinnissa esiintyy tärkeitä käyttö- ja ylläpito-ohjeita.

Norsk

Viktig informasjon om sikkerhet

Ta vare på denne veiledningen for senere bruk.

Følg alle anvisningene og advarslene som er angitt på apparatet.

Apparatet skal alltid anvendes med korrekt spenning. Produktbeskrivelsen inneholder spesifikasjoner for strømkrav. Vær oppmerksom på at det ved ulike driftsspenninger kan være nødvendig å bruke en annen ledning- og/eller støpseltype.

Apparatet skal ikke monteres i skap uten ventilasjon, eller direkte over varmeproduserende utstyr, som for eksempel kraftforstærkere. Den maksimale romtemperaturen som står oppgitt i produktbeskrivelsen, skal overholdes.

Apparatet er utstyrt med ventilasjonsåpninger. For at apparatet skal være pålitelig i bruk og ikke overopphetes, må disse åpningene ikke blokeres eller tildekkes. Stikk aldri noe inn i ventilasjonsåpningene, og pass på at det aldri søles noen form for væske på apparatet.

Dette apparatet er utstyrt med et jordet støpsel. Dette er en sikkerhetsforanstaltning som ikke må forandres.

Utgangsplugg fra audioforstærkere skal aldri koples direkte til apparatet.

Unngå brannfare og elektrisk støt ved å sørge for at apparatet ikke utsettes for regn eller fuktighet og ikke anvendes i nærheten av vann.

Apparatet skal ikke brukes hvis det har blitt utsatt for støt, er skadet eller blitt vått, eller hvis endringer i ytelsen tyder på at det trenger service.

Dette apparatet skal kun åpnes av fagfolk. Hvis dekslet fjernes, utsettes man for livsfarlig høyspenning.



Komponenten er merket med denne trekanten, som er en advarsel om at det finnes uisolert, farlig spenning inne i kabinettet ... høy nok til å utgjøre en fare for elektrisk støt.



Komponenten er merket med denne trekanten, som betyr at den tilhørende litteraturen inneholder viktige opplysninger om drift og vedlikehold.

Svenska

Viktiga säkerhetsföreskrifter

Spara dessa föreskrifter för framtida bruk.

Följ alla anvisningar och varningar som anges på enheten.

Använd alltid rätt nätspänning. Se tillverkarens bruksanvisningar för information om effektkrav. Märkväl, att andra matningsspänningar eventuellt kräver att en annan typs nätsladd och/eller kontakt används.

Installera inte enheten i ett oventilerat stativ, eller direkt ovanför utrustningar som avger värme, t.ex. effektförstärkare. Se till att omgivningens temperatur vid drift inte överskrider det angivna värdet i produktspecifikationen.

Behållaren är försedd med hål och öppningar för ventilering. För att garantera tillförlitlig funktion och förhindra överhettning får dessa öppningar inte blockeras eller täckas. Inga föremål får skuffas in genom ventilationshålen. Inga vätskor får spillas på enheten.

Produkten är försedd med en jordad 3-trådskontakt. Detta är en säkerhetsfunktion som inte får tas ur bruk.

Anslut aldrig audioeffektförstärkarutgångar direkt till någon av enhetens kontakter.

För att undvika elstöt eller brandfara får enheten inte utsättas för regn eller fukt, eller användas på ställen där den blir våt.

Använd inte enheten om den har fallit i golvet, skadats, blivit våt, eller om dess prestanda förändrats märkbart, vilket kräver service.

Enheten får öppnas endast av behörig servicepersonal. Farliga spänningar blir tillgängliga när locken tas bort.



Denna triangel, som visas på din komponent, varnar dig om en oisolerad farlig spänning inne i enheten. Denna spänning är eventuellt så hög att fara för elstöt föreligger.



Denna triangel, som visas på din komponent, anger att viktiga bruksanvisningar och serviceanvisningar ingår i dokumentationen i fråga.

Deutsch
Wichtige Sicherheitsanweisungen

Heben Sie sich diese Sicherheitsanweisungen auch für später auf.
Befolgen Sie alle auf der Vorrichtung stehenden Anweisungen und Warnungen.
Immer nur mit der richtigen Spannung verwenden! Die Gebrauchsanweisungen des Herstellers informieren Sie über die elektrischen Anforderungen. Vergessen Sie nicht daß bei verschiedenen Betriebsspannungen ggf. auch verschiedene Leitungskabel und/oder Verbindungsstecker zu verwenden sind.
Stellen Sie die Vorrichtung nicht in ein unbelüftetes Gestell oder unmittelbar über wärmeerzeugende Geräte wie z.B. Tonverstärker. Halten Sie die in den Produktspezifikationen angegebene maximale Umgebungstemperatur bei Betrieb ein.
Schlitze und Öffnungen im Gehäuse dienen der Belüftung; um verlässlichen Betrieb sicherzustellen und Überheizen zu vermeiden dürfen diese Öffnungen nicht verstopft oder abgedeckt werden. Stecken Sie nie irgend einen Gegenstand durch die Belüftungsschlitze. Vergießen Sie keine Flüssigkeiten auf den Apparat.
Dieses Produkt ist mit einem 3-drahtigen Erdungsstecker ausgerüstet. Diese Sicherheitsmaßnahme darf nicht unwirksam gemacht werden.
Schließen Sie nie Tonverstärker unmittelbar an einen Anschluß des Apparates an.
Um elektrischen Schlag oder Feuer zu vermeiden, setzen Sie den Apparat weder Regen noch Feuchtigkeit aus und betreiben Sie ihn nicht dort wo Wasser eindringen könnte.
Versuchen Sie nicht den Apparat zu betreiben falls er fallen gelassen, beschädigt, oder Flüssigkeiten ausgesetzt wurde, oder falls sich seine Arbeitsweise derart ändert daß daraus ein Bedarf nach Reparatur zu schließen ist.
Dieser Apparat sollte nur von qualifizierten Fachleuten geöffnet werden. Das Abnehmen von Abdeckungen setzt Sie gefährlichen Spannungen aus.



Dieses Dreieck auf Ihrem Apparat warnt Sie vor nicht-isolierter, gefährlicher Spannung im Gehäuse ... stark genug um eine Berührungsfahr darzustellen.



Dieses Dreieck auf Ihrem Apparat bedeutet daß wichtige Betriebs- und Wartungsanweisungen in der mitgelieferten Dokumentation zu finden sind.

Español
Instrucciones importantes de seguridad

Guarde esta instrucciones para uso posterior.
Utilice siempre el voltaje correcto. Diríjase a las instrucciones de operación del fabricante para obtener las especificaciones de potencia. Esté al tanto de que voltajes de operación distintos requieren el uso de cables y/o enchufes distintos.
No instale esta unidad en un estante sin ventilación, ni tampoco directamente encima de equipos que generen calor tales como amplificadores de potencia. Fíjese en las temperaturas ambientales máximas de operación que se mencionan en las especificaciones del producto.
Las aperturas y ranuras del chasis sirven para proveer la ventilación necesaria para operar la unidad con seguridad y para prevenir sobrecalentamiento, y por lo tanto no pueden ser obstruidas o cubiertas. No introduzca objetos de ningún tipo a través de las ranuras de ventilación, y nunca deje caer ningún líquido sobre la unidad.
Este producto está equipado con un enchufe de 3 clavijas con conexión a tierra. Éste es un elemento de seguridad que no debe ser eliminado.
Nunca conecte ningún tipo de salida de amplificadores de sonido directamente a los conectores de la unidad.
Para prevenir descargas eléctricas o incendios, mantenga la unidad alejada de la lluvia, humedad o cualquier lugar en el que pueda entrar en contacto con agua.
No trate de hacer funcionar la unidad si se ha caído, está dañada, ha entrado en contacto con líquidos, o si nota cualquier cambio brusco en su funcionamiento que indique la necesidad de hacerle un servicio de mantenimiento.
Esta unidad deberá ser abierta únicamente por personal calificado. Si usted quita las coberturas se expondrá a voltajes peligrosos.



Este triángulo que aparece en su componente le advierte sobre la existencia dentro del chasis de voltajes peligrosos sin aislantes ... voltajes que son lo suficientemente grandes como para causar electrocución.



Este triángulo que aparece en su componente lo alerta sobre las instrucciones de operación y mantenimiento importantes que están en los materiales de lectura que se incluyen.

Français
Instructions de Sûreté Importantes

Gardez ces instructions pour référence future.
Observez toutes les instructions et tous les avertissements marqués sur l'appareil.
Branchez uniquement sur un réseau de tension indiquée. Consultez le manuel d'instruction du fabricant pour les spécifications de courant. N'oubliez pas que différentes tensions peuvent nécessiter l'utilisation de cables et/ou de fiches de connexion différents.
N'installez pas l'appareil en un compartiment non-aéré ou directement au-dessus d'équipements générateurs de chaleur, tels qu'amplificateurs de courants, etc. Ne dépassez pas la température ambiante maximale de fonctionnement indiquée dans les spécifications du produit.
Des fentes et ouvertures sont prévues dans le boîtier pour l'aération; Pour assurer le bon fonctionnement et pour prévenir l'échauffement, ces ouvertures ne doivent pas être couvertes ou bloquées. N'insérez pas d'objets dans les fentes d'aération. Empêchez tout liquide de se répandre sur l'appareil.
Ce produit est muni d'une fiche à trois fils pour la mise à terre. Ceci est une mesure de sécurité et ne doit pas être contrariée.
Ne connectez jamais d'amplificateurs audio directement aux connecteurs de l'appareil.
Pour empêcher les chocs électriques et le danger d'incendie, évitez d'exposer l'appareil à la pluie ou à l'humidité, et ne le mettez pas en marche en un endroit où il serait exposé aux éclaboussures d'eau.
N'essayez pas de faire fonctionner l'appareil s'il est tombé à terre, a été endommagé, exposé à un liquide, ou si vous observez des différences nettes dans son fonctionnement, indiquant la nécessité de réparations.
Cet appareil ne doit être ouvert que par un personnel de service qualifié. En enlevant les couvercles vous vous exposez à des tensions électriques dangereuses.



Ce triangle, sur votre appareil vous avertit de la présence de tension dangereuse, non-isolée à l'intérieur du boîtier...une tension suffisante pour représenter un danger d'électrocution.



Ce triangle sur sur votre appareil vous invite de suivre d'importantes instructions d'utilisation et d'entretien dans la documentation livrée avec le produit.

Italiano
Importanti norme di sicurezza

Conservare le presenti norme per l'utilizzo futuro.
Osservare tutte le istruzioni e le avvertenze apposte sull'unità.
Utilizzare esclusivamente con la tensione di rete corretta. Consultare le istruzioni operative fornite dal fabbricante per i dati riguardanti la tensione e l'assorbimento di corrente. Potrebbe essere necessario l'uso di cavi di rete e/o di spine diverse a seconda della tensione utilizzata.
Non installare l'unità in uno scaffale privo di ventilazione oppure direttamente sopra una fonte di calore, come, ad esempio, un amplificatore. Non superare la temperatura ambientale massima di funzionamento riportata nei dati tecnici del prodotto.
Le fessure e le altre aperture nella scatola servono alla ventilazione. Per un funzionamento affidabile, e per evitare un eventuale surriscaldamento, queste aperture non vanno ostruite o coperte in nessun modo. Evitare in tutti i casi di inserire oggetti di qualsiasi genere attraverso le fessure di ventilazione. Non versare mai del liquido di nessun tipo sull'unità.
Questo prodotto viene fornito con una spina a 3 fili con massa. Tale dispositivo di sicurezza non va eliminato.
Evitare sempre di collegare le uscite dell'amplificatore audio direttamente ai connettori dell'unità.
Per prevenire il pericolo di folgorazione e di incendio non esporre l'unità alla pioggia o ad un'umidità eccessiva; evitare di adoperare l'unità dove potrebbe entrare in contatto con acqua.
Evitare di adoperare l'unità se la stessa è stata urtata violentemente, se ha subito un danno, se è stata esposta ad un liquido o in caso di un evidente cambiamento delle prestazioni che indichi la necessità di un intervento di assistenza tecnica.
Ogni intervento sull'unità va eseguito esclusivamente da personale qualificato. La rimozione della copertura comporta l'esposizione al pericolo di folgorazione.



Il presente triangolo impresso sul componente avverte della presenza di tensioni pericolose non isolate all'interno della copertura... tali tensioni rappresentano un pericolo di folgorazione



Il presente triangolo impresso sul componente avverte l'utente della presenza nella documentazione allegata di importanti istruzioni relative al funzionamento ed alla manutenzione.

Contents

Introduction

1. Product Overview

Block Diagram	1-1
Front Panel Overview	1-2
Rear Panel Overview	1-3
Installation Notes	1-4
Mounting	1-4
Power Requirements	1-4
Audio Connections	1-4
Control Connections	1-4
Setting Audio Levels	1-5
Headroom Display • Overload • Setting Analog and Digital Input Level • Setting Output Level	
Configurations	1-7
Memory Cards	1-8
Memory Expansion	1-8

2. Basic Operation

Modes of Operation	2-1
Navigating a Matrix	2-2
Info	2-3
Control Mode	2-4
Program and Register Banks	2-17
Tempo Mode	2-19
Editing an Effect	2-22
The Soft Knob	2-22
The Soft Row	2-23
Compare	2-24
Bypass	2-24
Store operations	2-25
Turning Memory Protection Off • Storing an Effect Renaming the Effect • Renaming the ADJUST Knob Patch Selecting a Bank and Register Location	
The Full Edit Matrix	2-27
Creating a Soft Row	
Patching	2-30
About Sources • The Patch Row • Assigning a Source Patch Sources • Assigning a Destination • Assigning Values • Jump • Patching Examples • Multiple Patches with the Same Destination • Mod Row Patching	

Contents, cont'd. 3. The Algorithms and their Parameters

About the Algorithms	3-1
The 4-Voice Algorithms	3-2
The Reverb Shell	3-2
Concert Hall	3-3
Plate	3-4
Chamber	3-5
Inverse	3-6
Infinite	3-7
The 6-Voice Algorithms	3-8
Glide>Hall	3-9
Chorus+Rvb	3-10
M-Band+Rvb	3-12
The Resonant Chord Algorithms Res1>Plate and Res2>Plate ..	3-14
The Parameters	3-16
Chorus	3-16
Controls	3-17
Delay Time	3-19
Feedback/Cross-Feedback	3-21
Filters	3-22
Glide FX	3-22
Levels	3-23
Modulation	3-24
Panning	3-28
Patching	3-29
Pitch	3-30
Resonance	3-34
Reverb Design	3-34
Reverb Time	3-36

4. The Presets

Program Bank 0	4-2
Multi Effects (0.0-1.9)	4-2
Modulation Effects (2.0-3.5)	4-3
Special Effects (3.6-4.9)	4-5
Program Bank 1	4-6
Rhythmic Echo and Delay Effects (0.0-3.6)	4-6
Ambience Effects (3.7-4.9)	4-10
Program Bank 2	4-11
EQ Effects (0.0-1.0)	4-11
Spatial Effects (1.1-2.4)	4-12
Gain Effects (2.5-4.0)	4-13
Resonant Chords (4.1-4.9)	4-15
Program Bank 3	4-16
Reverb Effects (0.0-2.8)	4-16
Processed Reverb Effects (2.9-3.9)	4-18
Remix Effects (4.0-4.9)	4-19
Alphabetical Index of Presets	4-21

5. MIDI Operation	
Selecting a MIDI Channel	5-1
Controlling PCM 80 Tempo Rate with MIDI Clock	5-2
MIDI Tempo Control • Using the PCM 80 as a MIDI Control Source • Slaving two or more PCM 80s	
Controller Quirks	5-4
The ADJUST Knob, Foot Pedal, Foot Sw 1 and Foot Sw 2 as MIDI controllers	5-4
Controlling the Soft Knob with MIDI • Controlling the Soft Knob with a Foot Pedal	
Program Change Messages	5-5
Automation	5-7
Bulk Data Dumps	5-8
MIDI Implementation Chart	5-9
6. Troubleshooting	
Low Voltage	6-2
Overheating	6-2
Common MIDI Problems	6-2
Operational Problems	6-3
Power On Behavior	6-3
Reinitialization	6-3
Restoring Factory Default Settings	6-4
7. Specifications	

Thank you for your purchase of the PCM 80, one of Lexicon's most powerful and versatile digital effects processors. The PCM 80 brings you exciting new effects with extensive processing and control capabilities, and uncompromising sonic clarity.

Introduction

The PCM 80 contains a built-in library of 200 preset programs that provide a comprehensive array of effects ranging from beautiful and lush to completely wild. The presets are organized into 4 Banks of 50, and functionally grouped for a wide range of applications. Be sure to experiment with all 200 presets to get a feel for the full range of PCM 80 capabilities.

The Presets

Bank P0 Multi Effects Modulation Effects Special Effects	Bank P1 Rhythmic Echo & Delay Effects Ambience Effects	Bank P2 EQ Effects Spatial Effects Gain Effects Resonant Chord Effects	Bank P3 Reverb Effects Processed Reverb Effects Remix Effects
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Every preset has one or more of its parameters patched to the front panel ADJUST knob, giving you instant control over the primary aspect of the effect — without going into Edit mode. In the preset, *Concert Hall*, for example, Mid Reverb Time is patched to ADJUST. When you turn the knob, you will adjust the reverb decay. In *Prime Blue*, ADJUST is patched to several parameters, so that turning the knob changes the effect from a tight chorus, to a chorus with recirculating echoes and, finally, into a reverb.

The PCM 80 uses 10 stereo algorithms to create different types of effects. Each algorithm includes an uncompromised stereo reverb effect, as well as several voices of additional stereo effects. There are two general classes of algorithm: 4-Voice and 6-Voice. The 4-Voice algorithms: Concert Hall, Plate, Chamber, Inverse and Infinite each combine a specific type of reverberation with a 4-voice, general purpose, stereo effect “toolbox”, as well as additional post-processing for the reverb. The 6-Voice algorithms: Glide>Hall, Chorus+Rvb, M-Band+Rvb, Res1>Plate and Res2>Plate each combine a specific type of reverberation with a specialized 6-voice stereo effect.

The Algorithms

All PCM 80 algorithms include several parameters that make it possible to create dynamic spatialization effects for 2-channel or surround applications. Check out the Ambience Effects in Bank P1 and the Spatial Effects in Bank P2 for examples.

The PCM 80 gives you a unique set of tempo controls. Tempos can be tapped in with the front panel Tap button (or an assigned controller) or “dialed-in”, in BPM (beats per minute) on the display. The PCM 80 also lets you generate MIDI clock from your tempo, as well as receive MIDI tempo from an external sequencer or drum machine. In the PCM 80, tempo can control LFO speeds and Time Switch controls, as well as all delay parameters, ensuring that all of your modulations are in tempo with your music. You can even set independent rhythmic values for different parameters within a single program.

Tempo Control

Tempo can be set and displayed in either rhythmic value or time values. Many presets, particularly the Rhythmic Echo & Delay Effects in Program Bank P1, have delay times assigned to Tap tempo. Try loading some of these and pressing **Tap** twice in rhythm to change tempo.

Editing An enormous range of editing control is provided for each algorithm, with parameters organized in an edit matrix of as many as 100 main controls. In addition to providing this powerful sound design capability, the PCM 80 also allows you to customize these controls for your day-to-day editing needs, or to use a subset of controls specially designed for each preset.

The PCM 80 has two levels of Edit Mode control called **Go** mode and **Pro** mode. In **Go** mode, the most useful parameters within an effect are grouped for instant access via the front panel Edit button. Each preset has a specially selected set of **Go** mode parameters which let you make value changes to the effect without losing the character of the sound. **Pro** mode gives you access to the full parameter editing matrix for the algorithm of any loaded effect when you press Edit. In this mode, you can access a complete set of Modulation and Patching parameters, create your own ADJUST knob patch and assign your own **Go** mode parameters.

A unique Patching and Modulation system provides unprecedented control over your effects, with a versatile set of internal modulators: LFO, AR Envelope, Envelope Follower, Latch and Time Switches. These allow you to create modulation sweeps which move in time with music, or wildly animated effects. You can create as many as 10 patches per effect, each with as many as 8 pivot points. You can patch multiple parameters to a single controller, or patch multiple sources to a single destination.

Expansion The front panel memory slot will accept industry standard PCMCIA SRAM cards (up to 1Meg). Use these cards to store effects (as many as 2350 on a 1 Meg card), system setups, MIDI program maps, and more.

PCM 80 internal audio memory can be expanded from a maximum stereo delay time of 2.6 seconds to more than 42 seconds by installing 4Meg memory modules (SIMMs).

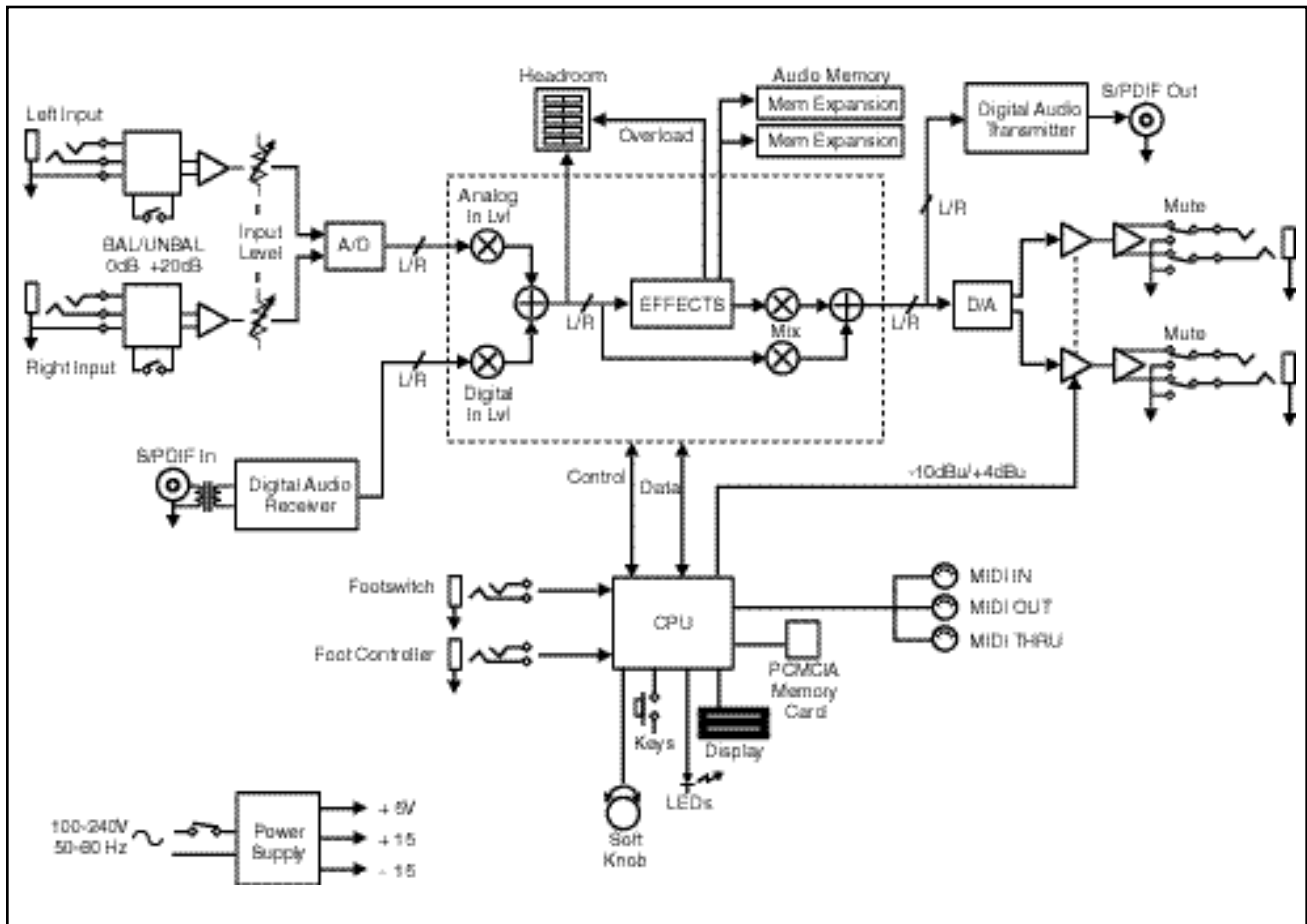
User Interface For all of its programming power and flexibility, you'll find the PCM 80 simple to use. The large, 2-line fluorescent display is easy to see from any angle whether the surroundings are bright or dark. Separate SELECT and ADJUST knobs make program loading and editing quick and easy. We've even designed in a special Info mode — press and hold any button to find out what its function is, or to get status information such as the name of the running effect, current tempo rate, etc.

To get the most out of the PCM 80, we suggest that you invest the time to explore this manual. We think you'll agree that the time spent investigating will reward you with enjoyment of its full capabilities.

1

Product Overview

Block Diagram



The Front Panel

Headroom

5-position indicator for analog and digital signal levels and overload conditions.

INPUT

Adjusts analog input level.

Display

Two rows of 20 alphanumeric characters display effect names and ID numbers, and parameter names and values.

ADJUST

In Edit mode, changes values of parameters chosen with SELECT. With Program Banks or Register Banks selected, behaves as a soft knob for patched parameters.

SELECT

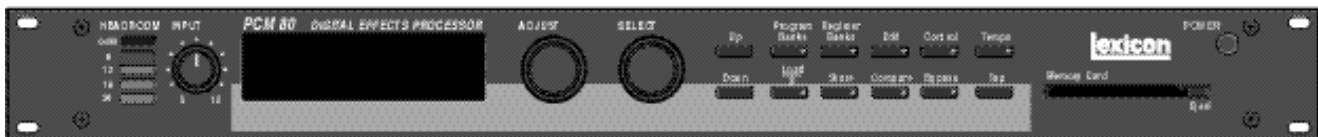
Scrolls through presets, registers or parameters. With Program Bank or Register Bank selected, scrolls through the 50 programs in the selected bank. With Edit selected, scrolls only through the parameters of the active row.

POWER

On/Off.

Memory Card

Slot for optional preset ROM or register RAM cards. Press Eject button to remove card.



Up/Down

Press to move up and down through a program, register, or parameter matrix.

Program Banks

Enables selection of factory presets. Press repeatedly to cycle selection of 4 internal preset banks. Press and hold to display the name of the current bank.

Load/*

In Program or Register mode, loads the selected program. In Edit mode, scrolls through any multi-field parameter.

Register Banks

Enables selection of user memory. If a RAM card is loaded into the Memory Card slot, each press of this button selects a new register bank. Press and hold to display the name of the current bank.

Store

Initiates register store function.

Edit

Enables parameter selection for editing of values.

Compare

Active in Program, Register, and Edit modes. Press to compare the active version of the current effect with the most recently stored version.

Control

Enables selection of system and global parameters.

Bypass

Bypasses or mutes audio, depending on the setting of each program's bypass parameter.

Tempo

Press to display tempo rate and to initiate tempo functions. LED flashes in time with current tempo rate.

Tap

Sets tempo. Press twice in rhythm to establish tempo rate. Press once to reset LFO.

Installation Notes

Mounting The PCM 80 uses one EIA-standard rack space, and can be mounted on any level surface or in a standard 19 inch (483 mm) rack. If the PCM 80 is mounted in a rack or road case, support the rear of the chassis to prevent possible damage from mechanical shock and vibration.

The maximum ambient operating temperature is 104°F (40°C). Provide adequate ventilation if the PCM 80 is mounted in a closed rack with heat-producing equipment such as power amplifiers.

Power Requirements The PCM 80 is equipped with a 3-pin IEC power connector and detachable cord.

The PCM 80 will operate with power sources from 100 to 240 volts AC, 50-60Hz. Power switching to actual line voltage is automatic.

Audio Connections **Analog Audio**

For best performance, maintain balanced connections, and use high-quality, low-capacitance, twisted-shielded pair cable.

When connecting to single-ended, unbalanced devices, connect the low side to signal ground at the unbalanced piece of equipment. Output level does not change when connected to an unbalanced input.

Mono Applications

Use a Y-connector inserted at the analog inputs and outputs to have the signal summed to mono.

NOTE

Be careful to keep input and output to all channels wired consistently. Out-of-phase wiring can produce audible effects.

Digital Audio

S/PDIF (CP-340 Type II) Consumer Digital Audio I/O. 75Ω coaxial cable suited for digital audio or video signals is required. Audio grade cable is *not* suitable.

Control Connections **Footswitch/Foot Controller**

One 1/4 inch T/R/S phone jack is provided for 2 momentary footswitches. Another 1/4 inch T/R/S phone jack is provided for a footpedal (minimum 100Ω to maximum 10k impedance). Normally open or normally closed momentary switches are suitable. At power on, the PCM 80 assumes the switch is off. Use shielded, twisted-pair cable with shield connected to sleeve. See diagram on previous page.

MIDI

5-pin DIN connectors are provided for MIDI IN, THRU and OUT. Use standard 5-pin DIN MIDI cable assemblies, available from your local dealer.

The PCM 80, with both analog and digital input and output connections, requires some attention to proper setting of signal level.

Setting Audio Levels

Analog inputs are first gain-conditioned by the rear panel input gain switch, and then by the front panel INPUT knob. Proper setting of both the switch and knob are important for best performance of the A/D converter. Audio data from the A/D converter is level adjusted by the Analog Lvl parameter before reaching the effects processors. Digital inputs are also level adjusted before reaching the effects processors via the Digital Lvl parameter.



Analog and digital sources are mixed at the input to the effects processors. For example, setting both Analog Lvl and Digital Lvl to 50% will mix the analog and digital input signals equally and send them to the effects. Creating a mix which exceeds 100% can cause overload.



Proper setting of Input level on the PCM 80 is dependent on:

- Proper signal level into the analog front end to avoid signals causing overload at the DSP input
- Proper adjustment of the signal level into the analog-to-digital converter to optimize noise and avoid overload
- Proper setting of signal level into the digital signal processor to optimize noise.

Headroom Display

The headroom display provides both headroom and overload information from a variety of measurement points. The meters display the sum of both the analog and the digital input data. Examining either the analog or the digital level alone requires that the Level parameter of the subject data stream be set to 100%, while the Level parameter of the other is set to 0%.

The chart below illustrates the adjustment range that will set input levels for both balanced and unbalanced operation. When a choice can be made, it is best to operate at the higher amplitude end of the recommended range to optimize noise performance.

	 Unbalanced	 Balanced
overload:	> 0dBu	>+20dBu
acceptable:	0dBu to -22dBu	+20dBu to -2dBu
too low (noisy):	<-22dBu	<-2dBu

Overload

The 0db (overload) indicators will light under the following conditions:

- A/D overload
- overload at any point in effects processing

For example, internal peaking of high Q filters, or level buildup from certain reverberation modes can result in overload, even when the input A/D or digital receiver data stream is not at full scale. Such conditions are most often caused by a combination of extreme parameter settings. Adjusting parameter/level settings can eliminate these overload conditions.

Setting Analog and Digital Input Level

1. Press **Control**.
2. Press **Up** or **Down** until the leftmost digit in the lower lefthand corner of the display is **0**.
3. Turn **SELECT** to **0.2 Dig In Lvl**, and turn **ADJUST** to display **0%**.

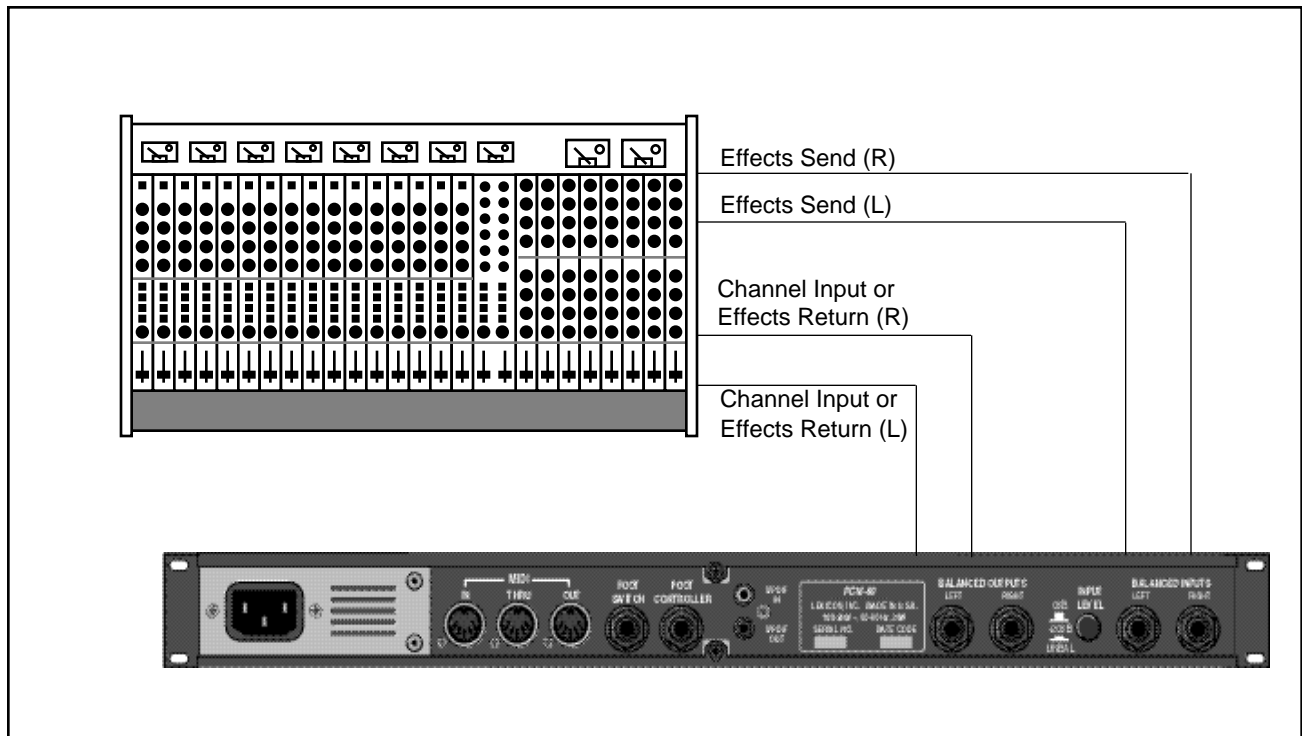
NOTE: If you are not running digital audio, controlled by External Clock, into the PCM 80, the digital audio input will be disabled or muted. Until there is valid digital audio input, select **0.0 External** to enable the digital input level control. Until valid digital audio is connected, the **Dig In Lvl** control will remain muted.
4. Turn **SELECT** to **0.1 Analog In Lvl**, and turn **ADJUST** to display **100%**.
5. Adjust the front panel **INPUT** knob so that program material level peaks cause the headroom display to reach the top of the column *without* lighting the overload indicators. An occasional large signal peak causing momentary flashing of the overload indicator is acceptable in most instances, but should be validated by listening to the actual result.
6. If you are running digital audio, turn **SELECT** back to **0.2 Dig In Lvl**, and turn **ADJUST** to the desired level. You may want to back off the **Analog In Lvl** setting to prevent the analog/digital mix from overloading the effects processor.

Setting Output Level

While still in Control mode, turn **SELECT** to **0.6 Output Level**. The Output Level parameter has two range positions. The appropriate position depends on the level handling capability of the device connected to the analog outputs. Devices capable of handling outputs with peak levels of 18dBu require setting **Output Level** to the **+4dBu** setting. Devices which cannot handle peak levels greater than +4dBu require the **-10dBu** setting.

Configurations

Connection to a mixing console's effects sends

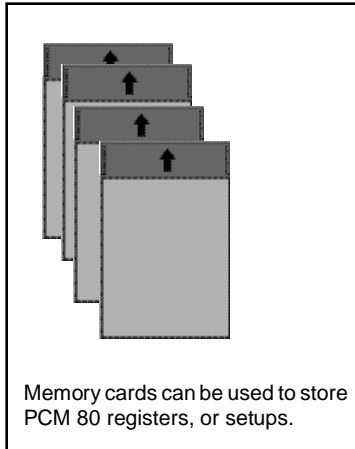


If you will be using a PCM 80 as your primary effects unit, and your system includes a console with one or more auxiliary (effects) sends, connect the PCM 80 as shown above. In most applications, it is preferable to connect the PCM 80 outputs to two of the console's input channel strips, panned full left and right, rather than to the effects returns. This allows the greatest flexibility in routing and equalization.

In this configuration the console controls are used to set the amount of effect heard—the PCM 80's MIX control should be set for 100% wet. To assign a global MIX setting:

1. Press **Control**.
2. Press **Up** or **Down** until **1.x** is displayed in the lower left of the display and **System** is displayed on the upper line.
3. Turn SELECT until **System Mix Mode** is displayed on the upper line. **1.1** will be displayed in the lower left.
4. Turn ADJUST until the lower line reads:
1.1 ★ Global
5. Press **Load/★** to show the current global setting of MIX; use ADJUST to set it to 100% wet.

Memory Cards



You can use Memory cards to store as many as 2350 PCM 80 registers (47 banks of 50 — on a 1 Meg card). Registers stored on a properly formatted card will be recognized whenever the card is inserted, and can be accessed via the front panel **Register Banks** button, exactly as internal registers.

Memory cards can also be used to store "setups" (your system configuration, as set in Control mode). As many as 5 PCM 80 setups can be stored on a card, allowing you to transport not only your effects, but complete PCM 80 environments to another PCM 80. Cards also provide storage for additional program maps and effect chains.

See *Control Mode* Store and Load functions for details on saving setups on a card and reloading them.

Memory cards must be of the following type:

PCMCIA SRAM Memory Card — 68 pin, Type I	
Usable densities:	64 kByte 128 kByte 256 kByte 1 MByte
Access Time:	250 nsec or faster
Conforms to PCMCIA 2.0/JEDIA 4.1. Can use either 8-bit or 8/16-bit bus configuration. Attribute memory can be present, but is not used.	

Memory Expansion

The addition of SIMMs (memory modules) allows several PCM 80 algorithms (Glide>Hall, M-Band+Rvb and the Resonant Chords algorithms) to address up to 4 Meg of delay memory, providing as much as 42 seconds of stereo delay. PCM 80 memory can be expanded with SIMM memory modules of the following type:

30-pin SIMM Memory Module	
Usable densities:	1 Meg x 9 4 Meg x 9 16 Meg x 9 (See Physical Requirements. Note also that only 4 Meg will be addressed by the PCM 80.) 8-bit SIMMs are not usable
Access Time:	70 nsec or faster
Physical Requirements:	Either 3-chip or 9-chip modules may be used, with the following size restrictions: Maximum size: .208" (5.28mm) total module thickness 1.30" (33mm) total module height 3.50" (88.9mm) total module length

Expanded memory is automatically detected by the PCM 80. The presence of additional memory will initiate internal power up testing which is longer than the unexpanded PCM 80 time period.

Safety issues and various agency approvals mandate that memory expansion be performed only by qualified service personnel. Instructions for performing this procedure are, therefore, available only in Lexicon's PCM 80 Service documentation.

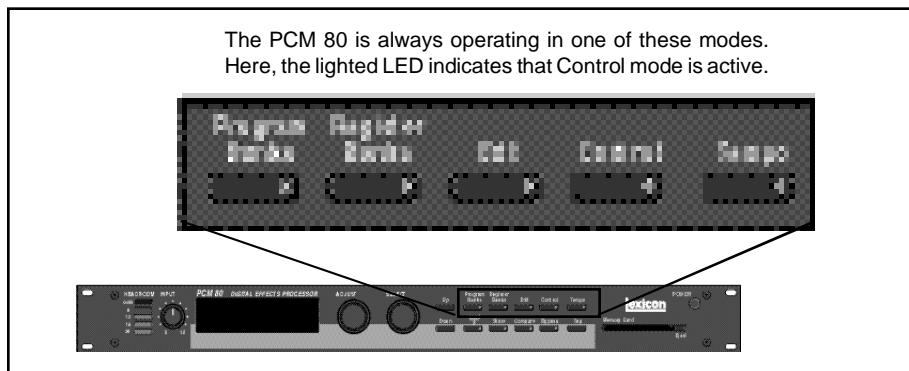
2

Basic Operation

The PCM 80 provides a wide range of control over an extraordinary set of reverb and modulation effects. All of the controls are easily accessed from the front panel and are described in detail in this section.

The PCM 80 has five basic modes of operation, each of which is selected by pressing a front panel button (**Program Banks**, **Register Banks**, **Edit**, **Control** and **Tempo**). Each of these first four mode buttons has an LED which lights when the mode is active. The Tempo LED (unless you elect to have this function turned off) flashes the current tempo. When Tempo mode is active, no other mode LEDs will be lighted.

Modes of Operation

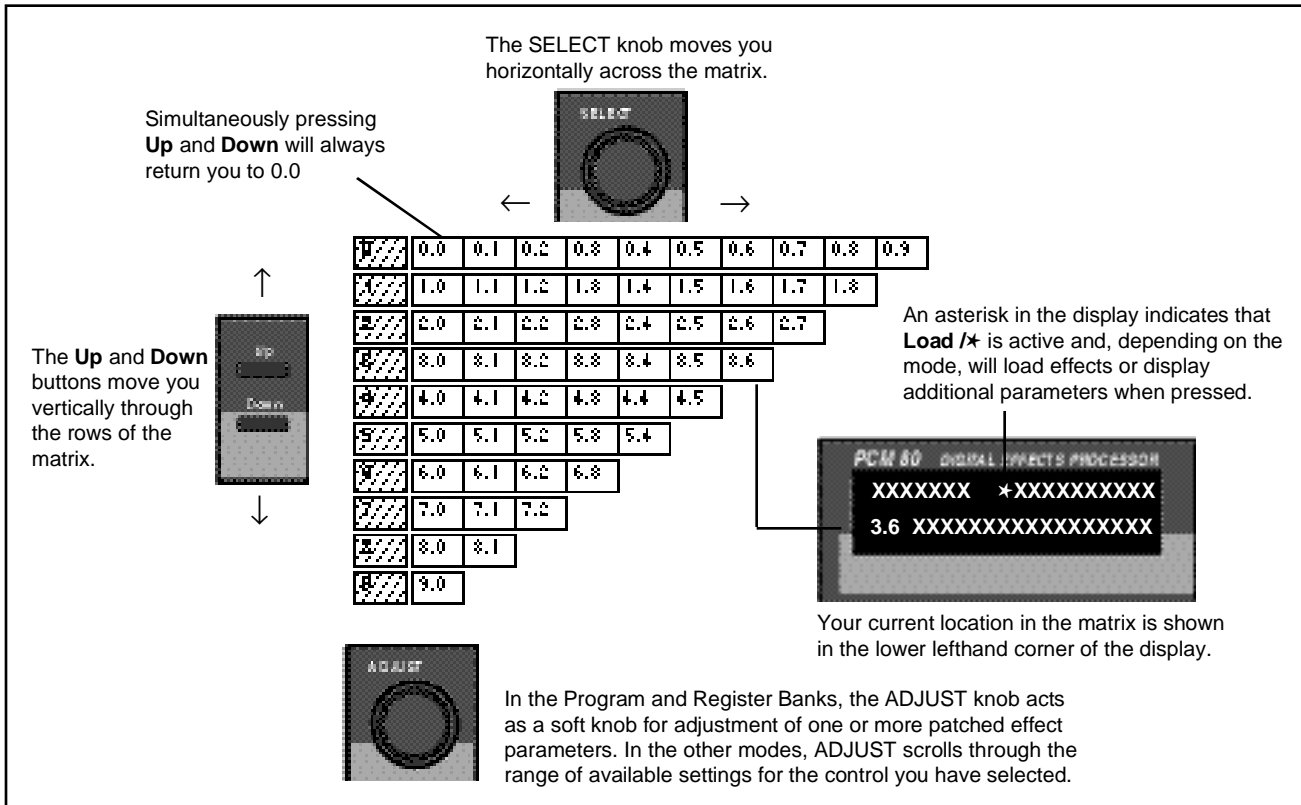


The five mode buttons give you the first level of access to all of the functions and parameters in the PCM 80.

- Press **Program Banks** repeatedly to access four banks of factory preset programs. Each bank contains 50 programs.
- Press **Register Banks** to access a bank of 50 memory locations, called *registers*, where you can store your customized effects. Memory cards can be used for storage of additional banks of registers. When a formatted memory card containing stored registers is inserted, pressing **Register Banks** repeatedly will cycle through all of the available register banks.
- Press **Edit** to access all of the available parameters for the currently running effect.
- Press **Control** to select system parameters, MIDI, card formatting, etc.
- Press **Tempo** to set tempo-related values that affect the delay time and LFO rate parameters of the currently-running effect. This is an exciting feature which is unique to the PCM 80, and which will be described in detail later in this chapter.

Navigating a Matrix

All of the controls available in a mode are arranged in a matrix of up to 10 columns (numbered 0-9) and 10 rows (each numbered .0-.9). This arrangement allows any one of as many as 100 parameters to be selected simply by using the SELECT knob and the **Up** and **Down** buttons to select a position in the matrix.



Go or Pro

The PCM 80 offers a choice between two levels of Edit mode parameter access. We call these **Go** mode and **Pro** mode.

Go mode makes use of an extra row in the edit mode matrix called the Soft Row, where you can assign as many as 10 effect parameters for easy access. Selecting **Go** mode (Control mode 1.0) limits the action of the **Edit** button to displaying only the Soft Row parameters assigned to the current effect.

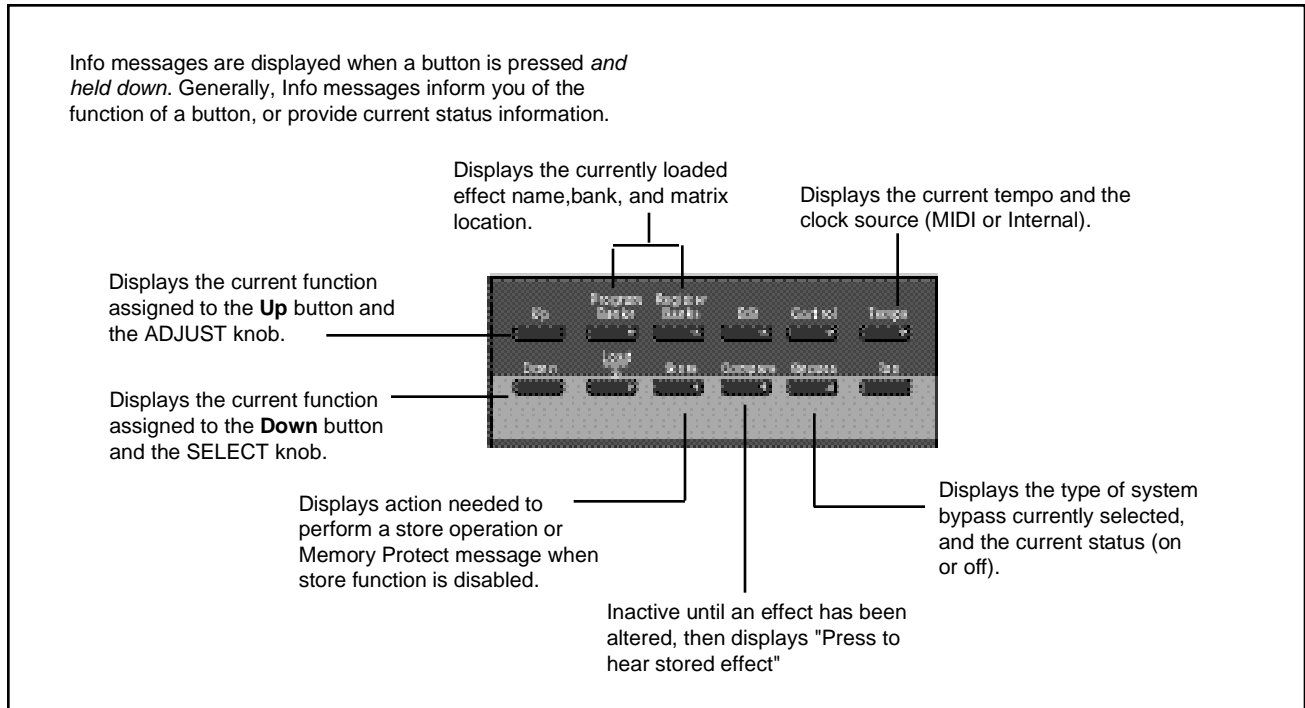
Each preset has a set of Soft Row assignments which we've selected for you (as well as an assignment for the ADJUST knob). When shipped, the PCM 80 will power up in **Go** mode with the first preset (P0 0.0) loaded. Press **Edit** to display the Soft Row of parameters.

Pro mode gives you access to the full parameter matrix, including the Soft Row. Use this mode when you want to do in-depth effects editing or patching, or when you want to customize Soft Row assignments.

Go mode and **Pro** mode selection is made in Control mode at matrix location 1.0.

The PCM 80 offers an extensive set of informative display messages which can be activated from the front panel. **Info**

The front panel switches perform various functions when pressed. Most of these functions are activated on *release* of the button. If you want to know more about the function of a particular button (without actually executing any action) *press and hold* the button down. While you are holding down the button, an explanatory message will appear on the display. The activation of an Info message overrides the normal function of the button, so that no action is taken on release.



Control Mode Selections of various system states and conditions are made in Control Mode. Press **Control** to enter this mode. The Control button LED will light to indicate that the mode is active. Note that Control Mode functions are not available when the **Compare** function is active.

The Control Mode matrix is shown below, followed by descriptions of each available selection.

Simultaneously press **Up** and **Down** to return to 0.0.

0 Audio	0.0 *Word Clock	0.1 Analog In Lvl	0.2 Dig In Lvl	0.3 Auto Lock	0.4 SCMS	0.5 Emphasis Bit	0.6 Output Level				
1 System	1.0 Edit Mode	1.1 Mix Mode	1.2 Tempo Mode	1.3 Bypass Mode	1.4 Pgm Bypass	1.5 Mem Protect	1.6 Auto Load	1.7 Patch Update	1.8 Initialize		
2 Card	2.0 Bank Copy	2.1 Load	2.2 Format								
3 MIDI	3.0 Reset	3.1 Receive	3.2 Transmit	3.3 *Pgm Change	3.4 Automation	3.5 *Send	3.6 Int. Clock	3.7 SysEx	3.8 Outp	3.9 Dump Speed	
4 Setup	4.0 Store	4.1 Load									
Map	Map 0	Map 1									
Chain	Chain Pgm Assign										
	Chain 0	Chain 1	Chain 2	Chain 3	Chain 4	Chain 5	Chain 6	Chain 7	Chain 8	Chain 9	

An asterisk (*) accompanying a parameter name indicates that there are subparameters available at that matrix location. The **Load/*** LED will light whenever an asterisk appears in the display. Press **Load/*** to step to the next subparameter. From any point in the matrix, press **Up** or **Down** together with **Load/*** to backstep to the previous parameter.

Row 0 Audio

0 Audio	0.0 *Word Clock	0.1 Analog In Lvl	0.2 Dig In Lvl	0.3 Auto Lock	0.4 SCMS	0.5 Emphasis Bit	0.6 Output Level
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0.0 Word Clock

The PCM 80 can use its own internal clock as a timing reference, or it can reference an external clock source from the rear panel S/PDIF jack. Use ADJUST to select **Ext** (External), **Int: 48kHz** or **Int: 44.1kHz**. When either Internal rate is selected, the digital input is disabled. To process audio from the digital input, you must select **Ext**.

When External clock is selected, and the PCM 80 detects valid digital audio, the rate of the External word clock will be displayed with a label indicating the digital audio format type: **Prf** (Professional) or **Cns** (Consumer, also called S/PDIF).

Note: Although the PCM 80 will detect AES professional format signals, it is designed to be used with S/PDIF input. If your digital input is not S/PDIF, please be alert for locking problems and other potential errors, and be prepared to take the necessary steps to provide the correct format input signal.

<p>Audio *Word Clock 0.0 Ext: Prf 44.1kHz</p>	<p>Audio *Word Clock 0.0 Ext: Cns 48kHz</p>
--	--

When the PCM 80 is receiving valid digital audio, selecting **Word Clock** will display the audio format and the rate of the incoming signal.

When External clock is first selected, the PCM 80 will repeatedly try to establish lock. You can choose to have any subsequent interruptions of the incoming digital audio signal dealt with in one of two ways. An Auto Lock feature allows you to choose to have the PCM 80 attempt to re-establish lock, or not. (See 0.3 Auto Lock.) In either case, the PCM 80 will immediately mute the digital input, and switch to Internal clock at the sample rate of the last valid external signal.

When External clock is selected, any loss of lock detected in the incoming digital audio, or reception of non-audio data will cause the digital input to be muted. An error message will be displayed if this occurs.

The following types of errors are detected when the PCM 80 is set to **Ext**:

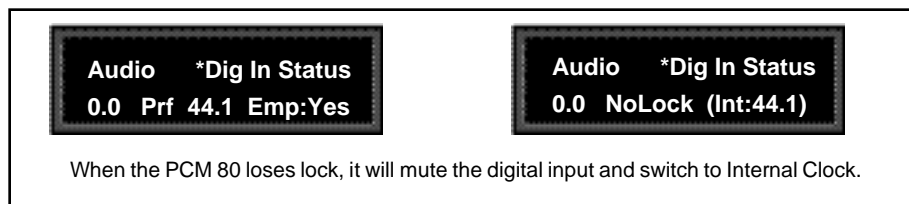
- No Lock: The PCM 80, at some point, lost lock to the incoming digital audio signal. Digital audio input is muted.
- Out of Range: The sampling rate of the incoming audio signal is outside of acceptable tolerance limits of $\pm 4\%$. Digital audio input is muted.
- Non Audio: Indicates transmission of non-audio data, such as from a CD ROM. Digital audio input is muted.

Dig In Status

Pressing **Load/★** from **Word Clock** will display the current digital input status. This status display is continuously updated, acting as a real-time monitor of the PCM 80 digital input. This display is active even when the PCM 80 is set to Internal clock. Note that in the case of an AES Pro format signal, "Emphasis" means either CCITT or 50/15µs emphasis.

If valid digital audio is detected, the display will show the external clock rate and format information, along with the status of the Emphasis bit(s) in the incoming audio signal. If the PCM 80 has lost lock, the display message will indicate "No Lock" and parenthetically show the internal clock rate now in use.

Upon loss of lock, or reception of non-audio data, the PCM 80 will mute the digital input and display the following messages when **Word Clock** or **Dig In Status** is selected:



When the PCM 80 loses lock, it will mute the digital input and switch to Internal Clock.

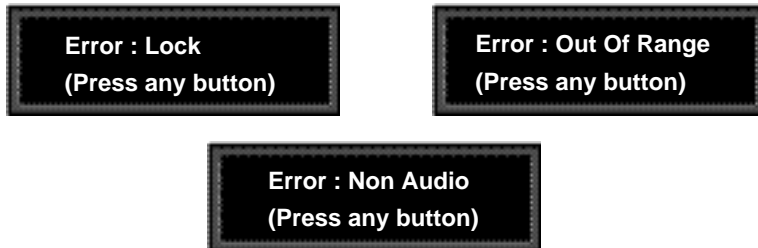
Word Clock	Dig In Status
Not Locked	No Lock (Int 44.1)
Out of Range	No Lock (Int 44.1)
Non Audio: 44.1	Non Audio: 44.1

Error Log

The following errors are continuously logged and are available for review by pressing **Load/★** from the Dig In Status display and using **ADJUST** to scroll through the error list.

- Validity: A Validity error indicates that the Validity bit was set in a frame of incoming data and that the data attached to it may be corrupted. This bit may also be sent when the transmitting device is paused.
- Confidence: The PCM 80 is detecting excessive jitter or noise on the digital audio line. No data has been corrupted, but corrective action should be taken.

If digital audio is interrupted by lock or range errors, or by transmission of non-audio data, the digital input will be muted. Whenever this occurs, the PCM 80 remains functional, while an error message, such as those shown below, is displayed.



Any such message will remain on the display until you dismiss it by pressing any front panel button. If the condition causing the error is corrected, and the digital input is unmuted, the message will still remain until you dismiss it to ensure that you are informed of a condition that has muted digital audio, even if only for a brief period of time. Once the message is dismissed, the display will return to its previous state.

Some errors detected in an incoming digital audio signal will cause the PCM 80 to mute the digital input. When this happens, the Dig In Lvl display will show both the level you selected, and the fact that the signal is muted.

Audio Dig In Lvl
0.2 30% (Muted)

If you select the **Dig In Lvl** parameter while there is a lock, range, or non-audio error, the display will continue to show the level you have selected, and parenthetically show that the signal has been muted.

Note, if Word Clock is set to **Int**, Dig In Lvl is disabled. You must select **Ext** to process digital audio.

0.3 Auto Lock

When Word Clock is set to **Ext**, and the PCM 80 loses lock with an incoming digital audio signal, it will immediately switch to Internal Clock at the sample rate of the digital signal last detected. The Auto Lock control allows you to choose whether or not the PCM 80 will continuously try to re-establish lock. Use ADJUST to select **On** (continuous retry), or **Off** (continue to use Internal Clock as a timing reference until **Ext** is reselected).

0.4 SCMS

Digital audio signals, in order to comply with copyright standards, are encoded with control information which can limit the ability to copy audio data. This control information is generally known as SCMS (Serial Copy Management System). Under this system, you can choose to have the audio material processed by the PCM 80 encoded to allow one of three levels of copy restriction. To make your selection, use ADJUST to select **No Copy**, **One Copy**, or **Multi Copy**.

0.5 Emphasis Bit

The Emphasis control allows you to explicitly set the emphasis "flag" in the digital audio, or to pass along the incoming signal without changing its emphasis coding. (The PCM 80 does not perform any emphasis or de-emphasis as part of its signal processing.) The choices available with ADJUST are: **Yes**, **No**, and **Pass Thru**.

0.6 Output Level

This control allows you to select the maximum output level at the PCM 80's analog outputs. Use ADJUST to select **+4 dBu**, or **-10 dBu**.

Exercise care when switching this control, as a 14dB level change instantly occurs when going from -10dBu to +4dBu.

Row 1 System

1	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.8
System	Edit Mode	Mix Mode	Tempo Mode	Bypass Mode	Pgm Bypass	Mem Protect	Auto Load	Patch Update	Initiation

1.0 Edit Mode

The PCM 80 has been designed with a "plug and play" feature called **Go** mode. In this mode, the most useful parameters of each effect are grouped together in a single row which is available whenever you press **Edit**.

Each PCM 80 preset has a set of **Go** mode parameters which we've selected for you. When shipped, the PCM 80 will power up in **Go** mode, with the first preset (**P0 0.0**) loaded. Press **Edit** to display the first available parameter in the Soft Row.

If you want access to the full parameter matrix for any effect, including the Soft Row parameters, use ADJUST to select **Pro** mode. Now, when **Edit** is pressed, you can select any parameter for adjustment, and customize any effect with your own Soft Row assignments. For more information about the Soft Row, see *Editing an Effect* later in this chapter.

1.1 Mix Mode

Each PCM 80 effect has its own Mix parameter, with the Mix setting stored as an integral part of the effect. Mix Mode allows you to override these individual Mix settings and set a global Mix value for all effects. This is useful when using a mixing console's controls to set the amount of wet signal in a mix. In such a case, you can use this control to set all PCM 80 effects to 100% wet.

When shipped, the PCM 80 has the Mix Mode set to **Pgm**. This setting determines that effects will be loaded with their stored Mix settings, and allows the individual Mix controls in the edit matrix of each effect to be adjusted from 0-100% Wet. To set a global Mix value, use ADJUST to select **Global**, press **Load/★** to display the current value, and use ADJUST to assign any value from 0-100% Wet.

1.2 Tempo Mode

The PCM 80 gives you an exciting new approach to working with delay times and modulation parameters. Now you can set these parameters in *beats*, allowing you to control your effects in a completely musical way. Each PCM 80 effect has its own Tempo parameters, with tempo settings stored as an integral part of the effect. These include: Tempo Rate, Tempo Beat, Tempo Source (internal or MIDI), Tap Duration, and Tap Average. The **Global** setting here allows you to override individual Tempo Rate settings with a global value which can then be changed on the fly.

When shipped, the PCM 80 has the Tempo Mode set to **Pgm**, with each effect driven by its own stored tempo rate. To change to a global Tempo Rate, use ADJUST to select **Global**, press **Load/★** to display the current tempo in BPM (beats per minute), then use ADJUST to assign a global tempo value of 40-400BPM.

Whether Tempo Mode is set to **Global** or **Pgm**, you can set a new tempo rate by pressing the front panel **Tap** button twice. Alternatively, you can choose to have tempo set automatically from incoming MIDI clock. The rate you tap, or the MIDI tempo, will be displayed here.

For more information about working with the tempo parameters, see *Tempo Mode* later in this chapter.

1.3 Bypass Mode/Bypass Src

This control allows you to determine the behavior of the PCM 80 when the front panel **Bypass** button is pressed. You can also assign an external controller to perform identically to the front panel button. When the **Bypass** button is pressed, the LED will light, and a message indicating bypass type will be displayed. Pressing **Bypass** again will turn bypass off.

The choices available via ADJUST are:

- AllMute:** Mutes both the input and the output signal, giving complete silence.
- InputMute:** Mutes the input to the PCM 80, allowing the tail of the effect to ring out. (This is the default setting.)
- OutputMute:** Mutes the output. Audio signals are still being fed to the PCM 80, so processed audio returns immediately when **Bypass** is turned off.
- Bypass:** Completely bypasses the PCM 80, passing unprocessed audio directly through to the outputs.

To assign an external controller to perform the selected bypass function, press **Load/★** to display **Bypass Src**. Use ADJUST to select a footswitch or any MIDI controller (or Off). Once a source is selected, it will perform the same function assigned to the front panel **Bypass** button.

1.4 Pgm Bypass

This control allows you to determine the behavior of the PCM 80 when a new effect is loaded. The choices available are: **AllMute** or **Bypass**.

1.5 Mem Protect

The PCM 80 provides a memory protection feature to prevent accidental overwriting of your stored effects. When this control is set to **On**, pressing the front panel **Store** button will cause an error message to be displayed. To enable the Store function, turn ADJUST to select **Off**.

1.6 Auto Load

This control allows you to choose whether PCM 80 effects will be loaded immediately when selected with SELECT and the **Up** and **Down** buttons (**On**), or whether they will require a press of the **Load/★** button (**Off**).

1.7 Patch Update

When a controller is patched to an effect parameter, this control determines when the controller will take control of the parameter. If **Immediate** is selected, stored parameter values will jump to the current controller position when the effect is loaded. If **Delayed** is selected, the stored parameter value will remain in effect until the controller is moved. See *Patching* later in this chapter.

1.8 Initialize

Selecting this control arms the PCM 80 to revert to its factory settings.

**This will erase all registers and setups,
and return the PCM 80 to its default states.**

If you press **Store**, the display will ask "Are you sure?" (Press STORE). If you don't want to reinitialize your unit, press any button to cancel the operation. If you press **Store** in response to this message, the display will flash "Restoring original factory settings" and your unit will be reinitialized.

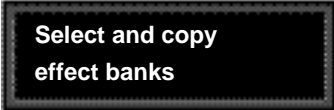


Row 2 Card

2.0 Bank Copy

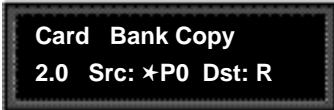
This control allows you to copy banks of effects from one location to another. Banks can be copied internally, or to and from PCMCIA Memory Cards. Try, for example, copying Preset Bank 0 into the internal Register Bank.

1. Press **Store**. The following display will appear briefly.



Select and copy
effect banks

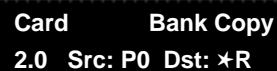
The display will then change to show:



Card Bank Copy
2.0 Src: *P0 Dst: R

The asterisk indicates that **Src** is available for adjustment. ADJUST will scroll through all available banks, including internal preset and register banks, as well as any banks on inserted PCMCIA cards. Internal banks are labeled "P0...P3" and "R1". Card registers will be labeled "C0, C1, C2" etc.

2. Press **Load/*** to move the asterisk to **Dst**.



Card Bank Copy
2.0 Src: P0 Dst: *R

Now, use ADJUST to select the destination of your copy. **Selecting a register bank here will cause its contents to be erased and overwritten with the bank you have selected as the source when Store is pressed.**

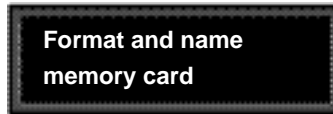
4. Press **Store** to copy the selected source (in this case Preset Bank 0) into the internal Register Bank. The display will ask "Are you sure?" (Press STORE). Press any button to cancel. Press **Store** to complete the store operation.

2.1 Load

This control is provided for future enhancement. It will allow you to load audio software from a Memory Card simply by inserting the new card and responding to the display prompts.

2.2 Format

This control allows you to format a Memory Card for PCM 80 use. Press **Store** and insert an unformatted card (or one you don't mind erasing). Make sure the Write Protect latch on the card is set to Off. Press **Store**. The display will ask "Are you sure?" (Press STORE). Press **Store**. The following display will appear briefly.



The display will then change as shown below.



This display allows you to assign a name (of 10 characters or less) to the card. A blinking cursor indicates that a particular character is available for changing. Use ADJUST to select the character you want in that position. Turn SELECT to move the cursor to another character. Press **Store** to execute. The display will ask "Are you sure?" (Press STORE). Press **Store** again to complete the operation. Press any front panel button to cancel.

Row 3 MIDI

3 MIDI	3.0 Reset	3.1 Receive	3.2 Transmit	3.3 Pgm Change	3.4 Automation	3.5 Send	3.6 Int Clock	3.7 SysEx	3.8 Dump	3.9 Dump Speed
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3.0 Reset

This control resets all patched parameters to their previously stored values. When this control is activated, a MIDI "Reset All Controllers" message is also transmitted on the current channel by the PCM 80.

3.1 Receive

Turn ADJUST to select **OFF**, **1-16**, or **OMNI** for receipt of MIDI messages.

3.2 Transmit

Turn ADJUST to select **OFF**, or **1-16** for transmission of MIDI messages.

3.3 Pgm Change

This control specifies the PCM 80's response to incoming MIDI Program Change messages. There are four selections available via ADJUST: **On**, **Off**, **Map** and **Chain**.

Pgm+ and **Pgm -**, are available as subparameters in each location. **Pgm+** will load the next higher effect in the current bank, map, or chain. **Pgm -** will load the next lower effect. You can select the following sources to activate **Pgm+** and **Pgm -**:

- Off
- Footswitch 1
- Footswitch 2
-
-
-
- MIDI Controller #119

On

Program Change messages 0—49 correspond to PCM 80 Effects 0.0 —4.9 in the current bank. Program Change messages 50—127 are ignored. The current bank can be changed with MIDI Bank Select Messages as follows:

- 0–3: Program Banks 0–3
- 4: Internal Register Bank
- 5–9: reserved
- 10–56: Memory Card Banks. The number of banks available on a given card will vary with its size, as follows:

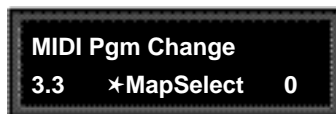
Card Size	# Banks
64	2
256	11
512	23
1 Meg	47

Off

All Program Change and Bank select messages are ignored.

Map

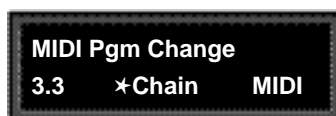
Program Change 0-127 can be mapped to any PCM 80 effect in any internal or card bank. Two 128 element maps are stored internally, additional maps may be stored on RAM cards. Once you have selected **Map**, press **Load/★** to display:



Turn ADJUST to select the desired Program Change Map.

Chain

Any Program Change number can be selected to load any one of ten customized effect “chains”. Additional chains can be stored on RAM cards. Once a chain is loaded, effects in the chain are accessed by the controller patched to **Pgm +** and **Pgm -** (program increment and program decrement). Once you have selected **Chain**, press **Load/★** to display:



Turn ADJUST to select the desired Program Chain. When set to **MIDI**, Program Chains will be loaded by MIDI Program Change messages according to the settings of Chain Pgm Assign in Row 6.

To load a specific Program Chain, without sending the PCM 80 a MIDI Program Change message, use ADJUST to display the desired chain number.



3.4 Automation

This control is provided for communication with one or more additional PCM 80s. Select **On** to have values resulting from front panel operations sent out as SysEx messages. Press **Load/★** to select the ID (**0-126** or **All**) of the target PCM 80(s).

3.5 Send (Foot Pedal, Foot Sw 1, Foot Sw 2, ADJUST)

If **Transmit** is set to **On** these four controllers can transmit MIDI controller messages. Press **Load/★** to cycle through the controller selections. Use ADJUST to select the MIDI Controller message to transmit.

3.6 Int Clock

You can choose to have the PCM 80 transmit MIDI Clock at the current tempo rate by setting this control to **On** and Tempo mode **Source** (0.2) to **Internal**. If this control is set to **Off**, MIDI Clock will not be transmitted.

3.7 SysEx

This control is provided for communication with one or more additional PCM 80s or computer editor software. **On** (the default setting) allows SysEx messages to be received by the PCM 80. Press **Load/★** to select device ID (**0-126**).

3.8 Dump

Press **Store** to configure the PCM 80 to execute MIDI dumps of single effects, banks, maps, chains, or setups.

3.9 Dump Speed

Turn ADJUST to select dump speeds of **Slow**, **Medium** or **Fast** to achieve compatibility with the connected MIDI device.



Row 4 Setup

4.0 Store

Control mode Audio, System, and MIDI parameter settings, along with two settings from the Tempo matrix, comprise a "Setup." Five setups can be stored in the unit, or on a Memory Card, allowing you to transport not only your effects, but complete PCM 80 environments to another PCM 80. Press **Store** to initiate the Setup Store function.

When the PCM 80 is shipped (or when you reinitialize the unit) default values are assigned to these parameters. The following table shows the Setup parameters along with the factory default setting of each parameter.

Control Mode			
Matrix Location		System Parameter	Default Setting
Audio	0.0	Word Clock	Internal 48kHz
	0.1	Analog Lvl	100%
	0.2	Digital Lvl	0%
	0.3	Auto Lock	Off
	0.4	SCMS	Multi Copy
	0.5	Emphasis Bit	Pass Thru
	0.6	Output Level	+4dBu
System	1.0	Edit Mode	Go
	1.1	Mix Mode	Pgm
		Global Mix Value	100% Wet
	1.2	Tempo Mode	Pgm
		Global Tempo Value	120 BPM
	1.3	Bypass Mode	InputMute
		Bypass Src	Off
	1.4	Pgm Bypass	AllMute
	1.5	Mem Protect	On
	1.6	Auto Load	Off
1.7	Patch Update	Delayed	
MIDI	3.1	Receive	OMNI
	3.2	Transmit	1
	3.3	Pgm Change	On
		Pgm+	Off
		Pgm-	Off
		Map select	0
		Chain	MIDI
	3.4	Automation	Off
	3.5	Footpedal	None
		Sw 1	None
		Sw 2	None
		ADJUST	None
3.6	Int Clock	Off	
3.7	SysEx	On	
	Device ID	0	
3.9	Dump Speed	Slow	
Tempo Mode			
Matrix Location		System Parameter	Default Setting
Tempo	0.2	Source	Internal
Tap	1.3	Display	On

4.1 Load

This control allows you to load your stored setup, restore the factory default setup shown above, or load a setup from a Memory Card.

Row 5
Mapx

Mask	Map 0	Map 1
------	-------	-------

Map 0 and Map 1

When Control mode 3.3 is set to **Map**, received MIDI Program Change messages will be mapped according to the selections made here. The selections available are: **MIDI Program Change #** (0-127), **Bank #** (PCM 80 preset, register, or card bank) and **Pgm #** (PCM 80 effect number 0-49). When shipped, the PCM 80 has the two internal maps configured to access all presets and registers:

Map 0	Map 1
MIDI 0 = P0 0.0	MIDI 0 = P2 2.8
MIDI 127 = P2 2.7	MIDI 121 = R 4.9

Row 6
Chain

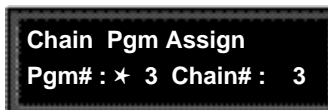
Chain	Chain Pgm Assign									
	Chain 0	Chain 1	Chain 2	Chain 3	Chain 4	Chain 5	Chain 6	Chain 7	Chain 8	Chain 9

The PCM 80 has 10 internal program chains, numbered 0-9. (Ten additional chains are available if a register card is inserted.) Each chain is made up of 10 "links" (numbered 0-9). You can assign any program or register to any link in the chain.

A chain can be loaded with a MIDI Program Change message, or by selecting its number directly at Control mode 3.3. Once a chain is loaded, the source assigned to **Pgm+** and **Pgm-** will load the next higher or lower program in the chain.

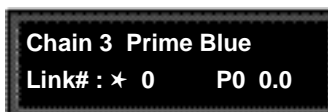
Pgm Assign

When Control mode 3.3 is set to **Chain**, received MIDI Program Change messages will be mapped according to the selections made here. Two assignments are available: **MIDI Program Change #** (0-127) and **Chain #** (0-9). When the PCM 80 is shipped, all program numbers are mapped to Chain #0. To change assignments, set **Pgm#**, with ADJUST, press **Load/★** to move the **★** to **Chain#** and set it with ADJUST. (You cannot assign more than one chain/MIDI #.)



Chain 0-9



Use SELECT to choose a chain. Once a chain is selected, any PCM 80 program or register can be assigned to any link in the chain. Press **Load/★** to move the **★** from **Link#** to the Bank ID, to the program number. Depending on the field marked with the **★**, ADJUST will select link numbers 0-9, Banks (Pn or Rn), or the desired program within the displayed bank.



The PCM 80 has 200 factory-designed programs, organized into four Program Banks of 50 each, and 50 memory locations, called registers, for storing your customized effects. One Register Bank is available in the PCM 80 itself. Additional Register Banks can be stored on PCMCIA cards.

Program and Register Banks

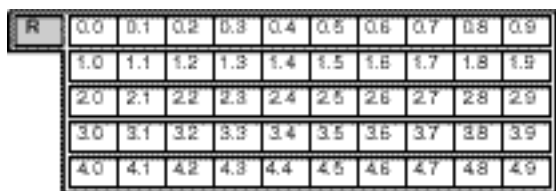
The PCM 80 has 4 Program Banks, each with 50 factory-designed programs

All PCM 80 programs have one or more parameters patched to the ADJUST knob.

In Program Banks or Register Banks mode, turn ADJUST to change the sound of the currently running effect. While ADJUST is turned, the patch name and value are displayed.

A Register Bank provides 50 memory locations for storing your own effects.



The procedure for loading effects is the same, whether you are choosing from banks of factory presets, or from your own banks of registers. When first turned on, the PCM 80 will load whatever effect was running when it was last turned off. When shipped from the factory, the first effect in the first Program Bank (**P0 0.0 Prime Blue**) is loaded. The Bank ID (**P0, P1, P2, P3**), matrix location, program name, and the algorithm from which the effect is derived are all displayed.

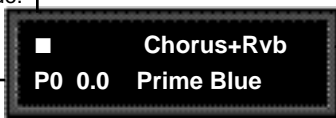
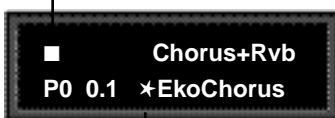
Selecting Effects

Indicates that the ADJUST knob is patched to one or more parameters in the currently-running effect — in this case, Prime Blue.

Turn SELECT to display another effect.

The patch indicator remains to indicate that the currently running effect has an ADJUST knob patch, although the displayed effect may not.

An asterisk in the display indicates that the displayed effect is not loaded.

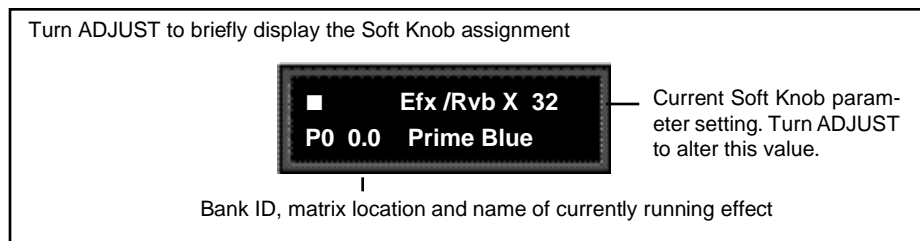



Press **Program Banks** to cycle through the program banks. Simultaneously press **Program Banks** along with either **Up** or **Down** to backstep.

Turn SELECT to scroll through all of the effects in the bank. Press **Program Banks** to reselect the last displayed effect in another bank. Press **Load/*** to load the displayed effect.

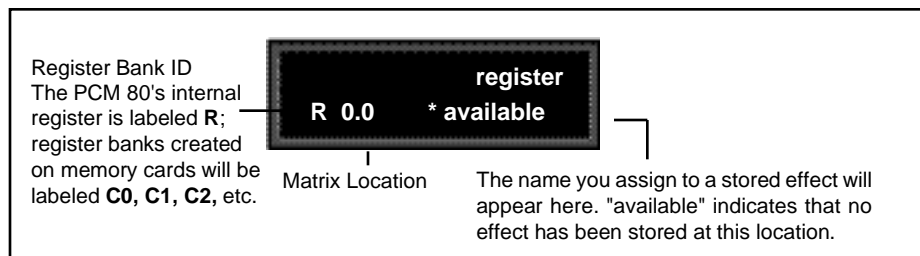
In the Program and Register Banks, ADJUST is a Soft Knob. Each of the factory-designed programs has one or more parameters patched to this knob, providing a quick way to make useful changes to the effect. For example, in **P0 0.0 Prime Blue**, ADJUST varies the mix of Chorus, Echo and Reverb effects.

The ■ symbol in the upper left corner of the display indicates that the currently running effect has an ADJUST knob patch. (When you display another program or register, this indicator continues to be displayed.) Turning ADJUST will cause the display to change to show the patch name and the current value, as well as the Bank, matrix location and name of the currently running effect. Continue turning ADJUST to alter the patched parameter's value. You can create your own ADJUST knob parameter assignments for your registers. (See *Editing*, later in this chapter.)



Note that scrolling through the effects in the Program or Register banks will not load the effects, but will merely display them (unless you have specifically turned on the Auto Load function in Control Mode). Displayed effect names will be preceded by an ★ indicating that they can be loaded by pressing **Load/★**. (The **Load / ★** LED will light to indicate that the load function is available.) To find out at any time what the currently running effect is, press and hold **Program Banks** or **Register Banks**. An Info message will be displayed providing the name bank and matrix location of the currently running effect.

To select an effect stored in a register, press **Register Banks**. If you have registers stored on a memory card, and have the card inserted, pressing **Register Banks** repeatedly will cycle through all of your stored bank selections. Simultaneously press **Register Banks** along with either **Up** or **Down** to backstep. Turn SELECT to scroll through all of the effects in the bank. As in Program Banks mode, an asterisk in front of the effect name indicates that the displayed effect is not loaded. Press **Register Banks** to reselect the last displayed effect in another bank. Unused registers are indicated by the message "available" on the display. Press **Load/★** to load the displayed effect.



The organization of programs in the four program banks and descriptions of the 200 preset programs are given in Chapter 3.

Tempo Mode

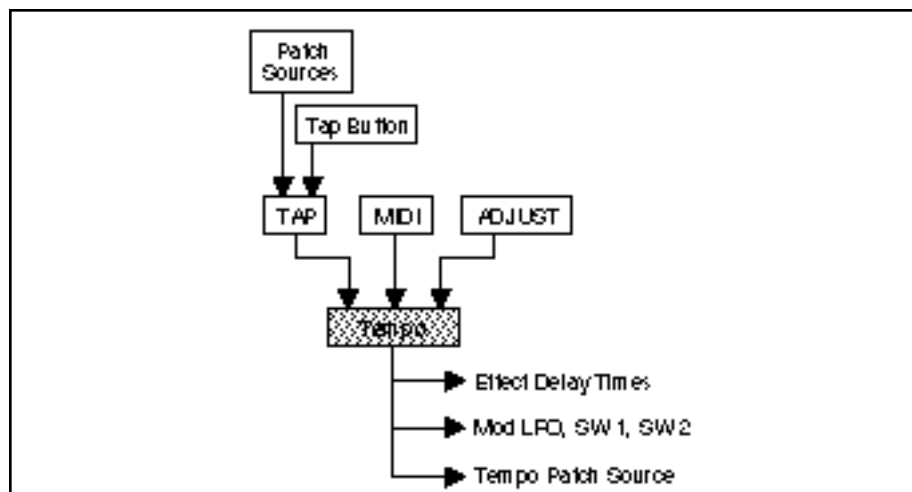
The PCM 80 gives you unique control over tempo. In the PCM 80, tempo is not just a matter of setting echo rates. Any delay parameter (as many as 10 in some effects) and any time-based modulator (LFO, Sw1 and Sw2) can be individually assigned to an absolute time value, or assigned to a tempo value.

For example, a delay time can be set to a specific number of milliseconds, and you will always get a delay of that number of milliseconds, regardless of tempo changes. Alternatively, a delay time can be set to a specific ratio of echoes to beats. Now, if you create a rhythmic echo pattern, delay times will be linked to tempo. When you change tempo, the delay time will change to maintain the same rhythm at the new tempo.

With the LFO and time-based switches, the rate of change can be an absolute value (such as once per second), or it can be linked to tempo (for example, once every four beats). Any delay parameter, or time-based modulator, can be set to its own individual rhythm, allowing you to set up an effect which will change in a rhythmically interesting way — evolving over time, for example, as opposed to being a mere series of repetitions. Once delays and time-based modulators are assigned, tempo rate can be easily changed in a variety of useful ways.

Tempo **Rate** can be set internally or via MIDI. If Tempo **Source** is set to **Internal**, you can dial in any tempo from 40-400 BPM at location 0.0 in the Tempo mode matrix. Alternatively, you can press the front panel **Tap** button twice in rhythm to establish the rate you want, or you can have the value of a patch source act as a tap trigger. (See *Patching*.) The Tap function, whether performed by the front panel **Tap** button, or by an assigned controller, is always active, allowing you to change tempo on the fly from any mode. You can also choose to have your tempo transmitted as a MIDI Clock signal to control the tempo of connected MIDI devices. (Control mode 3.6) If **Source** is set to MIDI Clock, PCM 80 tempo will sync to incoming MIDI Clock. Whether tempo is set internally or via MIDI, the LED in the Tempo button will flash at the current rate. (You can disable the Tempo LED flashing under Tempo mode 1.3.) Press and hold the **Tempo** button at any time to display the current Tempo **Rate** and **Source**.

Each effect in the PCM 80 has its own tempo rate setting which is stored with the effect. You can override these individual tempo rates with a global tempo rate at Control Mode 1.2. Tempo is also available as an independent patch source which can control any effect parameter. (See *Patching* later in this chapter.)



When **Compare** is on, **Tap** will not alter the tempo, but will still reset the LFO's. See Chapter 3 *Modulation*.

The Tempo Mode Matrix Press **Tempo** to access the following tempo parameters:

Simultaneously press **Up** and **Down** to return to 0.0.

0 Tempo	0.0 Rate	0.1 Beat Value	0.2 Source	
1 Tap	1.0 Duration	1.1 *Source	1.2 Average	1.3 Display

An asterisk (*) accompanying a parameter name indicates that there are subparameters available at that matrix location. The **Load /*** LED will light whenever an asterisk appears in the display. Press **Load /*** to step to the next subparameter.

From any point in the matrix, press **Up** or **Down** together with **Load /*** to backstep to the previous parameter.

**Row 0
Tempo**

0 Tempo	0.0 Rate	0.1 Beat Value	0.2 Source
------------	-------------	-------------------	---------------

0.0 Rate

This is the current tempo (in Beats Per Minute). When 0.2 is set to **Internal**, turning ADJUST allows you to select a different rate (40-400 BPM). The Tempo LED will flash at the new rate. Note that fractional tempos can be tapped in, but are not available via ADJUST. The display will always show the nearest whole number value.

0.1 BeatValue

Tempo is expressed in BPM. This control allows you to specify the value of the beat. Eighth, dotted-eighth, quarter, dotted-quarter, half, dotted-half, and whole-note values are available. If, for example, the rate is 120 BPM, and you select eighth-note here, the tempo will be 120 eighth-notes per minute. If you select quarter-note here, the tempo will be 120 quarter-notes per minute. (The factory default is quarter-note.)

0.2 Source

You can choose to have tempo determined by the PCM 80 **Tap** and **Rate** controls (Internal), or by MIDI Clock. When MIDI Clock is selected as the tempo source, **Tap** acts as a reset, setting the downbeat of the LFO and the time-based switches.

1 Tap	1.0 Duration	1.1 Source	1.2 Average	1.3 Display
----------	-----------------	---------------	----------------	----------------

Row 1 Tap

1.0 Tap Duration

This control determines how many beats will occur in a tap interval. The default setting (1 beat) is probably adequate for most applications. With the default setting of 1 beat, if the tempo is set to 120 bpm, and the beat value is set to quarter-note, each TAP = 1 quarter-note = 1 beat. Available values are: 1/8, 1/7, 1/6, 1/5, 1/4, 1/3, 1/2, 1-8 beats

1.1 Tap Source and Tap Level

Press **Load**/***** to toggle between these two controls.

Tap Source allows you to assign the Tap function to any of the PCM 80's Internal, MIDI, or MIDI controllers as listed under Patching.

Tap Level allows you to set the level at which the Tap function is triggered.

1.2 Average

This control allows you to average the last 2-8 taps. Higher numbers mean that the response to incoming taps will be more gradual. (The tempo is updated on every tap, but with a value which is the average of the last 2-8 taps.) Higher average values are more useful if you're trying to lock into a pre-recorded track.

1.3 Display

This control allows you to disable the flashing of the Tempo LED. Turn ADJUST to select **Off**. The Tempo LED will turn off.

Editing an Effect

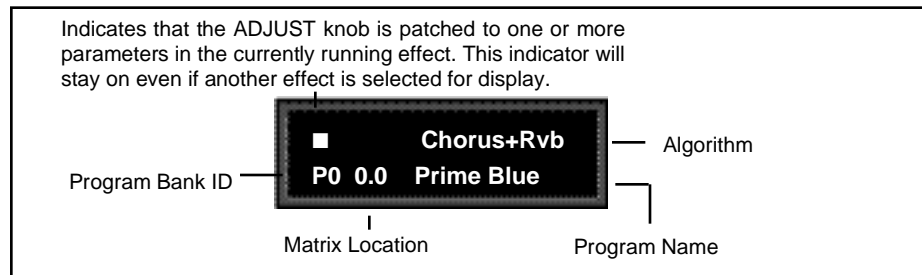
With 10 algorithms and 200 preset effects, the PCM 80 gives you a lot to play with right out of the box. An enormous range of editing control is provided for each algorithm, with parameters organized in an edit matrix of as many as 100 main controls. In addition to providing this powerful sound design capability, the PCM 80 is also designed to allow you to customize these controls for your day-to-day editing needs, or to simply use a subset of controls specially designed for each preset.

This section will describe three basic levels of editing, from the simplest "plug and play" method, through the full edit matrix.

The Soft Knob

Every preset in the PCM 80 has one or more of its available parameters patched to the front panel ADJUST knob. This Soft Knob provides the first level of editing control. Once you have loaded a preset, simply turn ADJUST to alter the effect.

When shipped, the PCM 80 will power up with the first preset (**P0 0.0 Prime Blue**) loaded. The following display will appear:

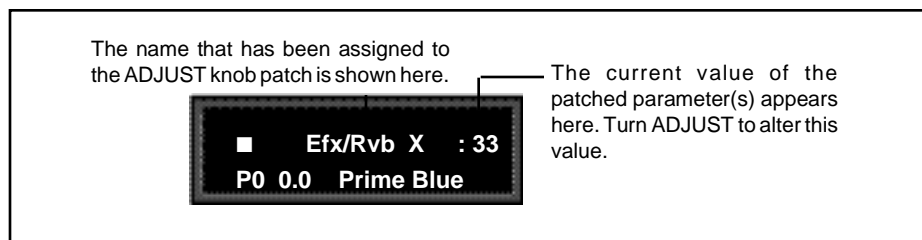


Turn ADJUST. The display will change to show the name assigned to the ADJUST patch, and the current value of the patch. Continue turning ADJUST to change the value of the patch along its entire range. The range of ADJUST knob control can be limited in Control Mode, making it possible, for example, to have a range of only 0...1, in order to have the ADJUST knob behave as an Off/On control. Many of the presets have range limits to make them more convenient to use. In some of the presets, the changes effected by ADJUST will be as simple as altering the wet/dry mix. In others, such as the example shown below, turning ADJUST will glide you all the way from a chorusing effect to a reverb effect over the complete control range of 0-127.

Controlling the Soft Knob with a Foot Pedal

If you have a foot pedal connected to the PCM rear panel Foot Controller jack, you can use it to control the soft knob patch. (Note that no MIDI connections are required to do this.)

To assign a foot pedal control over the soft knob patches, set both Control mode 3.5 **ADJUST** and Control mode 3.5 **Foot Pedal** to the same MIDI Controller. See Chapter 5 *MIDI Operation*.



Details on how to create your own ADJUST knob patches are given at the end of this chapter under *Patching*.

Beyond simple ADJUST knob editing, the PCM 80 offers two levels of editing control, called **Go** mode and **Pro** mode. **Go** mode is designed to be a basic "plug and play" mode, with easy access to a specific set of preset parameters. For each of the 200 presets, we have designed a Soft Row containing those parameters which allow you to make value changes to the effect *without* losing the character of the sound.

When shipped, the PCM 80 will power up in **Go** mode with the first preset (**P0 0.0 Prime Blue**) loaded. Press **Edit** to display the Soft Row of parameters which have been designed for this preset. In this example, 10 soft row parameters have been assigned. The name of each Soft Row parameter is displayed, along with a reference to its row in the Edit matrix.

The Soft Row

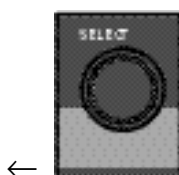
Turn **SELECT** to scroll all of the available parameters in the Soft Row. Turn **ADJUST** to change the value of any displayed parameter along its entire range.

Each preset has a Soft Row of parameters which have been specifically selected to provide everything you need to play with the effect. This example shows the Soft Row for **P0 0.0 Prime Blue**.

An asterisk in front of a displayed parameter indicates additional parameters are available when you press **Load/***.

Controls Mix	Controls High Cut	Controls FX Width	Rvb Time Mid Ft	Rvb Time Fr HC	Rvb Time Pre Delay	Rvb Design Size	Chorus *Mod Depth	Mod: LFO *Rate	Mod: Sw 1 *Rate
0 SOURCE	0.0 Mix	*0.1 FX Width	00 Reverb	00 High Cut	04 FX Pre	00 FX Width	00	00	00
1 Rvb Time	1.0 Mid Ft	1.1 Fr HC	12 Overmod	03 Fr HC	1.1 Pre Delay	00 The LFO	10	10	10
2 Pre Delay	2.0 Time	2.1 Overmod	2.2 Reverb	2.3 High Cut	2.4 FX Pre	2.5 FX Width			
3 Level	3.0 Mod	3.1 Mod	3.2 Mod	3.3 Mod	3.4 Mod	3.5 Mod	3.6	3.7	3.8
4 Delay Time	4.0 Mod	4.1 Mod	4.2 Mod	4.3 Mod	4.4 Mod	4.5 Mod	4.6	4.7	4.8
5 Chorus	5.0 Mod	5.1 Mod	5.2 Mod	5.3 Mod	5.4 Mod	5.5 Mod	5.6	5.7	5.8
6 Mod Sw 1	6.0 Mod	6.1 Mod	6.2 Mod	6.3 Mod	6.4 Mod	6.5 Mod	6.6	6.7	6.8
7 Mod Sw 2	7.0 Mod	7.1 Mod	7.2 Mod	7.3 Mod	7.4 Mod	7.5 Mod	7.6	7.7	7.8
8 Mod Sw 3	8.0 Mod	8.1 Mod	8.2 Mod	8.3 Mod	8.4 Mod	8.5 Mod	8.6	8.7	8.8
9 Mod Sw 4	9.0 Mod	9.1 Mod	9.2 Mod	9.3 Mod	9.4 Mod	9.5 Mod	9.6	9.7	9.8

Soft Row parameters are derived from the full Edit matrix (with the exception of the Patch row). In the presets, they are arranged according to their numerical order in the matrix.



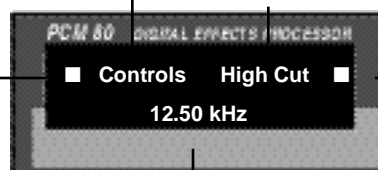
Turn **SELECT** to move horizontally across the Soft Row.



Use **ADJUST** to change the value of a displayed parameter.

The Soft Row display shows: an Edit matrix row label...

... the name of the parameter...



... and the current parameter value.

The symbol ■ in the upper left corner of the display indicates that a modulator is patched as a "source" controller.


The symbol ■ in the upper right corner of the display indicates that a parameter is a patch "destination".

Compare Whenever you edit a PCM 80 effect from the front panel, the LED in the **Compare** button will light. This lets you know that the effect has been altered since the last store operation, and that the edit compare function is active. Whenever this light is on, you can press **Compare** to hear the original version of the effect. A message will be displayed to inform you that the stored version of the effect is being loaded. Although this message is only displayed briefly, the **Compare** LED will flash to let you know the effect you are hearing is the stored version. While **Compare** is on, you can use the SELECT knob and the **Up** and **Down** buttons to view parameter values in the stored effect.


Press **Compare** again to reload your edited version. Another message will be displayed, and the **Compare** LED will stop flashing and remain lit until you store your edited version, or select and load another effect.

Note: Altering parameter values with patched sources other than ADJUST will *not* light the LED.

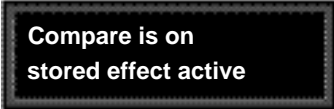
The **Compare** light is off until you make changes to an effect.



As soon as you alter an effect, the **Compare** light will go on.



If you press **Compare** while the light is on, a message will be displayed ...



...and you will hear the original (stored) version of the effect. You can display the parameter values of the stored effect with SELECT and **Up** and **Down**.

The **Compare** light will flash until you press **Compare** again to reload the edited version of the effect. While **Compare** is on, you cannot select another effect.

Bypass The front panel **Bypass** button is always active, and will turn on the type of bypass (**AllMute**, **InputMute**, **OutputMute**, or **Bypass**) selected in Control Mode 1.3.

When you press **Bypass**, the button LED will light and a message will be displayed to inform you that bypass is on. The display message will also indicate the type of bypass which is in effect. Press **Bypass** again to turn both the LED and the bypass condition off. A brief display message will inform you that bypass is off.

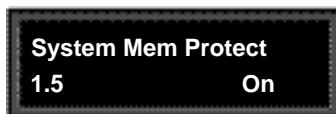
Press and hold **Bypass** to display the current state and type of bypass.

Store Operations

The PCM 80 is shipped with its Memory Protection option on. When you press the front panel **Store** button, the following message will be displayed:



To turn Memory Protection off, press **Control** and use **Up** and **Down** and **SELECT** to display matrix location 1.5. The display should read:



Turn **ADJUST** to select **Off**.

With Memory Protection disabled, pressing **Store** will cause a message like the following one to be displayed:

An asterisk (★) is positioned in front of the display label which is available for changing — in this case, the name of the effect.

The default Bank and register location will appear here.

"available" means that this location is empty. If an effect is stored at this location, its name will appear here.

Press **Load/★** to select the **ADJUST** patch for renaming. Press again to select the register bank. Press again to select the register location within the selected bank.

Turning Memory Protection Off

Storing an Effect

If you press **Store** again, the display will ask "Are you sure?" (Press **STORE**). Pressing **Store** will cause the currently running effect to be saved, as is, in the location shown in the lower lefthand corner of the display. A brief message will inform you that the effect is being stored, then the PCM 80 will revert to the mode it was in before **Store** was pressed, with the newly-stored effect loaded.

When you store an effect, the following things are saved:

- Values of all Edit matrix parameters. This includes the initial values for any patch destinations when **Patch Update** (Control mode 1.7) is set to **Delayed**.
- Soft Row parameter assignments.
- Value of **ADJUST** when the effect was stored.
- Last parameter selected when the effect was stored.
- Tempo **Rate** and **BeatValue**.
- Tap **Duration** and **Average**.
- **ADJUST** name.
- Effect name.

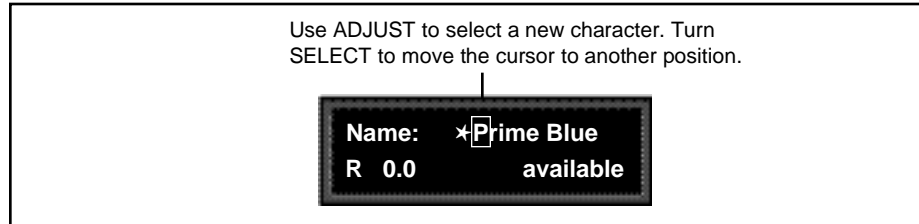
How the PCM 80 selects a default Bank and Register

If a register is loaded when **Store** is pressed, the default location will be the same as the loaded effect. If a preset is loaded when **Store** is pressed, the default location is determined as follows:

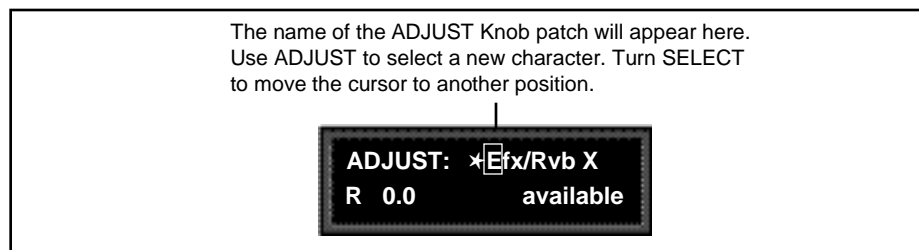
The PCM 80 always uses the last-stored register location as a starting point. Its default choice is the next "available" register within that bank. If there are no available registers at a higher location number within the same bank, the default location will be that of the last stored register.

If the last stored register is on a RAM card, and the RAM card is not inserted, the PCM 80 will search for available registers starting at 0.0 in the Internal Register Bank.

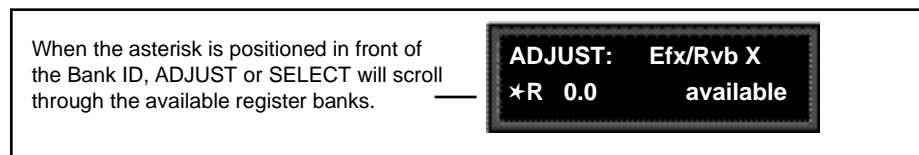
Renaming the Effect Renaming an effect is straightforward. With the asterisk and the cursor positioned as shown, turn ADJUST to select a new character. Press **Up** or **Down** to select a new *type* of character (upper case, lower case, numeric, symbolic, or blank). Simultaneously press **Up** and **Down** to clear all characters from the cursor to the end of the line. Turn SELECT to reposition the cursor over another character, and use ADJUST to change it. Continue in this manner until you have finished entering the new name. A maximum of 12 characters (including spaces) may be used.



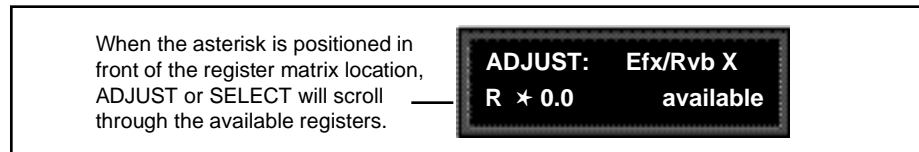
Renaming the ADJUST Knob Patch Press **Load/*** to select the ADJUST patch for renaming. The display will change to show the following:



Selecting a Bank and Register Location Press **Load/*** to move the asterisk to the Register Bank ID.



Press **Load/*** again to move the asterisk to the register matrix location.



Once you have made all the changes you want to an effect, and have selected a register location, press **Store**. If you press **Store**, the display will ask "Are you sure?" (Press STORE). If you don't want to save the effect as shown, press any button to cancel the operation. Press **Store** to complete the operation.

Setting Edit Mode to **Pro** (Control Mode 1.0) gives you access to the full parameter matrix of the algorithm for any loaded effect whenever you press the front panel **Edit** button.

The Full Edit Matrix

To select any parameter for adjustment, use SELECT to move horizontally across the matrix and the **Up** and **Down** buttons to move vertically. An asterisk (*) appearing before a displayed parameter indicates that more than one parameter is available at that location. Press **Load/*** to display these additional parameters.

Each of the ten PCM 80 algorithms has a unique matrix, but many parameters are common to all effects, and their placement within the matrix is consistent. For example, all parameters within a given row of any matrix are related. This type of grouping is immediately apparent from the name of the row. For example the "Levels" row in any matrix will contain all of the available level controls for the effect's delay voices.

As far as possible, rows with similar controls will always appear in the same position in the matrix and, within each row, parameters will generally appear in the same position. For example, the first row (0) in every algorithm is "Controls". The **Mix** parameter, which is available in all effects, is always located in position 0 in this row. Similarly, the last two rows of every matrix are "Modulation" and "Patches". This makes it very easy to find your way around the large number of available parameters, and to anticipate where to find the controls you are looking for when you switch between effects.

Concert Hall									
0 Controls	0.0 Mix	0.1 FX Adjust	0.2 *InLvlPan	0.3 High Cut	0.4 Voice Df	0.5 FX Mix	0.6 FX Width	0.7 *ADJUST	
1 Rvb Time	1.0 Low Rf	1.1 Mid Rf	1.2 Crossover	1.3 Rf HC	1.4 Pre Delay	1.5 *Ref LvlDly	1.6 *PatVds		
2 Rvb Design	2.0 Size								
3 Levels	3.0 Master								
4 Delay Time	4.0 *Master								
5 Feedback	5.0 Master								
6 Panning	6.0 Master								
7 Modulation	7.0 ModLFD								
Patches	Pat ch 0								
Plate									
0 Controls	0.0 Mix	0.1 FX Adjust	0.2 *InLvlPan	0.3 High Cut	0.4 Voice Df	0.5 FX Mix	0.6 FX Width	0.7 *ADJUST	
1 Rvb Time	1.0 Low Rf	1.1 Mid Rf	1.2 Crossover	1.3 Rf HC	1.4 Pre Delay	1.5 *Ref LvlDly	1.6 *EcoFwdDly	1.7 *PatVds	
2 Rvb Design	2.0 Size								
3 Levels	3.0 Master								
4 Delay Time	4.0 *Master								
5 Feedback	5.0 Master								
6 Panning	6.0 Master								
7 Modulation	7.0 ModLFD								
Patches	Pat ch 0								
M-Band+Rvb									
0 Controls	0.0 Mix	0.1 FX Adjust	0.2 *InLvlPan	0.3 FX Mix	0.4 FX Width	0.5 *ADJUST			
1 Rvb Time	1.0 Low Rf	1.1 Mid Rf	1.2 Crossover	1.3 Rf HC	1.4 Pre Delay	1.5 *Ref LvlDly	1.6 *EcoFwdDly		
2 Rvb Design	2.0 Size	2.1 Diffusion	2.2 Shape	2.3 Spread	2.4 Spin	2.5 Link	2.6 Rvb Out		
3 Levels	3.0 Master	3.1 Voice 1	3.2 Voice 2	3.3 Voice 3	3.4 Voice 4	3.5 Voice 5	3.6 Voice 6		
4 Delay Time	4.0 *Master	4.1 Voice 1	4.2 Voice 2	4.3 Voice 3	4.4 Voice 4	4.5 Voice 5	4.6 Voice 6		
5 Filters	5.0 *Master	5.1 *Voice 1	5.2 *Voice 2	5.3 *Voice 3	5.4 *Voice 4	5.5 *Voice 5	5.6 *Voice 6		
6 Feedback	6.0 Master	6.1 Voice 1	6.2 Voice 2	6.3 Voice 3	6.4 Voice 4	6.5 Voice 5	6.6 Voice 6		
7 Panning	7.0 Master	7.1 Voice 1	7.2 Voice 2	7.3 Voice 3	7.4 Voice 4	7.5 Voice 5	7.6 Voice 6		
8 Modulation	8.0 Mod AR Env	8.1 Mod AR L	8.2 Mod Env L	8.3 Mod Env R	8.4 Mod Latch	8.5 Mod Sw 1	8.6 Mod Sw 2		
Patches	Pat ch 0	Pat ch 1	Pat ch 2	Pat ch 3	Pat ch 4	Pat ch 5	Pat ch 6	Pat ch 7	Pat ch 8
								Pat ch 9	

Similar parameters can be found in similar positions in every effect matrix. Once you are familiar with one edit matrix, you will find it easy to anticipate where to find controls in another matrix.

Detailed information about each individual edit matrix, as well as parameter and effect descriptions are given in Chapter 3.

Creating a Soft Row In **Pro** mode you still have complete access to the Soft Row, which appears above row 0 of the full edit matrix. The parameters assigned here are duplicates of selected parameters in the matrix and can be adjusted from Row **S** (Soft Row), or from their matrix location.

The following example shows the edit matrix for the preset, **P 0.0 Prime Blue** (Chorus+Rvb algorithm). As you can see, parameters from locations throughout the matrix have been assigned to this Soft Row. In this preset (and in every preset) we have designed the Soft Row by assigning the parameters in numerical order, so that parameters from the Controls row are assigned in order to the first locations, followed by assignments from the Rvb Time row, and so on. As Soft Row parameters are also labeled with the name of the row from which they were taken, this makes it relatively easy to find the source parameter for any Soft Row assignment.

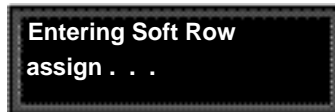
The Soft Row assigned to an effect appears above Row 0 in the full Edit matrix.

0 [Soft Row]	1 Controls	2 Rvb Time	3 Rvb Controls	4 Level In	5 Dry Time	6 Chorus	7 Reverb In	8 Mix Level In	9 Pan	10 Send	11 Send	12 Send
S 0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
0.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
1.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
2.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
3.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
4.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
5.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
6.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
7.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
8.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
9.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
10.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
11.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00
12.00	1.00	2.00	3.00	4.00	5.00	6.00	7.00	8.00	9.00	10.00	11.00	12.00

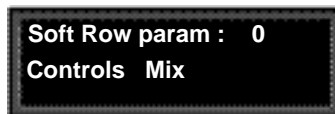
We have highlighted those parameters in the Edit matrix which have been assigned to the Soft Row of **P 0.0 Prime Blue**, for example: **FX Width**, and **Mod: Sw 1**.

Modifying the Soft Row, or creating a completely new Soft Row for an effect is easy:

1. From the full Edit matrix, press **Up** until you get to the Soft Row, indicated by an **S** in the lower left corner of the display.
2. With any Soft Row parameter displayed, press and hold down the **Edit** button. The following display will appear briefly.



When you release the **Edit** button, the display will change to the Soft Row Assignment display shown below. The **Edit** button LED will begin flashing and will continue to flash as long as you are in Soft Row Assign.



Here we show the first Soft Row parameter in our example — the actual Soft Row parameter selected will correspond to whichever one was displayed when you pressed and held **Edit**.

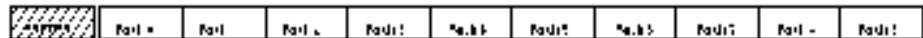
3. Turn **ADJUST** to scroll through all of the available parameters in the Edit matrix row by row, in numerical order. The entry "available" can also be selected to indicate that no assignment has been made at that position.
4. Turn **SELECT** to display another Soft Row position (0-9) for assignment. For each position, you can choose any effect parameter, including one(s) you have already assigned to a Soft Row position.
5. When you have arranged the Soft Row assignments as you want them, press **Edit** to exit Soft Row Assign and return to your last position in the Edit matrix. Pressing **Up** or **Down** once will also cause you to exit Soft Row Assign. Another push of either of these buttons will move you vertically through the Edit matrix.

When you return to **Go** mode, you will see the parameters in the order you assigned them — the spaces from any unassigned row positions will not appear.

Patching Patching is the ability to assign a control (Source) to any PCM 80 parameter (Destination). This allows you to alter the value of the parameter by manipulating the control Source. For example, you can select the front panel ADJUST knob as a Source and an effect's Mix parameter as a Destination. This simple patch will allow you to dynamically alter the mix of the effect whenever you turn ADJUST. You can create as many as 10 patches, each with as many as 8 pairs of pivot points. You can patch multiple parameters to a single controller, or patch multiple Sources to a single Destination.

About Sources All Sources are the same in the sense that each generates an output value in the range of 0-127. The output value is used to increase or decrease the setting of a Destination parameter. Sources differ in the manner in which they generate an output. Some generate values continuously (they're always "on"); some generate output based on the position of a particular external MIDI controller, or an external footpedal, or footswitch. Some Sources generate output based on aspects of physical performance such as how loud, how fast, or how hard you play. The PCM 80 allows you to choose from a selection of Sources as shown for each Destination. A list of the available Sources is shown on the following page.

The Patch Row Each PCM 80 effect has an identical Patch row at the end of its Edit matrix where you can make as many as 10 patches.



To make a patch, use SELECT and the **Down** button to move down through the Edit matrix to the Patch row. A display such as the following will appear.

The asterisk (*) indicates that Sources will be selected when you turn ADJUST. Press **Load /*** to change the selection to **Dst**. Press **Load /*** again to bring up the Values display where you can select **Src Value** and **Dst Value**.

SELECT will move you across the Patch row (0-9).

The Source type is indicated here. (**Int**, **MIDI** or **001-119** to indicate a MIDI Controller.)

Patch 0 *Src

Int LFO

The name of the current Source assignment is shown here. (The default Source assignment is **Int...Off**.)

Pressing the **Load /*** button will change the display to allow you to sequentially select: **Src**, **Dst**, **Src Value** and **Dst Value**. Press **Up** or **Down** together with **Load /*** to backstep to the previous parameter.

Three types of sources are available: Internal, MIDI and MIDI Controller. These types are indicated in the Source list by the labels: **Int**, **MIDI**, or a number (**001-119**). Turn ADJUST to scroll through the entire list of available sources.

Assigning a Source

Internal
LFO
Sine
Cosine
Square
Sawtooth
Pulse
Triangle
Env L
Env R
AR Env
Latch
Sw 1
Sw 2
Sw 1 & 2
Mono Lvl
Left Lvl
Right Lvl
Footpedal
Foot Sw 1
Foot Sw 2
ADJUST
Tempo
On
Off

MIDI
P Bend
A Touch
Velocity
Last Note
Low Note
High Note
Clk Comnds

MIDI Controller Numbers			
(PCM 80 interprets 000 as Bank Select)		070	Sound Var
001	Mod Wheel	071	Timbre
002	Breath	072	Release
003	Ctl 3	073	Attack
004	Foot Ctl	074	Bright
005	PortaTime	075	Sound 6
006	Data Entry	076	Sound 7
007	Volume	077	Sound 8
008	Balance	078	Sound 9
009	Ctl 9	079	Sound 10
010	Pan	080	General 5
011	Xpression	081	General 6
012	Effect 1	082	General 7
013	Effect 2	083	General 8
014	Ctl 14	084	Porta Ctl
015	Ctl 15	085	Ctl 85
016	General 1
017	General 2	090	Ctl 90
018	General 3	091	FX1 Depth
019	General 4	092	FX2 Depth
020	Ctl 20	093	FX3 Depth
...	...	094	FX4 Depth
031	Ctl 31	095	FX5 Depth
(PCM 80 interprets 032 as Bank Select)		096	Data Inc
033	Ctl 33	097	Data Dec
...	...	098	NRPN LSB
063	Ctl 63	099	NRPN MSB
064	Sustain	100	RPN LSB
065	Porta On	101	RPN MSB
066	Sostenuto	102	Ctl 102
067	SoftPedal
068	Legato	119	Ctl 119
069	Hold 2		

Patch Sources

Assigning a Destination Once you have selected a Source, press **Load /*** and the display will change to allow you to assign a Destination (**Dst**).

The asterisk (*) indicates that Destinations will be selected when you turn ADJUST. Press **Load /*** to bring up the Values display where you can assign **Src Value** and **Dst Value**. Press **Load /*** again to return to Source selection, etc.

SELECT will move you across the Patch row (0-9).

The Edit matrix row label for the currently assigned parameter is shown here.

The name of the current Destination assignment is shown here. (**Unassigned**) will appear across the bottom display line if no assignment is selected.)

Turn ADJUST to scroll through all of the parameters in the Edit matrix of the currently loaded effect, including the Modulation parameters.

Once you have assigned a parameter as a Destination, the controller you have assigned “owns” that parameter. Adjustments made to this parameter from the Edit matrix, will only affect the initial value of the parameter when the program is loaded.

The behavior of the parameter on program load is determined by the setting of the Patch Update parameter in Control mode (1.7). This parameter can be set to **Immediate** or **Delayed**.

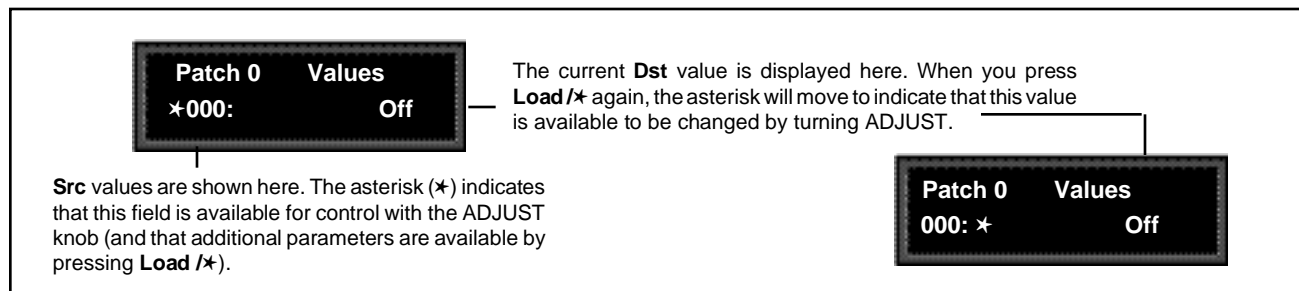
When **Immediate** is selected, the initial value of the parameter value will correspond to the controller position.

When **Delayed** is selected, the stored value of the parameter will continue to be in effect until the controller is moved. (It is, therefore, a good idea to set a sensible value to the parameter in the Edit matrix.)

Mod Row parameters that can be assigned as Patch Destinations	
LFO	Rate, Shape, P Width, Depth
AR ENV	Attack, Release, Mode
Env L	Release
Env R	Release
Sw 1	Rate, P Width, Mode
Sw 2	Rate, P Width, Mode

Assigning Values

Once you have assigned a Destination, press **Load /*** to get to the **Values** display.



This display allows you to assign Destination values to specific Source values. These assignments are made in pairs, each with a value for the Source and a value for the Destination. For example, the default is two pairs mapped as follows:

minimum Src value (0) = minimum Dst value
 maximum Src value (127) = maximum Dst value

This establishes a linear relationship between the parameter and the controller. Inverse control is accomplished easily by reversing these settings. As many as eight pairs of Destination/Source values, or pivot points, can be assigned here, providing an exciting new level of dynamic control.

Jump

When creating patches, there are situations in which you will want to leave the Patch row to adjust parameters. To make this convenient, a *Jump* command is available. Jumping is dependent on the current Patch display, and is activated simply by pressing **Edit** while a certain display is active. This will jump you out of the Patch row and to the location where you can make the necessary adjustments. Pressing **Edit** again will jump you back to the Patch Row. (Note that using any front panel controls other than those required to adjust the parameter to which you have jumped, will disable the jump. This is not catastrophic, but it will require you to return by using **Up** and **Down** and **SELECT**.) The following Jumps are available:

From the Patch row **Src** display:

- With ADJUST selected as the Source, press **Edit** to jump to the Controls row, where you can specify range limits for the ADJUST knob. Press **Edit** again to return to the Patch row.
- With any modulation parameter selected as a Source, press **Edit** to jump to the Modulation row position of the Source. For example, if the Patch source **LFO** is displayed, press **Edit** to jump to Modulation row position 0 (LFO) where you can edit any LFO parameter value. Press **Edit** again to return to the Patch row.

Jump cont'd.

From the Patch row **Dst** selection display:

- Press **Edit** to jump to the Edit controls for the parameter you have selected as the Destination. You will have complete access to all parameter controls, including any subparameters at that location. Press **Edit** again to return to the Patch row.

From the Patch row **Values** display:

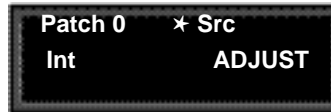
- Press **Edit** to jump to the next **Src** or **Dst** value. Default values are 0...minimum, 127...maximum.

Patching Examples

The following examples illustrate how to create a patch, use the patch jump features, modify the default patch values and add an additional pivot point to the example patch values.

Creating a patch with default values

Load program **P0 0.1 EkoChorus**. Press **Edit** to enter Edit mode, then press **Up** to move to the Patch Row. Press **Load/*** until the display looks like this:



Turn SELECT to select Patch 1 (which is set to **Off**).



Turning ADJUST will scroll through the entire list of available patch Sources. Turn ADJUST counterclockwise until **LFO** is displayed in the lower right.



The LFO is now assigned as a patch Source.

Press **Load/★** to bring up patch Destinations for selection. The display should show that Destination is unassigned.



The ADJUST knob will now scroll through all of the available parameters of **EkoChorus**. The lower line of the display will show the edit matrix row label on the left, and the parameters in that row on the right.

Turn ADJUST clockwise until **FX Width** (in the effect's Controls row) is displayed in the lower right corner of the display.



The FX Width parameter is now assigned as the patch Destination.

Now, press **Load/★** to bring up the Values display. This will show the default Destination value setting (–360 MONO). This is the value assigned to FX Width when the LFO is at its minimum value (000).



Turn ADJUST one click counterclockwise to display the default Destination value (+360 MONO) assigned to FX Width when the LFO is at its maximum value (127).



That's all there is to setting up a default patch— select a Source and Destination, and the minimum and maximum patch values are set automatically.

Of course, you will often want to modify the patch further, either by adjusting the modulation source parameters, changing the default values or adding additional pivot points. In the following sections, we'll continue using this patch to demonstrate examples of these modifications. When we're done, the new patch will add dynamic spatialization to the EkoChorus program.

Adjusting the modulation source parameters

Continuing the previous example, we'll adjust the rate of the LFO by jumping to it from the Patch row.

Press **Load/★** repeatedly to return to the Patch 1 Source selection display.



Press **Edit** to jump directly to the LFO parameters in the Mod row.

The asterisk (★) indicates that LFO **Rate** will be altered when you turn ADJUST. Press **Load/★** to change the selection to the other LFO parameters (**Shape**, **P Width** and **Depth**).

Patch Source Indicator



The display now shows position 8.0 in the Edit matrix Mod Row. The small square in the upper left corner of the display is a *patch source indicator*. This indicator appears whenever a modulator (such as the LFO in this example) has been assigned as a patch Source in the effect being edited.

Turn ADJUST to change the LFO rate to **0.10Hz**.



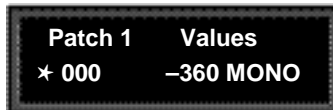
Now, press **Edit** to jump back to your previous position in the Patch row.



Let's modify the patch further by adjusting the Destination values to a more useful range.

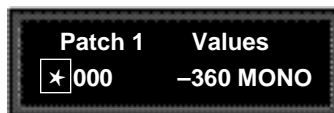
Changing the default destination values

Press **Load/★** repeatedly until the Patch 1 Values screen is displayed.



Notice that the ★ is to the left of the Source value. This indicates that the Source value is selected and its value will be changed when you turn ADJUST.

Press **Load/★** once to move the ★ to the right of the Source value. When the ★ is in this position, ADJUST will change the Destination value.



The asterisk (★) indicates that the Source value will be altered when you turn ADJUST.



Press **Load /★** to move the asterisk to this position, where it indicates that Destination values will be altered when you turn ADJUST.

With the Destination value selected, turn ADJUST clockwise to set the value to **+0**.



Next, we'll want to adjust the Destination value when the LFO is at its maximum value. One way to do this is to press **Load/★** three times to cycle the ★ to the display of the Source value, and continue on from there — but we've provided a short cut! Press **Edit** to jump to the next assigned value (in our example, the LFO maximum value).



Note that the ★ remains in the same position, so you can just turn ADJUST to set the new Destination value. Set the value to **+90**.



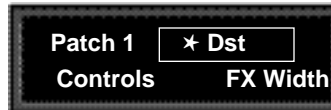
Now our example has been modified so that the LFO sweeps the FX Width Value from 0 to 90. This creates a dynamic alteration of the effect's spatial characteristics. Its stereo image changes smoothly from mono to stereo, to surround, and back again.

Adding an additional pivot point to the patch

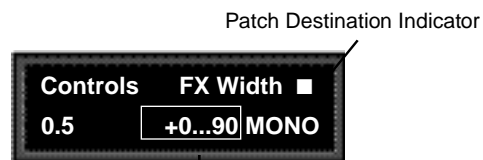
So far, our example uses only two pairs of patch values. The Destination parameter moves linearly between the value assigned at 000 and the value assigned at 127.

You can watch this change by displaying the Destination parameter. Here's how to jump directly to it from the patch:

Press **Load/★** repeatedly to return to the Patch 1 Destination selection display.



Press **Edit** to jump directly to the FX Width parameter in the Controls Row.



The FX Width value will be changing from 0 to 90 and back again.

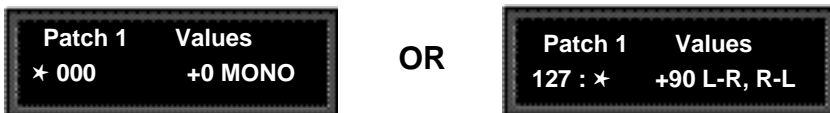
The display will change to show position 0.5 in the Controls Row. Note that the value is changing continuously from 0 to 90 and back again. Notice also the small square in the upper right corner of the display. This patch destination indicator appears whenever a parameter has been assigned as a patch Destination in the effect being edited.

Now let's return to the Patch row to add a pivot point to the effect.

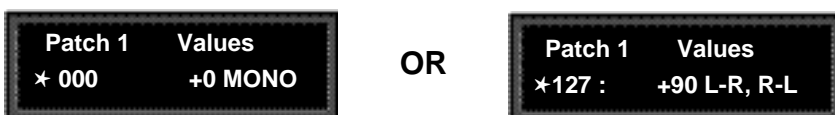
Press **Edit** to jump back to the Patch row.



Press **Load/★** to bring up the Values display. The last value edited will be displayed, so you will see *either* the minimum or maximum value.



If the ★ is not at the left of the Source value, press **Load/★** three times to move it there. (You can take a short cut instead — simultaneously press **Down** and **Load/★** to back-step.)



Turn ADJUST to display **64**. This will be the Source value of our new pivot point. The string of dots in the destination value portion of the display indicate that there is no Destination value assigned when the source value is 64.



Press **Load/★** to move the ★ to the right of the Source value, and turn ADJUST clockwise to set the Destination value for this point to **-45**.



By adding this pivot point, we have put a “kink” in the patch. The value of the Destination parameter no longer moves in a straight line between 0 and 90. Instead it moves from 0 to -45, and then from -45 to 90. This will produce a very different sounding spatial change from the original patch. You can see the difference by pressing **Load/★** twice to display the patch Destination, then pressing **Edit** to jump back to the Destination parameter to watch its value change.

Multiple Patches with the Same Destination

If you create two or more patches with the same Destination, the Destination value will be the sum of all of the patches assigned to it.

For example, if Pedal and ADJUST are both assigned to Mix, the Mix value will be the sum of the patch Destination values for those two patches. When creating multiple patches to the same Destination, you should set the individual Destinations to values which, when added together, are less than or equal to the maximum value for the parameter. Pedal and ADJUST, for example, could each have a maximum value of 50%, or they could be assigned values of 25% and 75%, 60% and 40%, etc.

When the sum of multiple patched parameter Destination values is greater than the maximum value of the parameter, the parameter value will remain at maximum until the sum of the patches falls below it.

Mod Row Patches

AR ENV, **Latch**, **Sw 1** and **Sw 2** are each activated by assigning a threshold source to **T Src** that is used to turn them on and off. This assignment is a subparameter in the Mod row — not in the Patch row.

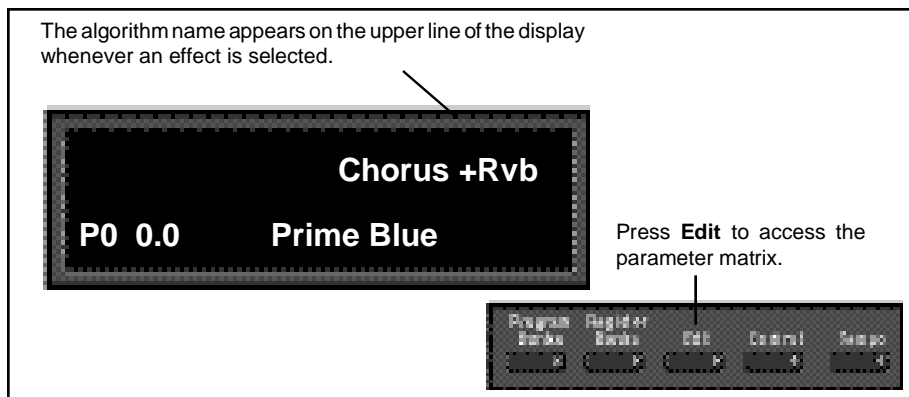
For an example, check out ADJUST and Latch in the preset **P0 3.1 Rotor Cabinet**.

3

The Algorithms and Their Parameters

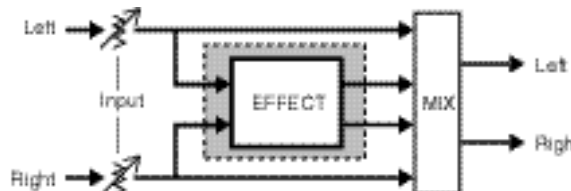
The PCM 80 uses ten algorithms to create different types of effects. Each algorithm includes an uncompromised stereo reverb effect, as well as several voices of additional stereo effects. Each of these algorithms and its associated parameters are described in detail in this section.

When you select any effect, the name of the algorithm from which it was derived will appear on the upper display line. Pressing **Edit** will display the last edited parameter in that algorithm's parameter matrix.



All PCM 80 algorithms share the same general structure, shown below. The shaded area of the diagram is detailed in the individual effect descriptions that follow.

About the Algorithms

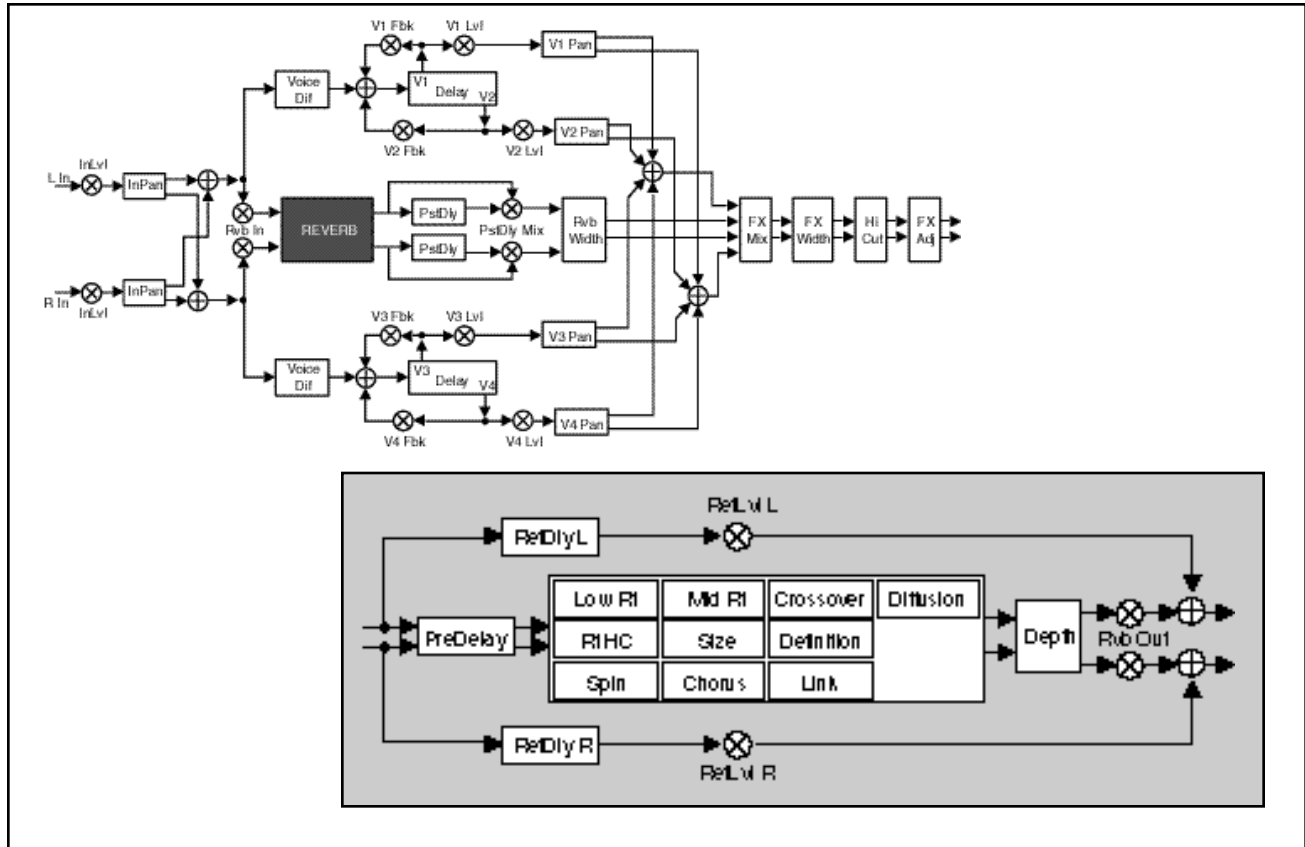


There are two general classes of algorithm: 4-Voice and 6-Voice. The 4-Voice algorithms: Concert Hall, Plate, Chamber, Inverse and Infinite each combine a specific type of reverb with a 4-voice, general purpose stereo "effect toolbox" which we call the Reverb Shell. These algorithms also provide "post-processing" for the reverb. The 6-Voice algorithms: Glide>Hall, Chorus+Rvb, M-Band+Rvb, Res 1>Plate, and Res 2>Plate each combine a specific type of reverb with a specialized 6-voice stereo effect.

In this chapter, diagrams and descriptions of the Reverb Shell, and of each algorithm are presented first, along with pictures of each edit matrix. The diagrams are followed by a glossary of parameter descriptions, organized alphabetically by matrix row name. Within each matrix row, parameters are organized as far as possible in the sequence in which they appear in the row.

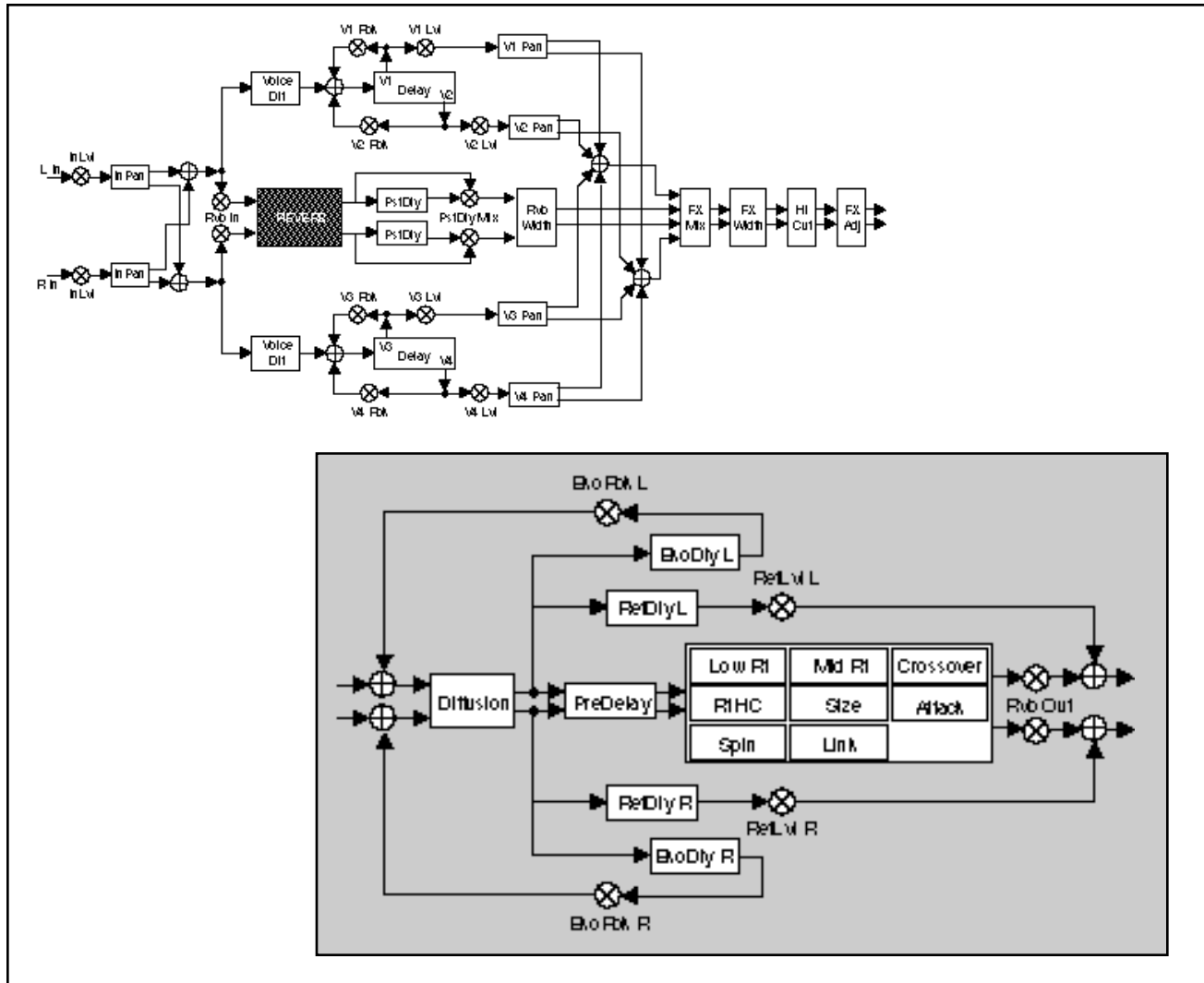
This algorithm emulates a real concert hall. The reverberation is very clean, and designed to remain behind the direct sound — adding ambience, but leaving the source unchanged. This effect has a relatively low initial echo density which builds up gradually over time.

Concert Hall



0	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7		
Controls	Mix	FX Adjust	*InLvlPan	High Cut	Voice Dif	FX Mix	FX Width	*ADJUST		
1	1.0	1.1	1.2	1.3	1.4	1.5	1.6			
Reverb Time	Low Rt	Mid Rt	Crossover	R1HC	Pre Delay	*ReLvlDly	*PreDly			
2	2.0	2.1	2.2	2.3	2.4	2.5	2.6	2.7	2.8	
Reverb Design	Size	Diffusion	Def	Depth	Spin	Chorus	Link	Reverb Width	*Reverb In/Out	
3	3.0	3.1	3.2	3.3	3.4					
Levels	Master	Voice 1	Voice 2	Voice 3	Voice 4					
4	4.0	4.1	4.2	4.3	4.4					
Delay Time	*Master	Voice 1	Voice 2	Voice 3	Voice 4					
5	5.0	5.1	5.2	5.3	5.4					
Feedback	Master	Voice 1	Voice 2	Voice 3	Voice 4					
6	6.0	6.1	6.2	6.3	6.4					
Panning	Master	Voice 1	Voice 2	Voice 3	Voice 4					
7	7.0	7.1	7.2	7.3	7.4	7.5	7.6			
Modulation	Mod LFD	Mod AR Env	Mod Env L	Mod Env R	Mod Latch	Mod Sw 1	Mod Sw 2			
Patches	Patch 0	Patch 1	Patch 2	Patch 3	Patch 4	Patch 5	Patch 6	Patch 7	Patch 8	Patch 9

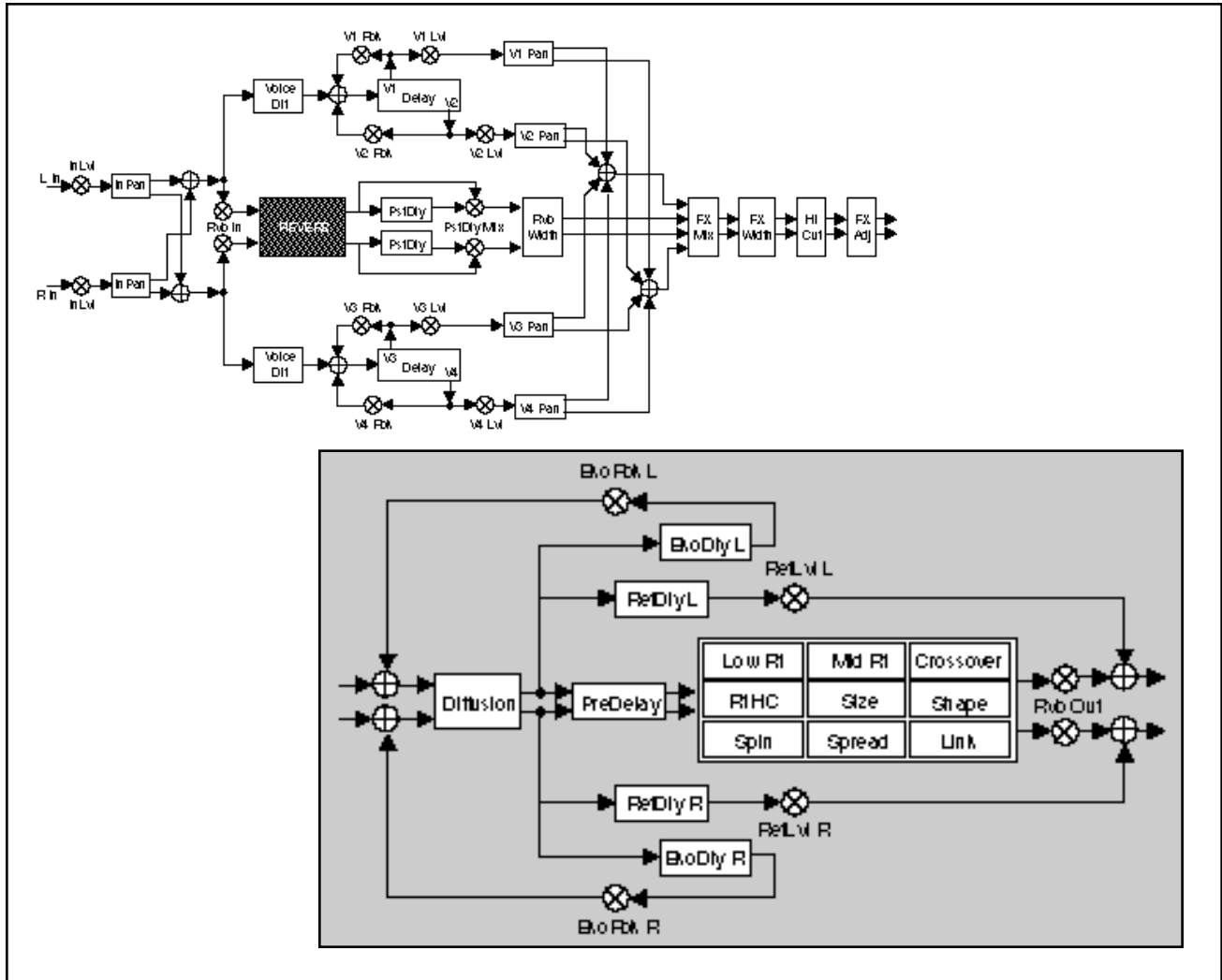
Plate The Plate algorithm mimics the sound of metal plates, with high initial diffusion and a relatively bright sound. This makes them a good choice for enhancing any type of percussion.



0	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7
Controls	Mix	FX Adjust	*InLvlPan	High Cut	Voice DF	FX Mix	FXWidth	*ADJUST
1	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7
Reverb Time	Low Rf	Mid Rf	Crossover	RfHC	Pre Delay	*ReLvlDly	*ElevFbkDly	*Pan/Dly
2	2.0	2.1	2.2	2.3	2.4	2.5	2.6	
Reverb Design	Size	Diffusion	Attack	Spin	Link	RebWidth	*RebIn/Out	
3	3.0	3.1	3.2	3.3	3.4			
Levels	Master	Voice 1	Voice 2	Voice 3	Voice 4			
4	4.0	4.1	4.2	4.3	4.4			
Delay Time	*Master	Voice 1	Voice 2	Voice 3	Voice 4			
5	5.0	5.1	5.2	5.3	5.4			
Feedback	*Master	Voice 1	Voice 2	Voice 3	Voice 4			
6	6.0	6.1	6.2	6.3	6.4			
Panning	*Master	Voice 1	Voice 2	Voice 3	Voice 4			
7	7.0	7.1	7.2	7.3	7.4	7.5	7.6	
Modulation	Mod LFD	Mod AR Env	Mod Env L	Mod Env R	Mod Latch	Mod Sw 1	Mod Sw 2	
Patches	Patch 0	Patch 1	Patch 2	Patch 3	Patch 4	Patch 5	Patch 6	Patch 7
	Patch 8	Patch 9						

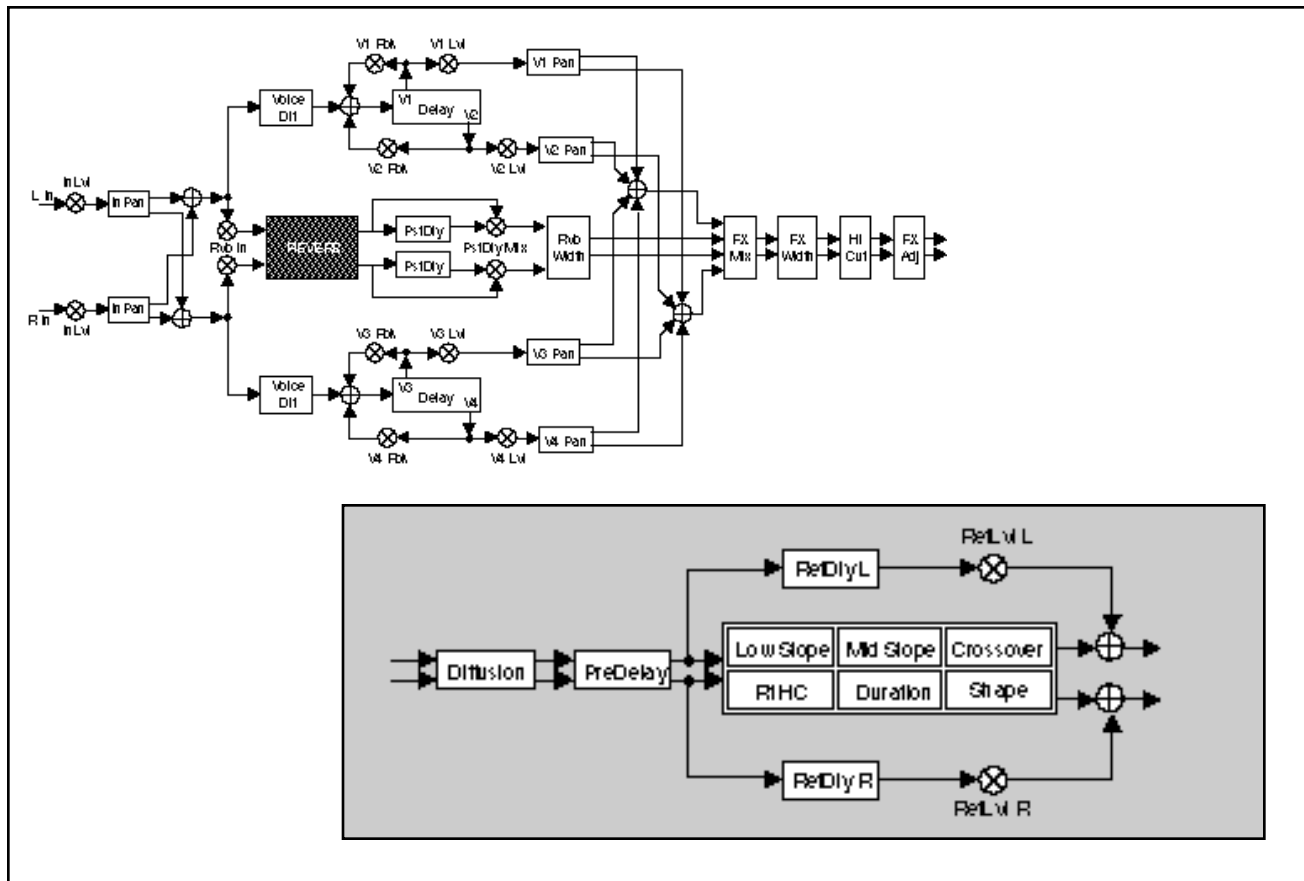
The Chamber algorithm produces an even, relatively dimensionless reverberation, with little change in color as the sound decays. The initial diffusion is similar to the Concert Hall algorithm, but the sense of space and size is much less obvious. This characteristic, along with the low color in the decay tail makes Chamber useful on a wide range of material. It is especially useful on spoken voice, giving a noticeable increase in loudness with very low color.

Chamber



0	Controls	0.0 N6x	0.1 FX Adjust	0.2 *InLvPan	0.3 High Cut	0.4 Voice Del	0.5 FX Mix	0.6 FX Width	0.7 *ADJUST		
1	Reverb Time	1.0 Low Dly	1.1 Mid Dly	1.2 Crossover	1.3 RI HC	1.4 Pre Delay	1.5 *ReLvDly	1.6 *EksFwDly	1.7 *PanOut		
2	Reverb Design	2.0 Size	2.1 Diffusion	2.2 Shape	2.3 Spread	2.4 Spin	2.5 Link	2.6 RebWidth	2.7 *RebIn/Out		
3	Levels	3.0 Master	3.1 Voice 1	3.2 Voice 2	3.3 Voice 3	3.4 Voice 4					
4	Delay Time	4.0 *Master	4.1 Voice 1	4.2 Voice 2	4.3 Voice 3	4.4 Voice 4					
5	Feedback	5.0 Master	5.1 Voice 1	5.2 Voice 2	5.3 Voice 3	5.4 Voice 4					
6	Panning	6.0 Master	6.1 Voice 1	6.2 Voice 2	6.3 Voice 3	6.4 Voice 4					
7	Modulation	7.0 ModLFD	7.1 ModAR Env	7.2 ModEnv L	7.3 ModEnv R	7.4 ModLatch	7.5 ModSw 1	7.6 ModSw 2			
	Patches	Patch 0	Patch 1	Patch 2	Patch 3	Patch 4	Patch 5	Patch 6	Patch 7	Patch 8	Patch 9

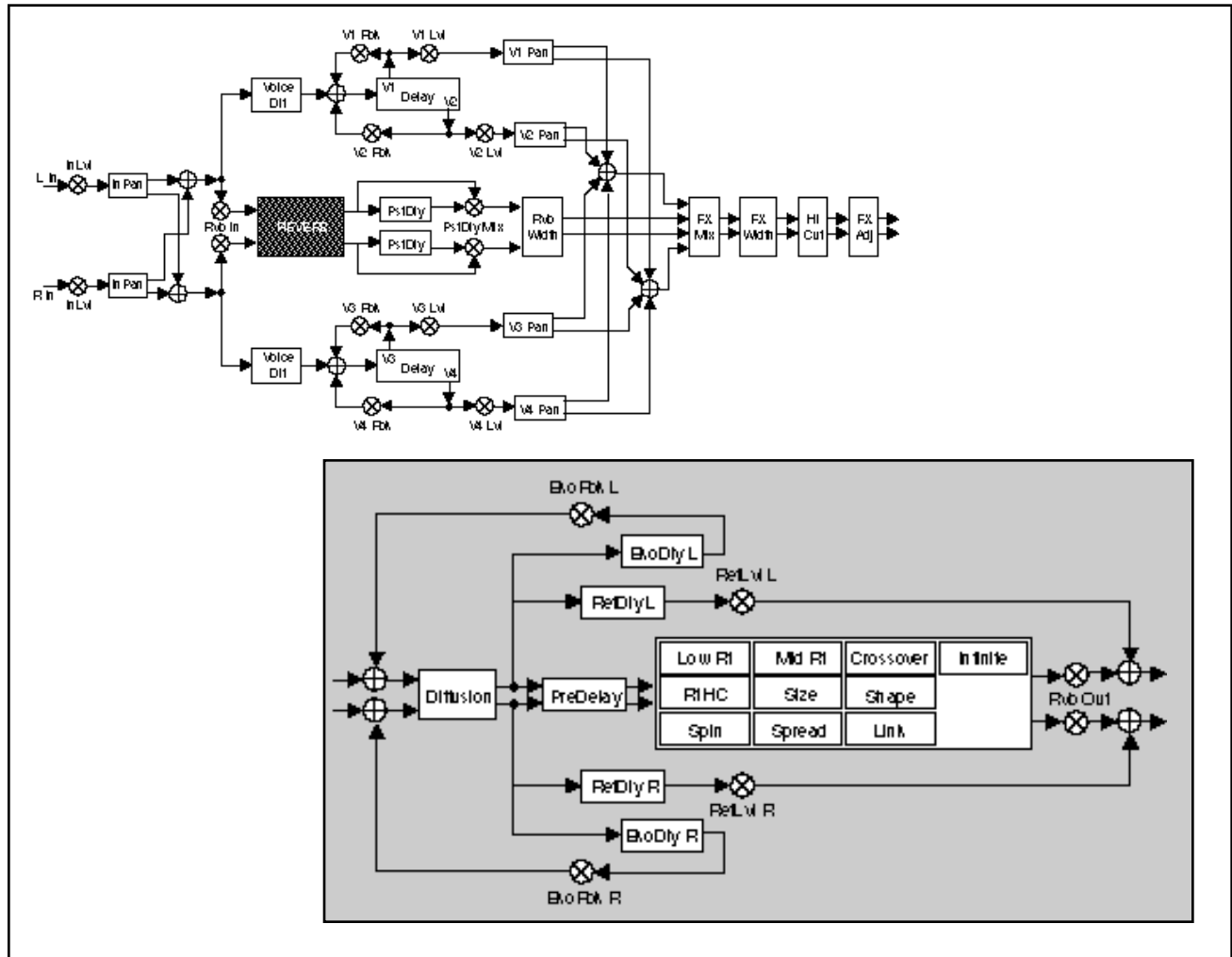
Inverse The Inverse algorithm allows you to vary the slope of the initial portion of the reverb envelope. The slope can decay, remain level, or rise over a variable time interval. When the time interval is up, the reverberation cuts off abruptly. The resulting effect is similar to a gate, but is not at all dependent on the level or complexity of the input signal. Slopes are adjustable over a negative, even, or positive slope. Positive slopes create inverse effects, while more even slopes create gated effects. Negative slope values have rather natural reverb tails.



0	Controls	0.0 Mix	0.1 FX Adjust	0.2 *InV/Pan	0.3 High Cut	0.4 Voice Dtl	0.5 FX Mix	0.6 FX Width	0.7 *ADJUST	
1	Rvb Time	1.0 Low Slope	1.1 Mid Slope	1.2 Crossover	1.3 RH C	1.4 Pre Delay	1.5 *Pre Delay Dry	1.6 *Pre Delay		
2	Rvb Design	2.0 Duration	2.1 Diffusion	2.2 Shape	2.3 Rvb Width	2.4 Rvb In				
3	Levels	3.0 Master	3.1 Voice 1	3.2 Voice 2	3.3 Voice 3	3.4 Voice 4				
4	Delay Time	4.0 *Master	4.1 Voice 1	4.2 Voice 2	4.3 Voice 3	4.4 Voice 4				
5	Feedback	5.0 Master	5.1 Voice 1	5.2 Voice 2	5.3 Voice 3	5.4 Voice 4				
6	Panning	6.0 Master	6.1 Voice 1	6.2 Voice 2	6.3 Voice 3	6.4 Voice 4				
7	Modulation	7.0 Mod LFD	7.1 Mod AR Env	7.2 Mod Env L	7.3 Mod Env R	7.4 Mod Latch	7.5 Mod Sw 1	7.6 Mod Sw 2		
Patches	Patch 0	Patch 1	Patch 2	Patch 3	Patch 4	Patch 5	Patch 6	Patch 7	Patch 8	Patch 9

Infinite is acoustically similar to the Chamber algorithm, with the addition of an Infinite parameter. When this parameter is turned on, the input to the reverberator ramps off. (Note that this still allows the Reverb Shell to be utilized.) With Infinite on, the reverb tail remains constant, creating strange and useful reverb effects. When Infinite is switched off, input to the reverberator is restored, and the current running reverb time is utilized.

Infinite



0	Controls	0.0 Mix	0.1 FX Adjust	0.2 *InLvPan	0.3 High Cut	0.4 Voice Dtl	0.5 FX Mix	0.6 FX Width	0.7 *ADJUST	
1	Rev's Time	1.0 Loo Dt	1.1 Mid R	1.2 Crossover	1.3 RHC	1.4 Pre Delay	1.5 Infinite	1.6 *ReLvDly	1.7 *EkrFWdly	1.8 *RebOut
2	Rev's Design	2.0 Size	2.1 Diffusion	2.2 Shape	2.3 Spread	2.4 Spin	2.5 Link	2.6 RebWidth	2.7 *RebIn/Out	
3	Levels	3.0 Master	3.1 Voice 1	3.2 Voice 2	3.3 Voice 3	3.4 Voice 4				
4	Delay Time	4.0 *Master	4.1 Voice 1	4.2 Voice 2	4.3 Voice 3	4.4 Voice 4				
5	Feedback	5.0 Master	5.1 Voice 1	5.2 Voice 2	5.3 Voice 3	5.4 Voice 4				
6	Panning	6.0 Master	6.1 Voice 1	6.2 Voice 2	6.3 Voice 3	6.4 Voice 4				
7	Modulation	7.0 ModLFD	7.1 ModAR Env	7.2 ModEnv L	7.3 ModEnv R	7.4 ModLath	7.5 ModSw 1	7.6 ModSw 2		
Patches		Patch 0	Patch 1	Patch 2	Patch 3	Patch 4	Patch 5	Patch 6	Patch 7	Patch 8

The 6-Voice Algorithms

Each 6-Voice algorithm is a combination of a specific 6-voice stereo effect and a specific reverb effect. These algorithms: Glide>Hall, Chorus+Rvb, M-Band+Rvb, Res1>Plate and Res2>Plate are each optimized for a particular class of audio processing effects in combination with studio quality stereo reverberation, bringing formidable processing power and flexibility to effects creation.

The 6-Voice algorithms use the same, uncompromised, stereo reverberation effects as the 4-Voice algorithms but, instead of the general-purpose Reverb Shell, each reverb is coupled with a unique 6-voice stereo effect: gliding delays, 6-voice chorus, multi-band EQ, and two 6-voice resonators. Voices 1-3 are connected to input audio panned to the left. Voices 4-6 are connected to input audio panned to the right. (Use the **InPan L** and **InPan R** controls at Control mode 0.2 to pan input audio.) Each voice has independent delay time, panning and level controls, in addition to other parameters specific to the particular effect.

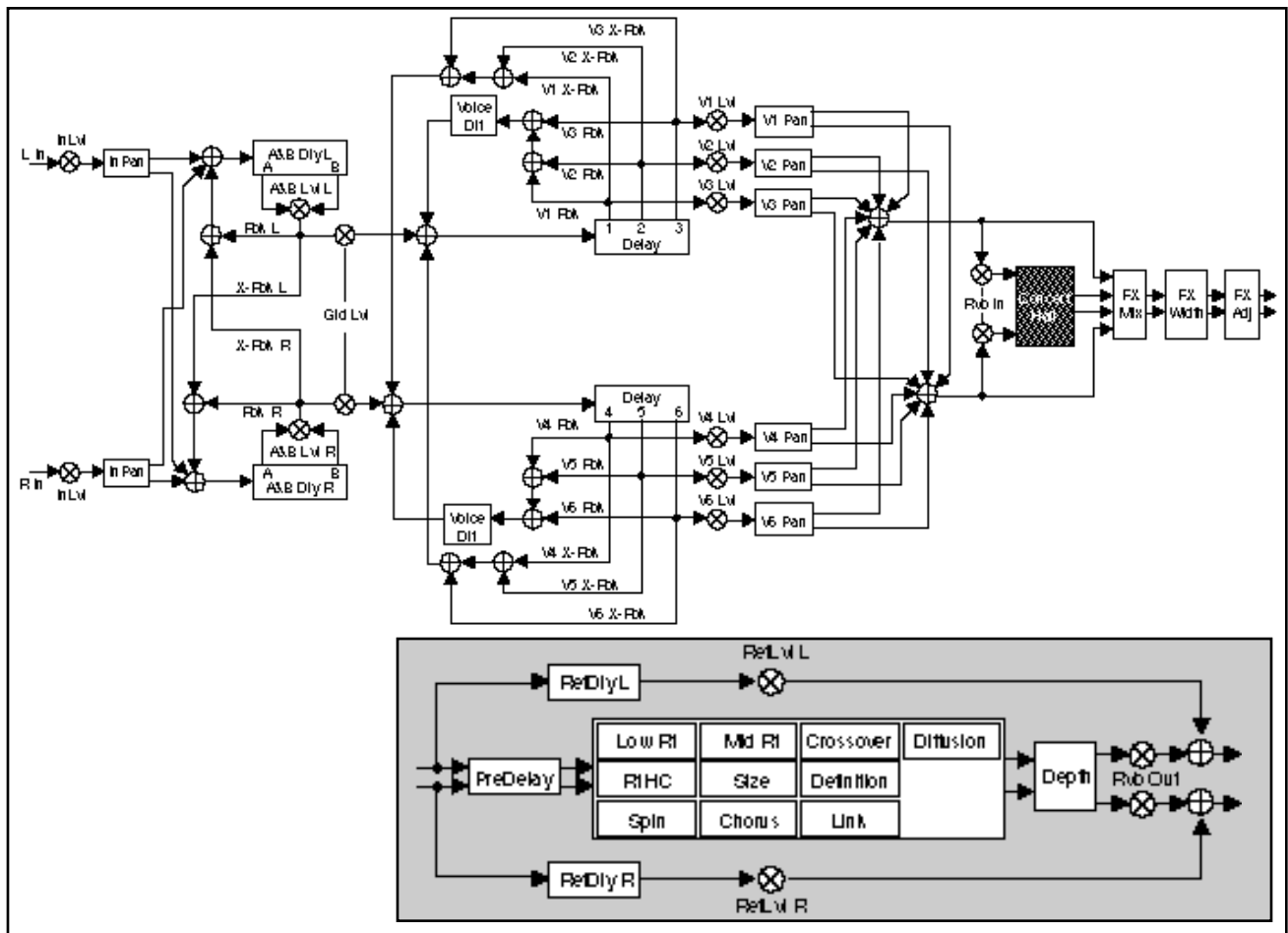
In the Glide>Hall, Res1>Plate and Res2>Plate algorithms, the reverb effect is in series with the 6-voice effect. Use **FX Mix** to set the relative level of dry and reverberated effect.

In the M-Band+Rvb and the Chorus+Rvb algorithms, the reverb effect is in parallel with the 6-voice effect. Use **FX Mix** to set the balance of the 6-voice effect and the reverb.

A stereo pair of 2-tap gliding delays feeds six individually adjustable delay voices. Each voice has its own level, feedback, delay, cross-feedback, and pan parameters. The output of these delay voices is fed into a Concert Hall reverb algorithm. Glide>Hall is useful for creating such effects as stereo flangers, loop samplers, pitch modulation, etc. which can then be fed into the reverb.

Glide>Hall

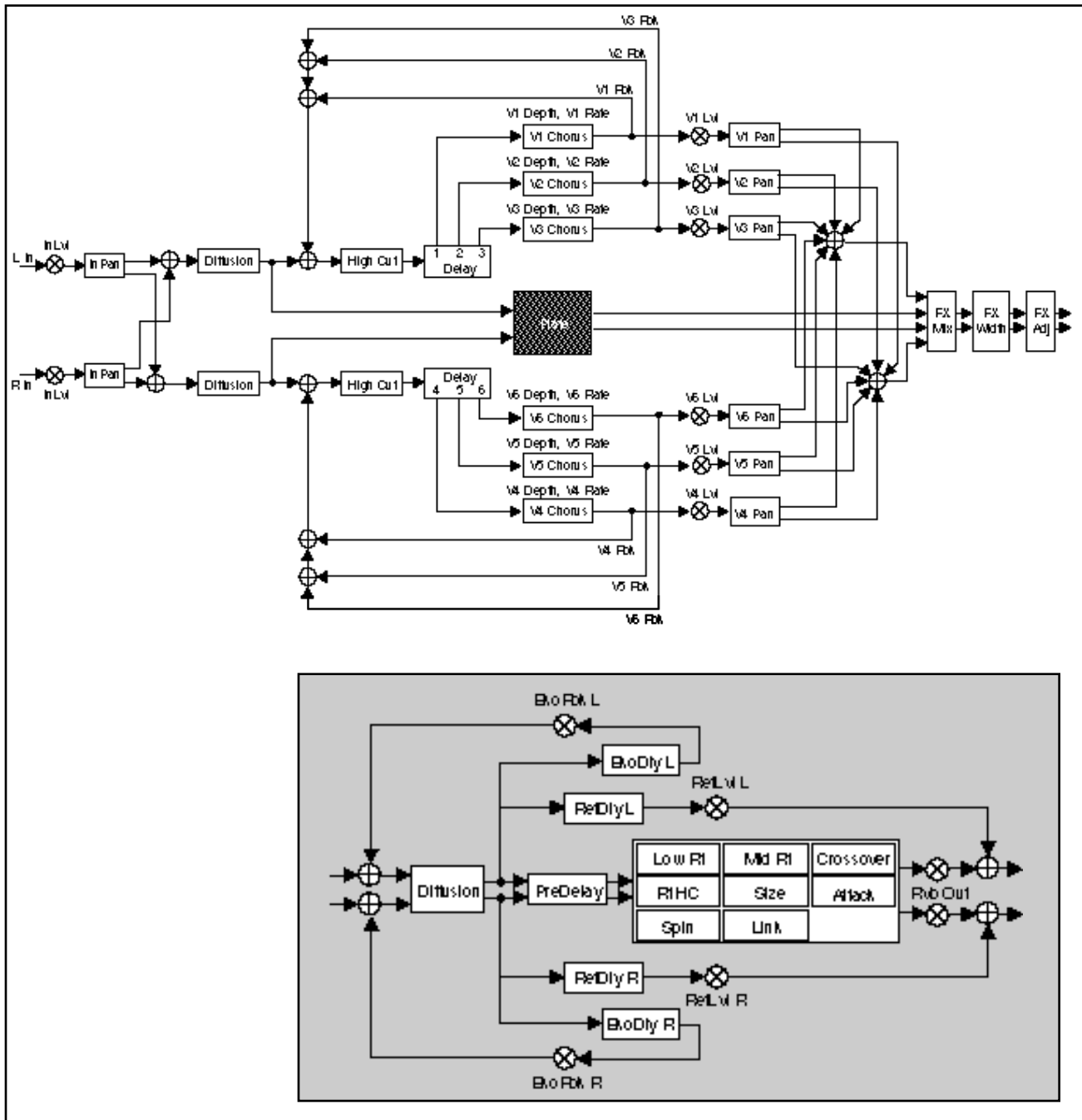
This algorithm can address up to 4 Meg of delay memory (with optional SIMMs added to the PCM 80), providing 42 seconds of stereo delay.



0 Controls	0.0 Mix	0.1 FX Adjst	0.2 *InLvFPan	0.3 Voice Dfl	0.4 FX Mix	0.5 FX Width	0.6 *ADJUST			
1 Rvb Time	1.0 Low Rt	1.1 Mid Rt	1.2 Crossover	1.3 Rf HC	1.4 Pre Delay	1.5 *Rf Lv/Dly				
2 Rvb Design	2.0 Size	2.1 Diffusion	2.2 Del	2.3 Depth	2.4 Spin	2.5 Chorus	2.6 Link	2.7 *Rvb In/Out		
3 Glide FX	3.0 Gld Lvl	3.1 *A Left	3.2 *A Right	3.3 *B Left	3.4 *B Right	3.5 *Fbk LR	3.6 *X-Fbk LR			
4 Levels	4.0 *Master	4.1 Voice 1	4.2 Voice 2	4.3 Voice 3	4.4 Voice 4	4.5 Voice 5	4.6 Voice 6			
5 Delay Time	5.0 *Master	5.1 *Voice 1	5.2 *Voice 2	5.3 *Voice 3	5.4 *Voice 4	5.5 *Voice 5	5.6 *Voice 6			
6 Feedback	6.0 Master	6.1 Voice 1	6.2 Voice 2	6.3 Voice 3	6.4 Voice 4	6.5 Voice 5	6.6 Voice 6			
7 Panning	7.0 Master	7.1 Voice 1	7.2 Voice 2	7.3 Voice 3	7.4 Voice 4	7.5 Voice 5	7.6 Voice 6			
8 Modulation	8.0 Mod LFO	8.1 Mod AR Env	8.2 Mod Env L	8.3 Mod Env R	8.4 Mod Latch	8.5 Mod Sw 1	8.6 Mod Sw 2			
Patches	Patch 0	Patch 1	Patch 2	Patch 3	Patch 4	Patch 5	Patch 6	Patch 7	Patch 8	Patch 9

Chorus+Rvb The Chorus effect has six separately adjustable voices — allowing the PCM 80 to sound like a rack of six digital delay boxes. Each voice has its own independently adjustable chorus depth and rate, level control, delay time, feedback and panning control. The 6-voice chorus is in parallel with a plate algorithm, providing two independent stereo effects.

Note that the Diffusion parameter (Rvb Design 2.1) is shared by both the reverb and the chorus effect.



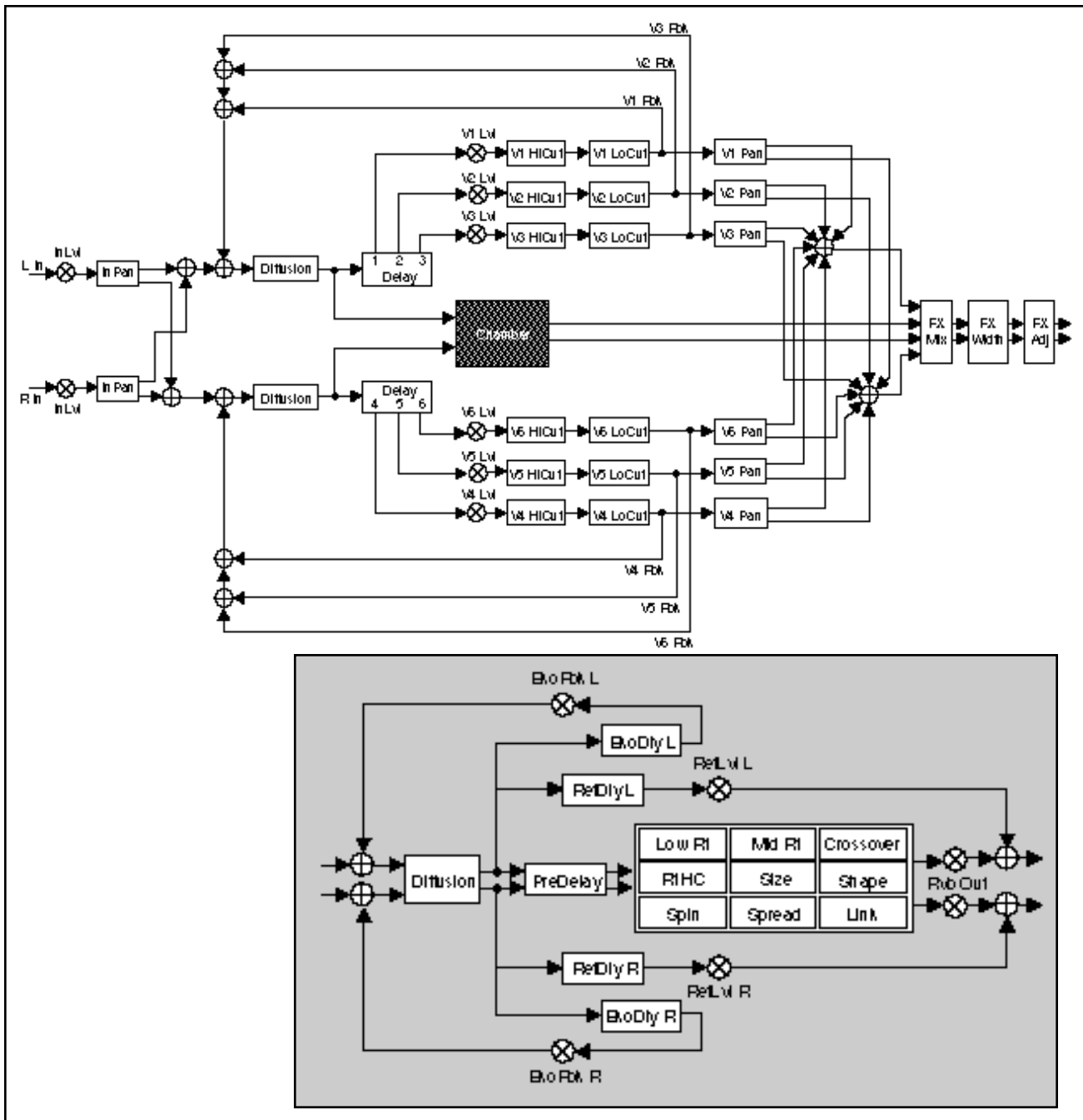
Chorus+Rvb cont'd.

0	Controls	0.0 Mix	0.1 FX Adjust	0.2 IntrlPan	0.3 High Cut	0.4 FX Mix	0.5 FXWidh	0.6 *ADJUST						
1	Rvb Time	1.0 Low Rt	1.1 Mid Rt	1.2 Crossover	1.3 Rt HC	1.4 Pre Delay	1.5 *Ref Lst/Dly	1.6 EkoFlw/Dly						
2	Rvb Design	2.0 Size	2.1 Diffusion	2.2 Attack	2.3 Spin	2.4 Link	2.5 Rvb Out							
3	Levels	3.0 Master	3.1 Voice 1	3.2 Voice 2	3.3 Voice 3	3.4 Voice 4	3.5 Voice 5	3.6 Voice 6						
4	Delay Time	4.0 *Master	4.1 Voice 1	4.2 Voice 2	4.3 Voice 3	4.4 Voice 4	4.5 Voice 5	4.6 Voice 6						
5	Chorus	5.0 *Master	5.1 *Voice 1	5.2 *Voice 2	5.3 *Voice 3	5.4 *Voice 4	5.5 *Voice 5	5.6 *Voice 6						
6	Feedback	6.0 Master	6.1 Voice 1	6.2 Voice 2	6.3 Voice 3	6.4 Voice 4	6.5 Voice 5	6.6 Voice 6						
7	Panning	7.0 Master	7.1 Voice 1	7.2 Voice 2	7.3 Voice 3	7.4 Voice 4	7.5 Voice 5	7.6 Voice 6						
8	Modulation	8.0 Mod LFO	8.1 Mod AR Env	8.2 Mod Env L	8.3 Mod Env R	8.4 Mod Latch	8.5 Mod Sw 1	8.6 Mod Sw 2						
	Patches	Pg ch 0	Patch 1	Patch 2	Pg ch 3	Pg ch 4	Pg ch 5	Patch 6	Patch 7	Patch 8	Patch 9			

M-Band+Rvb

This effect features six separately adjustable voices, each with its own level control, delay time, low and high frequency filters, feedback and pan controls. The multi-band effect is in parallel with a Chamber effect, providing independent stereo effects. Note that the Diffusion parameter (Rvb Design 2.1) is shared by both the multi-band and reverb effects. Note also that, in this particular algorithm, the diffuser is within the feedback paths of the multi-band voices. This allows you to create filtered echoes that grow more diffuse with each repeat, or to create effects with filtered echoes passing through the reverberator.

This algorithm can address up to 4 Meg of delay memory (with optional SIMMs added to the PCM 80), providing 42 seconds of stereo delay.



M-Band+Rvb cont'd.

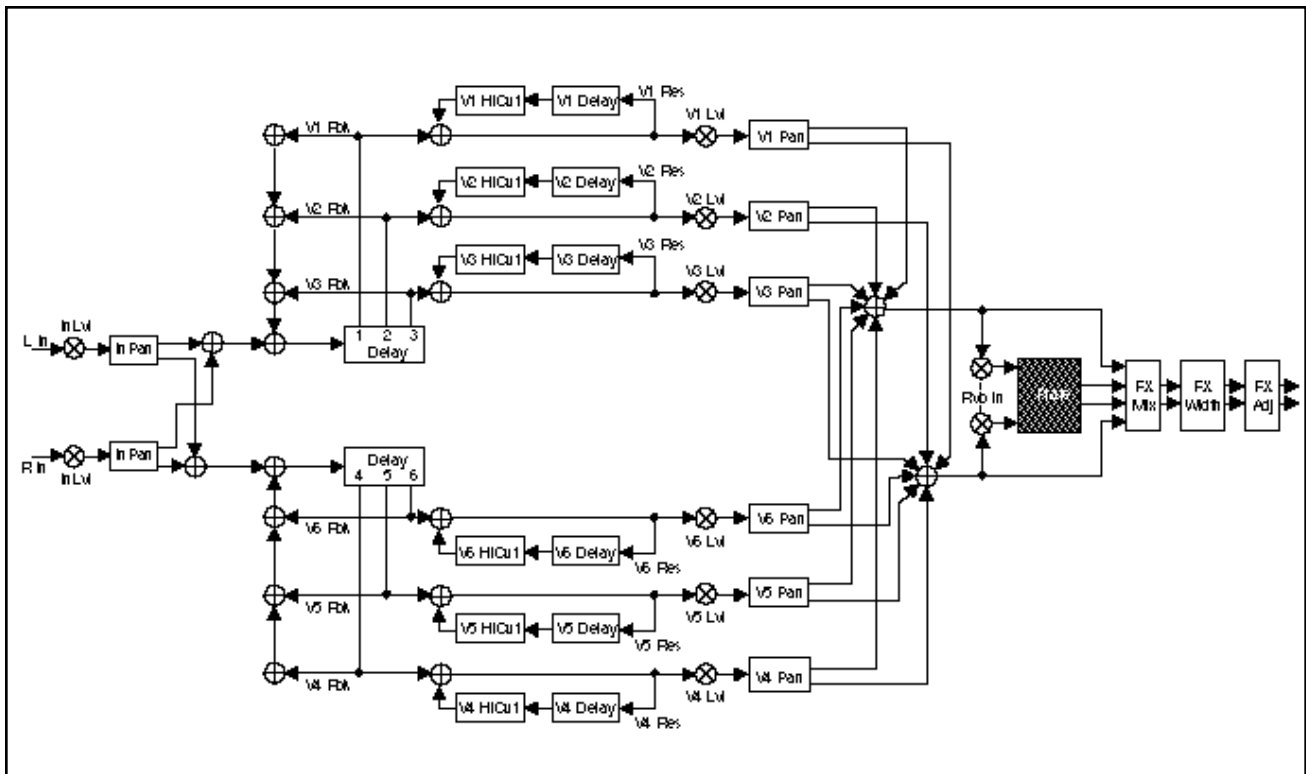
0	Controls	0.0 Mix	0.1 FX Adjust	0.2 IntrlPan	0.3 FX Mix	0.4 FX Width	0.5 *ADJUST				
1	Rvb Time	1.0 Low Rt	1.1 Mid Rt	1.2 Crossover	1.3 Rt HC	1.4 Pre Delay	1.5 *Ref Lst/Dly	1.6 EkoFst/Dly			
2	Rvb Design	2.0 Size	2.1 Diffusion	2.2 Shape	2.3 Spread	2.4 Spin	2.5 Link	2.6 Rvb Out			
3	Levels	3.0 Master	3.1 Voice 1	3.2 Voice 2	3.3 Voice 3	3.4 Voice 4	3.5 Voice 5	3.6 Voice 6			
4	Delay Time	4.0 *Master	4.1 Voice 1	4.2 Voice 2	4.3 Voice 3	4.4 Voice 4	4.5 Voice 5	4.6 Voice 6			
5	Filters	5.0 *Master	5.1 *Voice 1	5.2 *Voice 2	5.3 *Voice 3	5.4 *Voice 4	5.5 *Voice 5	5.6 *Voice 6			
6	Feedback	6.0 Master	6.1 Voice 1	6.2 Voice 2	6.3 Voice 3	6.4 Voice 4	6.5 Voice 5	6.6 Voice 6			
7	Panning	7.0 Master	7.1 Voice 1	7.2 Voice 2	7.3 Voice 3	7.4 Voice 4	7.5 Voice 5	7.6 Voice 6			
8	Modulation	8.0 Mod LFO	8.1 Mod AR Env	8.2 Mod Env L	8.3 Mod Env R	8.4 Mod Latch	8.5 Mod Sw 1	8.6 Mod Sw 2			
	Patches	Pg ch 0	Patch 1	Patch 2	Pg ch 3	Pg ch 4	Pg ch 5	Patch 6	Patch 7	Patch 8	Pg ch 9

**The Resonant Chord Algorithms:
Res1>Plate and Res2>Plate**

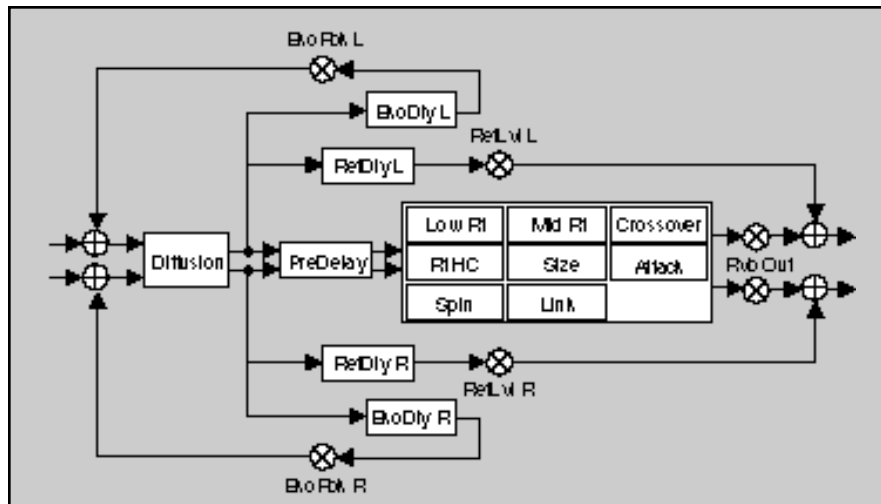
The Resonant Chord effects use impulsive energy at the inputs to excite six resonant voices (notes). The level, pitch, duration, and high-frequency cutoff of the overtones for each voice are separately controllable. Each voice can be panned independently. The voices resonate to some degree with any input, but the most effective excitation contains all frequencies, like percussion. Other instruments may give a quality of tonal ambience in which certain notes rise ethereally from the background. The output of the resonator is then fed into a stereo plate reverb effect.

The two algorithms differ in the way pitches are assigned to the resonators. In Res1>Plate, pitches are assigned to the six voices chromatically, in a round-robin. If, for example, MIDI note numbers are used to assign pitch, the resonators will constantly be re-tuned to the pitches of the last six MIDI notes received. (This can produce an effect similar to playing a piano with the sustain pedal depressed.) In Res2>Plate, pitches are assigned to the six resonators diatonically — harmonized with the key, scale, and root of your choice. If MIDI note numbers are used to assign pitch, the resonators will constantly be re-tuned to harmonize with the incoming notes.

These algorithms can address up to 4 Meg of delay memory (with optional SIMMs added to the PCM 80), providing 38 seconds of stereo delay.



**The Resonant Chord Algorithms:
Res1>Plate and
Res2>Plate cont'd.**



0 Controls	0.0 Mix	0.1 FX Adjust	0.2 *InLvlPan	0.3 FX Mix	0.4 FX Width	0.5 *ADJUST					
1 Rvb Time	1.0 Low Rf	1.1 Mid Rf	1.2 Crossover	1.3 Rf HC	1.4 Pre Delay	1.5 *Ref LvlDly	1.6 EkvFlwDly				
2 Rvb Design	2.0 Size	2.1 Diffusion	2.2 Attack	2.3 Spin	2.4 Link	2.5 *Rvb In/Out					
3 Levels	3.0 *Master	3.1 *Voice 1	3.2 *Voice 2	3.3 *Voice 3	3.4 *Voice 4	3.5 *Voice 5	3.6 *Voice 6				
4 Delay Time	4.0 *Master	4.1 Voice 1	4.2 Voice 2	4.3 Voice 3	4.4 Voice 4	4.5 Voice 5	4.6 Voice 6				
5 Resonance	5.0 *MatRsvHC	5.1 *Voice 1	5.2 *Voice 2	5.3 *Voice 3	5.4 *Voice 4	5.5 *Voice 5	5.6 *Voice 6				
6 Pitch	6.0 Assign	6.1 Tuning	6.2 Adline	6.3 Unson							
7 Panning	7.0 Master	7.1 Voice 1	7.2 Voice 2	7.3 Voice 3	7.4 Voice 4	7.5 Voice 5	7.6 Voice 6				
8 Modulation	8.0 Mod LFO	8.1 Mod AR Env	8.2 Mod Env L	8.3 Mod Env R	8.4 Mod Latch	8.5 Mod Sw 1	8.6 Mod Sw 2				
Patches	Patch 0	Patch 1	Patch 2	Patch 3	Patch 4	Patch 5	Patch 6	Patch 7	Patch 8	Patch 9	

Res1>Plate

0 Controls	0.0 Mix	0.1 FX Adjust	0.2 *InLvlPan	0.3 FX Mix	0.4 FX Width	0.5 *ADJUST					
1 Rvb Time	1.0 Low Rf	1.1 Mid Rf	1.2 Crossover	1.3 Rf HC	1.4 Pre Delay	1.5 *Ref LvlDly	1.6 EkvFlwDly				
2 Rvb Design	2.0 Size	2.1 Diffusion	2.2 Attack	2.3 Spin	2.4 Link	2.5 *Rvb In/Out					
3 Levels	3.0 *Master	3.1 *Voice 1	3.2 *Voice 2	3.3 *Voice 3	3.4 *Voice 4	3.5 *Voice 5	3.6 *Voice 6				
4 Delay Time	4.0 *Master	4.1 Voice 1	4.2 Voice 2	4.3 Voice 3	4.4 Voice 4	4.5 Voice 5	4.6 Voice 6				
5 Resonance	5.0 *MatRsvHC	5.1 *Voice 1	5.2 *Voice 2	5.3 *Voice 3	5.4 *Voice 4	5.5 *Voice 5	5.6 *Voice 6				
6 Pitch	6.0 *Master	6.1 Voice 1	6.2 Voice 2	6.3 Voice 3	6.4 Voice 4	6.5 Voice 5	6.6 Voice 6				
7 Panning	7.0 Master	7.1 Voice 1	7.2 Voice 2	7.3 Voice 3	7.4 Voice 4	7.5 Voice 5	7.6 Voice 6				
8 Modulation	8.0 Mod LFO	8.1 Mod AR Env	8.2 Mod Env L	8.3 Mod Env R	8.4 Mod Latch	8.5 Mod Sw 1	8.6 Mod Sw 2				
Patches	Patch 0	Patch 1	Patch 2	Patch 3	Patch 4	Patch 5	Patch 6	Patch 7	Patch 8	Patch 9	

Res2>Plate

Row 0 of every algorithm contains parameters that provide overall control of both the reverb and voice effects.

Controls

Mix

Mix controls the ratio of dry and wet signal present at the PCM 80 outputs. When the PCM 80 is patched into a console or an instrument amplifier through an auxiliary or effects loop, this control should always be set to 100% wet. (Control Mode 1.1 allows you to select a global Mix setting.) When an instrument is plugged directly into the PCM 80, a setting between 45 and 65% is a good starting point.

FX Adjust

FX Adjust controls the level of the processed (wet) signal before it is mixed with the dry signal (if any) and sent to the audio outputs. The range of this parameter is +12dB to -73dB, and Off (wet output muted.) FX Adjust is inactive when the PCM 80 is in Bypass mode, so it is a good idea to compare the levels with Bypass on and off while editing this parameter. Adjust it until the audio level sounds the same with bypass on and off.

InLvl L&R, InPan L&R

InLvl L and InLvl R control the level and phase of the unprocessed dry signal into the effects. The range of these parameters is from Full (0dB) Phase Normal, to -85dB Phase Normal, Off, -85dB Phase Inverted to Full (0dB) Phase Inverted.

InPan L and InPan R control the location of the left and right input audio as a stereo image to the effect's audio input. Unmodified stereo imaging to the effects can be achieved by setting InPan L hard left (50L) and InPan R hard right (50R). Changing InPanL to any other value (49L to 50R), takes the left audio input and presents it as a panned source to the effect's left and right input. Changing InPan R to any value other than 50R, does the same for the right audio input.

High Cut

High Cut sets the high frequency cutoff of a low-pass filter. This parameter affects both channels.

Voice Dif

This parameter is available in all of the 4-Voice Algorithms, and in Glide>Hall. It controls the density of echoes in the delay voices, independently of Reverb diffusion. High levels of diffusion thicken, or smear, the echoes. This is most noticeable on material with sharp transients.

FX Mix

FX Mix controls the balance of reverb and non-reverb effects. (Non-reverb effects are those processed as "voices" controlled by level, delay and feedback parameters generally found in rows 3-7.) The range of this control is 0 to 100%.

Controls cont'd. FX Width

FX Width can be thought of as an extension of typical mono to stereo imaging controls. The range of this parameter is -360 to +360, in single digit increments. Values of -360, 0, or +360 cause the effect's audio output to be mono. Values of -315 and +45 cause the output to be normal left/right stereo. Values of -45 and +315 cause "swapped", or right/left stereo.

Value	Display Label	Description
360	MONO	Phase Normal Mono
315	R, L	Phase Normal R/L stereo
270	R-L, L-R	R-L, L-R surround
225	STEREO INV	Phase Inverted L/R Stereo
180	MONO INV	Phase Inverted Mono
135	R, L INV	Phase Inverted R/L Stereo
90	L-R, R-L	L-R, R-L surround
45	STEREO	Phase Normal L/R stereo
0	MONO	Phase Normal Mono
-45	R,L	Phase Normal R/L Stereo
-90	R-L, L-R	Phase Inverted R-L, L-R surround
-135	STEREO INV	Phase Inverted L/R Stereo
-180	MONO INV	Phase Inverted Mono
-225	R, L INV	Phase Inverted R/L Stereo
-270	L-R, R-L	L-R, R-L surround
-315	STEREO	Phase Normal L/R Stereo
-360	MONO	Phase Normal Mono

The large and duplicated range of this parameter allows smooth glides from any Left/Right Mix, Phase, Mono/Stereo image point to any other. These are on the output of the FX Mix. Of particular interest are: 0 MONO, 45 STEREO, and 90 L-R, R-L (surround channel). This parameter can be changed in real-time for fascinating spatial effects.

ADJUST

This control allows you to specify the range of control of the ADJUST knob when it is patched to a parameter. Low and High settings are available, allowing you to select full range (0-127) for those parameters where it is appropriate and to limit the range in other cases. You can, for example set the Low value to 0, and the High value to 1, to have ADJUST behave as an on/off control. Many of the presets take advantage of this, and have ADJUST range limits which are appropriate to the specific parameter.

Delay Time cont'd. Voices

These parameters set the delay time, in seconds, for each individual voice. The range for each algorithm is shown below, along with the delay time available with optional SIMMs memory expansion for those 6-Voice algorithms which make use of additional memory.

You can set and display delay values in units of time, or with tempo values. Press **Up** and **Tempo** simultaneously to toggle between these two options. When time units are selected, delay times are set and displayed in milliseconds (From 0ms to the maximum available delay for that parameter). When tempo values are selected, delay values are set and displayed as a ratio of echoes to beats (from 24:1 to 1:24). This will automatically synchronize the delay to the current tempo (MIDI, Internal, or TAP — see *Tempo Mode* in Chapter 2.) For example, a delay setting of 1:2 (1 echo for every 2 beats) will produce half-note delay rhythms synchronized to the current tempo.

Algorithm	Delay Time	Expanded Delay Time
Concert Hall	0-1.365 sec	-
Plate	0-1.365 sec	-
Chamber	0-1.365 sec	-
Inverse	0-1.365 sec	-
Infinite	0-1.365 sec	-
Glide>Hall	0-2.645 sec	42.325 sec
Chorus+Rvb	0-1.365 sec	-
M-Band+Rvb	0-2.730 sec	43.690 sec
Res 1>Plate	0-2.389 sec	38.229 sec
Res 2>Plate	0-2.389 sec	38.229 sec

When display of values in BPM has been selected, these are set as fractions of a beat. The smallest fraction is 1/24th beat. Changing these values live can produce a variety of pitch shift, and flange effects. Delay times can also be tempo modulated.

Modulation The Modulation row, which is the same for every algorithm, contains the parameters for the PCM 80's internal modulation sources. Use the Patch row to assign these modulators to any PCM 80 effect parameter.

Mod: LFO

Four parameters are available: **Shape**, **P Width**, **Depth**, and **Rate**.

Shape allows you to select the wave shape which will be used when "LFO" is selected as a patch Source. The choices are:

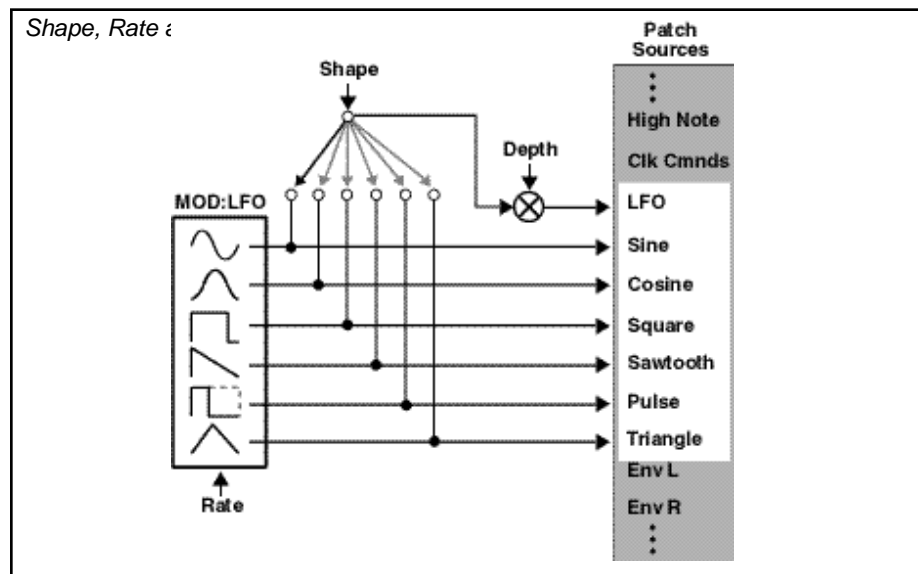
- Sine
- Cosine
- Square
- Sawtooth
- Pulse
- Triangle

P Width determines the proportion of each pulse wave cycle for which the LFO is on (1-99%). For example, setting **P Width** to 50% means that the LFO is on for half of its cycle. The effect of this control will only be heard if you are using the Pulse shape.

Depth scales the output of the LFO from 0 to 100%.

Rate sets the speed (0-25Hz) at which the LFO cycles. It can be set in time values (such as 1.5Hz) or in tempo values (such as 3:2 cycles per beat). Simultaneously pressing **Up** and **Tempo** will toggle these two display options.

Note: The PCM 80 allows six LFO shapes (sine, cosine, sawtooth, triangle, square and pulse) to be selected as patch Sources, as well as the LFO itself. All of these are generated by a single LFO, and are controlled by the single **Rate** control. When "LFO" is selected as a patch Source, the output will be the **Shape** selected here. The amplitude of the LFO output is controlled by **Depth**. Both Shape and Depth are available as patch Destinations and can be controlled externally. Shape, Pulse Width, Depth, and Rate are all available as patch Destination parameters, and can be controlled externally. See *Patching* in Chapter 2.



Mod: AR Env

This envelope generator's output, when turned on, will go from 0 to 127. How quickly it goes from 0 to 127 is determined by the setting of **Attack** (0-10 seconds). Once the envelope generator has reached 127, it remains there as long as it is turned on. When it is turned off, it goes from 127 to 0, at the rate determined by **Release** (0 to 10 seconds).

T Src allows you to select a Source to turn the envelope generator on and off.

T Lvl allows you to select a specific threshold value which the **T Src** must reach to turn the envelope generator on.

The **Mode** parameter allows you to determine the behavior of the envelope controller in relation to the threshold value. Four settings are available: **Repeat**, **One Shot**, **Retrigger**, and **Off**.

- Repeat** As long as the threshold source remains at or above **T Lvl**, the envelope cycles from attack to release. If A=R, the output of the envelope is a triangle wave.
- One Shot** Once **T Lvl** is reached, the envelope will go through its entire attack cycle. Once the attack cycle is completed, if Source value is *below* **T Lvl**, the envelope will immediately fall at the specified **Release** rate. The envelope will go through its entire release cycle, even if the source subsequently rises above **T Lvl**. If the Source value is *at or above* **T Lvl**, the envelope will remain at 127 until the **T Src** falls.
- Retrigger** As long as the level is at or above **T Lvl**, the envelope will go through its attack cycle. If the level falls below **T Lvl** before attack is completed, the envelope immediately begins to release. Likewise, if the **T Lvl** is crossed again before the release is completed, the attack cycle will begin again.
- Off** This control turns the AR envelope off (and frees up processor time). To optimize PCM 80 real-time response, set AR Env to **Off** when it is not being used.

Mod: Env L and Mod: Env R

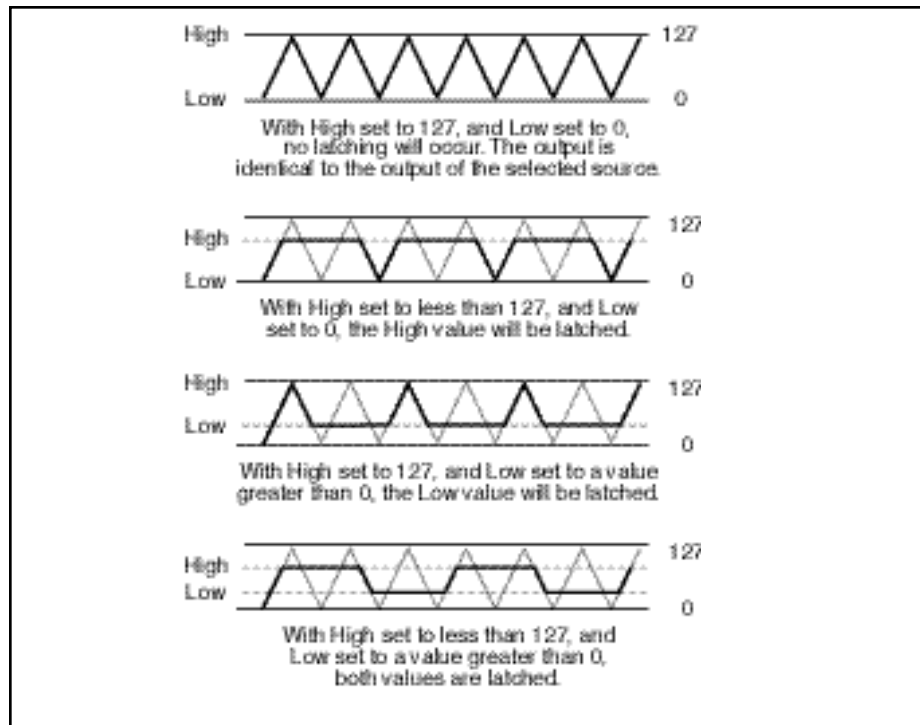
These are left and right input signal envelope followers. The only available parameter is **Release** which is set in milliseconds. This control allows you to specify the release rate (0-10 seconds) when the input level drops.

Modulation cont'd.

Modulation cont'd. Mod: Latch

The latch is a very flexible modulation source. It can be used to do such things as derive a switch from a continuous “return to zero” source (like MIDI After Touch). It can turn a momentary (on/off) footswitch into a latching footswitch (push on/ push off), and it can divide the switching rates of sources in half or thirds.

The latch has three parameters: **Src**, **High** and **Low**. Any patch source can be the **Src** (See Source listing under Patching.) **High** and **Low** are threshold values. The latch works as follows:



There is no output from the latch until the **Src** value falls within the range defined by the settings of **High** and **Low**. While the source value is between these thresholds, the output of the latch is the same value as the source. When the source value reaches or passes either threshold, the output of the latch holds at the limit value until the source value passes through the threshold twice. The latch can be set to hold at either the low threshold, the high threshold, or both. Setting **Low** to 0 disables latching at the low threshold. Setting **High** to 127 disables latching at the high threshold.

See preset **P0 3.0 FSw2 Rotary** as an example.

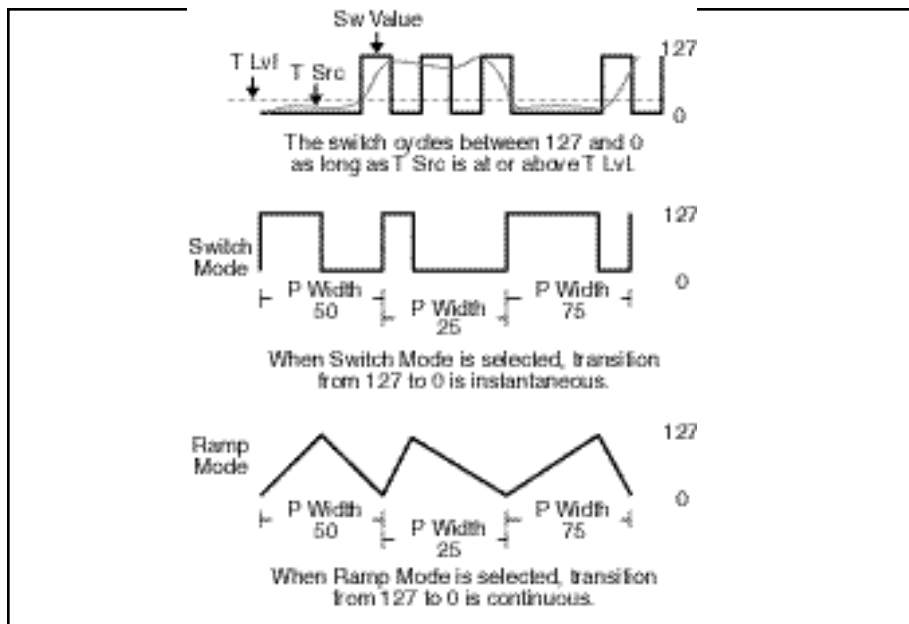
Mod: Sw 1 and Mod: Sw 2

These are identical time switches. Each has five parameters: **Rate**, **P Width**, **Mode**, **T Lvl** and **T Src**.

Modulation cont'd.

- Rate** sets the speed at which the switch cycles. It can be set in time values (such as 1.5 Hz) or tempo values (such as 3:2 Cycles per Beat). Simultaneously pressing **Up** and **Tempo** will toggle these display options.
- P Width** determines the proportion of each switch cycle during which the switch is on. For example, setting **P Width** to 50% means that the switch is on for one-half of a cycle.
- Mode** determines the “shape” of the switch output. Three settings are available: **Switch**, **Ramp**, and **Off**. When **Switch** is selected, the transition from on to off is instantaneous, i.e. the switch output resembles a pulse wave. When **Ramp** is selected, the transition from on to off is continuous, i.e. the switch output resembles a triangle or sawtooth wave.
- Off** turns the switch off (and frees up processor time). To optimize PCM 80 real-time response, set switch to **Off** when it is not being used.
- T Lvl** sets the threshold value at which the switch will begin to cycle.
- T Src** selects a patch source to drive the switch. The output of the switch is 0 as long as **T Src** is set to a value below **T Lvl**. Once the source value reaches or passes **T Lvl**, the switch will begin to cycle between on (127) and off (0) at the speed set by **Rate**.

Note that both Rate and P Width are available as patch Destinations, allowing them to be dynamically controlled by other patch sources. Switches are reset to the beginning of their cycles whenever **Tap** is pressed.



Patching

The last row of each algorithm's edit matrix is the Patch row. This row provides parameters for creating as many as ten patches in each effect. Each row position (Patch 0-9) has three controls available: **Src**, **Dst**, and **Values**. Press **Load/*** to cycle among these selections.

Src

Use ADJUST to select any of the sources listed below.

Dst

Use ADJUST to select any effect parameter except those on the Patch row.

Values

Use ADJUST to assign Destination values to specific Source values. These assignments are made in pairs, each with a value for the Source and a value for the Destination. For example, the default is two pairs mapped as follows:

- minimum Source value (0) = minimum Destination value
- maximum Source value (127) = maximum Destination value

This gives you a linear relationship between the parameter and the controller. Inverse control is accomplished easily by reversing these settings. As many as eight pairs of Destination/ Source values can be assigned here, providing an exciting new level of dynamic control.

See Chapter 2 for a complete description of the Patching System.

PCM 80 Patch Sources																																																																																																																																																																																			
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Internal</th> </tr> </thead> <tbody> <tr><td>LFO</td></tr> <tr><td>Sine</td></tr> <tr><td>Cosine</td></tr> <tr><td>Square</td></tr> <tr><td>Sawtooth</td></tr> <tr><td>Pulse</td></tr> <tr><td>Triangle</td></tr> <tr><td>Env L</td></tr> <tr><td>Env R</td></tr> <tr><td>AR Env</td></tr> <tr><td>Latch</td></tr> <tr><td>Sw 1</td></tr> <tr><td>Sw 2</td></tr> <tr><td>Sw 1 & 2</td></tr> <tr><td>Mono Lvl</td></tr> <tr><td>Left Lvl</td></tr> <tr><td>Right Lvl</td></tr> <tr><td>Footpedal</td></tr> <tr><td>Foot Sw 1</td></tr> <tr><td>Foot Sw 2</td></tr> <tr><td>ADJUST</td></tr> <tr><td>Tempo</td></tr> <tr><td>On</td></tr> <tr><td>Off</td></tr> </tbody> </table>	Internal	LFO	Sine	Cosine	Square	Sawtooth	Pulse	Triangle	Env L	Env R	AR Env	Latch	Sw 1	Sw 2	Sw 1 & 2	Mono Lvl	Left Lvl	Right Lvl	Footpedal	Foot Sw 1	Foot Sw 2	ADJUST	Tempo	On	Off	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">MIDI</th> </tr> </thead> <tbody> <tr><td>P Bend</td></tr> <tr><td>A Touch</td></tr> <tr><td>Velocity</td></tr> <tr><td>Last Note</td></tr> <tr><td>Low Note</td></tr> <tr><td>High Note</td></tr> <tr><td>Clk Comnds</td></tr> </tbody> </table>	MIDI	P Bend	A Touch	Velocity	Last Note	Low Note	High Note	Clk Comnds	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="4" style="text-align: center;">MIDI Controller Numbers</th> </tr> </thead> <tbody> <tr><td colspan="4">(PCM 80 interprets 000 as Bank Select)</td></tr> <tr><td>001</td><td>Mod Wheel</td><td>070</td><td>Sound Var</td></tr> <tr><td>002</td><td>Breath</td><td>071</td><td>Timbre</td></tr> <tr><td>003</td><td>Ctl 3</td><td>072</td><td>Release</td></tr> <tr><td>004</td><td>Foot Ctl</td><td>073</td><td>Attack</td></tr> <tr><td>005</td><td>PortaTime</td><td>074</td><td>Bright</td></tr> <tr><td>006</td><td>Data Entry</td><td>075</td><td>Sound 6</td></tr> <tr><td>007</td><td>Volume</td><td>076</td><td>Sound 7</td></tr> <tr><td>008</td><td>Balance</td><td>077</td><td>Sound 8</td></tr> <tr><td>009</td><td>Ctl 9</td><td>078</td><td>Sound 9</td></tr> <tr><td>010</td><td>Pan</td><td>079</td><td>Sound 10</td></tr> <tr><td>011</td><td>Xpression</td><td>080</td><td>General 5</td></tr> <tr><td>012</td><td>Effect 1</td><td>081</td><td>General 6</td></tr> <tr><td>013</td><td>Effect 2</td><td>082</td><td>General 7</td></tr> <tr><td>014</td><td>Ctl 14</td><td>083</td><td>General 8</td></tr> <tr><td>015</td><td>Ctl 15</td><td>084</td><td>Porta Ctl</td></tr> <tr><td>016</td><td>General 1</td><td>085</td><td>Ctl 85</td></tr> <tr><td>017</td><td>General 2</td><td>...</td><td>...</td></tr> <tr><td>018</td><td>General 3</td><td>090</td><td>Ctl 90</td></tr> <tr><td>019</td><td>General 4</td><td>091</td><td>FX1 Depth</td></tr> <tr><td>020</td><td>Ctl 20</td><td>092</td><td>FX2 Depth</td></tr> <tr><td>...</td><td>...</td><td>093</td><td>FX3 Depth</td></tr> <tr><td>...</td><td>...</td><td>094</td><td>FX4 Depth</td></tr> <tr><td>031</td><td>Ctl 31</td><td>095</td><td>FX5 Depth</td></tr> <tr><td colspan="4">(PCM 80 interprets 032 as Bank Select)</td></tr> <tr><td>033</td><td>Ctl 33</td><td>096</td><td>Data Inc</td></tr> <tr><td>...</td><td>...</td><td>097</td><td>Data Dec</td></tr> <tr><td>...</td><td>...</td><td>098</td><td>NRPN LSB</td></tr> <tr><td>063</td><td>Ctl 63</td><td>099</td><td>NRPN MSB</td></tr> <tr><td>064</td><td>Sustain</td><td>100</td><td>RPN LSB</td></tr> <tr><td>065</td><td>Porta On</td><td>101</td><td>RPN MSB</td></tr> <tr><td>066</td><td>Sostenuto</td><td>102</td><td>Ctl 102</td></tr> <tr><td>067</td><td>SoftPedal</td><td>...</td><td>...</td></tr> <tr><td>068</td><td>Legato</td><td>119</td><td>Ctl 119</td></tr> <tr><td>069</td><td>Hold 2</td><td></td><td></td></tr> </tbody> </table>	MIDI Controller Numbers				(PCM 80 interprets 000 as Bank Select)				001	Mod Wheel	070	Sound Var	002	Breath	071	Timbre	003	Ctl 3	072	Release	004	Foot Ctl	073	Attack	005	PortaTime	074	Bright	006	Data Entry	075	Sound 6	007	Volume	076	Sound 7	008	Balance	077	Sound 8	009	Ctl 9	078	Sound 9	010	Pan	079	Sound 10	011	Xpression	080	General 5	012	Effect 1	081	General 6	013	Effect 2	082	General 7	014	Ctl 14	083	General 8	015	Ctl 15	084	Porta Ctl	016	General 1	085	Ctl 85	017	General 2	018	General 3	090	Ctl 90	019	General 4	091	FX1 Depth	020	Ctl 20	092	FX2 Depth	093	FX3 Depth	094	FX4 Depth	031	Ctl 31	095	FX5 Depth	(PCM 80 interprets 032 as Bank Select)				033	Ctl 33	096	Data Inc	097	Data Dec	098	NRPN LSB	063	Ctl 63	099	NRPN MSB	064	Sustain	100	RPN LSB	065	Porta On	101	RPN MSB	066	Sostenuto	102	Ctl 102	067	SoftPedal	068	Legato	119	Ctl 119	069	Hold 2		
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Pitch The Resonant Chord algorithms: Res1>Plate and Res 2>Plate each have a Pitch row that contains the parameters for setting and controlling the tuning of the effect's resonators. Each set of parameters is presented separately here.

Res 1>Plate Pitch parameters

The voice resonators take the audio impulse from a delay voice and “resonate” it at a desired pitch. Until a resonator is assigned a pitch, it does not resonate. The Res1 effect is a “round robin” pitch assign in that pitch changes are individually assigned to one of (as many as) six voice resonators. For example, assume that all six voice resonators are active in the newly loaded effect, and the first pitch assigned is A4. Voice 1’s resonator will be set to the A4 frequency. Assign B4, and Voice 2’s resonator will be set to that pitch. In this example, if we assign four more pitches (D5, G4, A#:Bb4, C5, for example), they will be assigned to the Voice 3, 4, 5, and 6 resonators, respectively. If a seventh pitch is assigned, for example, F3, Voice 1’s resonator will be changed from A4 to F3 (the other resonators remain at the last assigned pitches).

Assign

This parameter has a range of C0 to G10 (128 pitches) to be convenient for MIDI patching. As the value of this parameter is changed, each “next value” is assigned to the next active pitch resonator of the six possible active resonators. An example might be driving this parameter with a slow LFO to achieve an effect something like strumming the strings of an open piano.

Tuning

This parameter allows you to tune the A440 reference of the box anywhere from 430.0-450.0Hz in 0.1Hz increments.

Active

This parameter allows you to define the number of active voice resonators. You can choose from 0 (no resonators active) to 6. Setting the value to 1 will limit pitch assignments to Voice 1’s resonator. Setting the value to 2 will limit the round robin pitch assign to Voices 1 and 2. A value of 6 uses all the voice resonators.

A handy feature of this parameter is the ability to mute resonators. For example, you can patch this parameter to a footswitch or pedal, allowing you to drive the parameter value down to 0 at any time, causing the resonators to stop playing their last assigned pitches. You can then immediately drive it back up to the desired number of active resonators. This “clears” the pitch assign for the resonators, so they don’t go back to playing their previous pitches, but rather wait for the next pitch assign to come along before resonating.

Unison

This is a simple On/Off control. When set to On, pitch assigns will be sent simultaneously to all active resonators. When set to Off, pitch assigns will operate in the round robin method described earlier. This allows you to set multiple delay times for all Voices and allows a single pitch assign (rather than 6 individual assigns) to set all the resonators to the same pitch. The pitch will ring out at 6 different delay times from the input impulse.

Res 2>Plate Pitch parameters

The voice resonators take the audio impulse from a delay voice and “resonate” it at a desired pitch. The Res2 effect is a “interval harmonization” pitch assign in that pitch changes generate interval pitches to be assigned to the six voice resonators.

Pitch cont'd.

Position 0 contains all of the pitch parameters which affect the voices in the remaining position in the row. Press **Load/★** to cycle through the selections at position 0: **Assign, Tuning, Active, Key, Scale, Root** and **Rule**.

- Assign** This parameter has a range of C0 to G10 (128 pitches to be convenient for MIDI patching). As the value of this parameter is changed, each voice resonator is set to a pitch at the defined voice’s interval (described later).
- Tuning** This parameter allows you to tune the A440 reference of the box anywhere from 430.0-450.0Hz in 0.1Hz increments.
- Active** This parameter allows you to define the number of voice resonators which are active. You can choose from 0 (no resonators active) to 6. Setting the value to 1 will permit only Voice 1’s resonator to ring out. Setting the value to 2 will permit Voices 1 and 2 to ring out. A value of 6 uses all the voice resonators. A handy feature of this parameter is the ability to mute resonators. For example, you can patch this parameter to a footswitch or pedal, allowing you to drive the parameter value down to 0 at any time, causing the resonators to stop playing their last assigned pitches. You can then immediately drive it back up to the desired number of active resonators. This “clears” the note assign for the resonators, so they don’t go back to playing their previous pitches, but rather wait for the next pitch assign to come along before resonating.
- Key** This parameter establishes a key signature for the pitch selection of the voice intervals. The range of this value is the 12 keys from C, C#, etc., up to B.
- Scale** This parameter establishes one of two scales of semitones: a standard Major scale (intervals of 2, 2, 1, 2, 2, 2, 1 half steps for the scale), or a Harmonic scale (intervals of 2, 1, 2, 2, 1, 3, 1).
- Root** This parameter (with values of 1-7) establishes the root of the scale which, when combined with the scale, defines the mode. For example, with a Major scale selected, roots 1-7 define the modes — Ionian (Major), Dorian, Phrygian, Lydian, Mixolydian, Aeolian (minor) and Locrian.

Pitch cont'd.

Rule This parameter has four values: Round Down, Round Up, Shift Down, and Shift Up. Its exclusive purpose is to tell the interval harmonizer what to do with out-of-key pitch assignments. The values instruct the interval harmonizer as follows:

Round Down Take the input pitch assign, round it down a half-step to an in key pitch, then calculate the interval pitch.

Round Up Take the input pitch assign, round it up a half-step to an in key pitch, then calculate the interval pitch.

Both of these generate in-key harmonization.

Shift Down Take the input pitch assign, round it up a half-step to an in-key pitch, calculate the interval pitch then shift the interval pitch down a half-step.

Shift Up Take the input pitch assign, round it down a half-step to an in-key pitch, calculate the interval pitch then shift the interval pitch up a half-step.

Both of these generate out-of-key harmonization.

Unison and Octave interval pitches strictly follow the input pitch assign. An example of how to use these follows the explanation of Voice Pitch intervals.

V1-V6 Pitch

The Res2>Plate effect has an individual pitch interval control for each voice resonator. The range of each control is up or down any scale interval through five octaves and Unison, for a total of 81 possible settings. For example: an interval of up one-fifth reads "+5th", and an interval of up one octave and a fifth reads "+1 Oct +5th". Down one-fifth reads "-5th", down one octave and a fifth reads "-1 Oct -5th".

An example application of Key, Scale, Root, Rule and Voice Pitch Intervals. Pitch cont'd.

Active resonators set to 3.

The Key is C.

The Scale is Major.

The Root is 1. (C Major Ionian)

Voice 1 Pitch is assigned to Unison.

Voice 2 Pitch is assigned to +3rd.

Voice 3 Pitch is assigned to +5th. (Basic triad)

In-key pitch assignment examples:

1. Pitch Assign: C4. Voice 1 will resonate at C4, Voice 2 at E4, and Voice 3 at G4. (Standard chord in the key based on the tonic)
2. Pitch Assign: D4. Voice 1 will resonate at D4, Voice 2 at F4, and Voice 3 at A4. (Standard chord in the key based on the supertonic)
3. Pitch Assign: E4. Voice 1 will resonate at E4, Voice 2 at G4, and Voice 3 at B4. (Standard chord in the key based on the median)
4. Pitch Assign: B4. Voice 1 will resonate at B4, Voice 2 at D5, and Voice 3 at F5. (Standard chord in the key based on the leading tone)

Out-of-key pitch assignment — Pitch Assign: C#:Db4.

Rule: Round Down: Voice 1 will resonate at C#/Db4, Voice 2 at E4, and Voice 3 at G4 diminished

Round Up: Voice 1 will resonate at C#/Db4, Voice 2 at F4, and Voice 3 at A4 augmented

Shift Down: Voice 1 will resonate at C#/Db4, Voice 2 at E4, and Voice 3 at G#:Ab4 minor

Shift Up: Voice 1 will resonate at C#/Db4, Voice 2 at F4, and Voice 3 at G#:Ab4 Major

Shape, Spread

In the Chamber and Infinite algorithms, Shape and Spread work together to control the overall ambience of the reverberation created by the PCM 80. Shape determines the contour of the reverberation envelope. With Shape all the way down, reverberation builds explosively, and decays quickly. As Shape is advanced, reverberation builds up more slowly and sustains for the time set by Spread. With Shape in the middle, the build-up and sustain of the reverberation envelope emulates a large concert hall (assuming that Spread is at least halfway up, and that Size is suitably large — 30 meters or larger). Low Spread settings result in a rapid onset of reverberation at the beginning of the envelope, with little or no sustain. Higher settings spread out both the buildup and sustain. In the Inverse algorithm, Spread is fixed, and only a Shape control is available.

Rvb Design cont'd.**Def**

Available in the Concert Hall and Glide>Hall algorithms, Definition affects the echo density buildup rate during the latter part of the decay period. At 0, the rate is determined by the program material. Raising Definition causes the sound to become choppy — the decrease in density of the echoes creates increasingly distinct, repetitive echo trails.

Depth

Available in the Concert Hall and Glide>Hall algorithms, this control sets the output amplitude envelope, changing the listener's perspective from the front to the rear of the hall.

Spin

Spin affects the movement of the reverberation tail. The object of Spin is to continuously alter the timbre of the reverberant sound. This makes the result more natural, without making the position of instruments unstable. Spin should typically be set to values between 10 and 50. Higher values may make the timbre of piano or guitar unstable.

Chorus

In the Concert Hall and the Glide>Hall algorithms Chorus randomizes delay times and introduces modulation to make reverberation sound less metallic. Increasing Chorus increases the rate of modulation. Because Chorus can cause pitch variation, this parameter should be set with care when using sources with very little pitch wobble (such as guitar or piano). A good practice is to increase the setting until pitch wobble becomes noticeable, then lower it slightly.

Link

This control is available in all algorithms except Inverse. When Link is set to On, the reverb time (Mid Rt) and Spread scale linearly as the Size control is varied. For some special effects, Mid Rt, Spread and Size can be unlinked.

Rvb Width

In all of the 4-Voice algorithms, this control performs the same function as FX Width, but controls the audio of only the reverb and post delay reverb.

Rvb In/Out

Rvb In and Rvb Out control the level of the audio going into and coming out of the reverb effect. Rvb In has a range of Full (0dB) down to -85dB, and Off. Rvb Out has a range of Full (0dB) down to -24dB, and Off. Rvb Out does not affect the level of the pre-echoes set by the Ref Lvl and Eko Fbk parameters.

RefLvl L&R, RefDly L&R

These controls provide pre-echoes to the left and right channels. The maximum range for Inverse effects is 800ms. In all other effects it is 1.2 seconds. Press **Load/★** to cycle through the selections.

EkoFbk L&R, EkoDly L&R

Available in the Plate, Chamber and Infinite algorithms, these controls provide a pre-echo of 1.2 seconds maximum to the left and right channels, with feedback. Press **Load/★** to cycle through the selections.

PstMix, PstGld

In the 4-Voice Algorithms, these controls adjust a pair of delays after the reverb. Press **Load/★** to cycle through the selections: **PstMix**, **Pst Dly L&R**, **GldResp** and **GldRange**.

Pst Mix

In the 4-Voice Algorithms, this parameter controls the mix of the reverb audio with the post delayed reverb audio (0-100%).

Pst Dly L&R

In the 4-Voice Algorithms, these parameters control the time of the post delay. The available range of 0-682ms can produce a variety of pitch shift, flange, or stutter effects on the reverb audio. (Expanding PCM 80 memory will extend this range to 1365ms.)

GldResp

In the 4-Voice Algorithms, this parameter controls the response of the glide of the post delay. The range is 0-100, with a typical default setting of 50. This setting provides a good, real-time glide. Changing a delay time from 0 to 100 ms with a glide response of 0, causes the glide delays to take a minute or more, allowing subtle changes in delay times and echoes with no noticeable pitch shifting. A glide response of 100 is ultrafast, causing high speed pitch shift, and even chirping effects with large delay time changes.

GldRange

In the 4-Voice Algorithms, this parameter controls the range over which changes to the post delay time will be performed as a glide. For example, if **GldRange** is set to 100ms, and the **PstDly L** and **R** times are varied over a range of 100ms, those delays will glide smoothly from one delay time to another. Suddenly changing the delay time to a greater value, such as 200ms, will cause the audio delay to change instantly to the new time without gliding. The available range is 0-682ms, with 0 causing all delay time changes to be "instantaneous", and 682 causing all delay time changes to glide. (Expanding PCM 80 memory will extend this range to 1365ms.)

Rvb Time cont'd.

You can set and display delay values in units of time, or with tempo values. Press **Up** and **Tempo** simultaneously to toggle between these two options. When time units are selected, delay times are set and displayed in milliseconds (From 0ms to the maximum available delay for that parameter). When tempo values are selected, delay values are set and displayed as a ratio of echoes to beats (from 24:1 to 1:24). This will automatically synchronize the delay to the current tempo (MIDI, Internal, or TAP—see *Tempo Mode* in Chapter 2.) For example, a delay setting of 1:2 (1 echo for every 2 beats) will produce half-note delay rhythms synchronized to the current tempo.

The Presets

The PCM 80 has 200 factory-designed presets which are organized into four banks of 50 each (labeled **P0**, **P1**, **P2** and **P3**). Each bank is organized in a matrix of 5 rows of 10. Press the front panel **Program Banks** button to display the first bank. Press it again to switch to another bank. Simultaneously press **Program Banks** and either the **Up** or **Down** button to backstep through the banks. The display will show the bank label and the matrix location, the preset name, and the algorithm from which the effect is derived.

Turn **SELECT** to scroll through all of the presets in a bank in numerical order. Use **Up** or **Down** to jump forward or backward by 10. Press **Load/★** to load any displayed preset.

In the Program Banks mode (as in the Register Banks mode), **ADJUST** is a soft knob. Each preset has one or more parameters patched to this knob, providing a quick way to make useful changes to the effect. (A ■ symbol in the upper left corner of the display indicates that the currently running effect has an **ADJUST** knob patch.) When you turn **ADJUST**, the display will show the name assigned to **ADJUST**, as well as the patch value. Continue turning **ADJUST** to alter the patch value along its available range.

The program banks are organized as follows:

Bank	Matrix Location	Preset Type
P0	0.0–1.9	Multi Effects
	2.0–3.5	Modulation Effects
	3.6–4.9	Special Effects
P1	0.0–3.6	Rhythmic Echo and Delay Effects
	3.7–4.9	Ambience Effects
P2	0.0–1.0	EQ Effects
	1.1–2.4	Spatial Effects
	2.5–4.0	Gain Effects
	4.1–4.9	Resonant Chord Effects
P3	0.0–2.8	Reverb Effects
	2.9–3.9	Processed Reverb Effects
	4.0–4.9	Remix Effects

Each preset is described in this section with a header which indicates the matrix location, the program name, the name assigned to the **ADJUST** knob, and the range of **ADJUST** knob control. This header is followed by a brief description of the effect. For additional reference, at the end of this chapter is an alphabetical list of the presets, with references to bank and matrix location.

- 3.6 Under Water** **ADJUST: DrownKnob 0–100** **Special Effects (P0 3.6– P0 4.9)**
 This effect really pulls you under! It will submerge any track under water. ADJUST controls the over all rate of the effect.
- 3.7 Thunder FX** **ADJUST: FlashTime 0–127**
 An unusual special effect that produces a rolling clap of thunder from a percussive source (tom toms , etc.) and ethereal sweeps from synth pads. The effect is driven by the AR Env, which is available in the soft row. ADJUST controls the AR release rate.
- 3.8 Thunder FX 2** **ADJUST: FlashTime 0–127**
 A variation of Thunder FX. The zaps are produced by setting a much faster release rate. ADJUST controls the release rate.
- 3.9 ChaosImpuls** **ADJUST: GldResp 0–100**
 This special effect is hard to describe but interesting to listen to. It produces chaotic rhythms and detunings from the input source. ADJUST sets the chaotic limits. Try this with individual percussive hits.
- 4.0 DemonDescent** **ADJUST: GldResp 0–100**
 Dark reverb and modulated detuning are combined to create an eerie special effect. ADJUST controls the rate and depth of the detuning.
- 4.1 RoughIdle FX** **ADJUST: Speed 0–127**
 Use this to mutate any steady, broad band source into a poorly tuned combustion engine. ADJUST controls the speed.
- 4.2 RoxStutter** **ADJUST: FX Mix 0–100**
 Use on those strong rock and roll lead vocals. The trailing echoes on voices 3 and 4 go longer as the signal disappears. ADJUST combines the delay effects with a plate reverb effect. Delays 2 and 5 are available in the soft row to add more echo presence.
- 4.3 Split Pitch?** **ADJUST: SplitWide 0–127**
 Modulated varispeed in stereo. One side goes low as the other side goes high. ADJUST controls the rate and depth of the varispeed. Good for special FX processing of various sources including synths and dialog.
- 4.4 TryTalk'n** **ADJUST: GldResp 0–100**
 A variation of Split Pitch? In this version highly colored reverb and additional delay voices have been added. ADJUST controls the rate and depth of the varispeed.
- 4.5 AutoInfinite** **ADJUST: FX Mix 0–100**
 With signal present the reverb time runs long. With signal absent the infinite process is switched on. The threshold for the event is set high such that after a source is running in the infinite process, you can play softer passages against it which chorus and echo at the same time. AR Envelope parameters are included in the soft row. Adjust the threshold to suit your application.
- 4.6 Remove Cntr** **ADJUST: Cntr Fc 0–127**
 This effect uses filters and crosstalk cancellation to remove mono material from a stereo mix. ADJUST controls a low pass filter for the center channel frequencies. As it is turned from 0-127 mono material is added back into the mix.
- 4.7 V-Eliminate** **ADJUST: Cut Zone 0–127**
 This effect is a vocal eliminator. It is similar to Remove Cntr, in that it will remove mono material from a stereo mix. In this effect, however, only frequencies in the vocal range are removed. This keeps mono low and high frequencies (kick, bass, snare cymbals, etc.) in the mix. ADJUST controls the width of the elimination band. Note that phase cancellation will occur if the two outputs are summed to mono.

0.7 Sliding Eko **ADJUST: Slide It! 0–100**
 This stereo delay effect lets you dial in the perfect “feel” to match the moment. Two echoes are produced. One is fixed on the beat. The other can be slid in musical time anywhere in front of or behind the beat by turning ADJUST. 0-49 = in front of the beat, 50 = on the beat, 51–100 = behind the beat. Of course, the Soft Row contains additional controls for fine tuning the effect.

**Rhythmic Echo and
 Delay Effects
 (P1 0.0 – P1 3.6) cont'd.**

0.8 Six Trips **ADJUST: EchoSlope 0–127**
 Rhythmic delay voices produce a six note triplet pattern. Each repeat gets progressively louder. ADJUST controls the slope of the first six repeats. 0 = loud to soft (normal echoes), 64 = six repeats of equal loudness, 127 = soft to loud (reversed echoes).

0.9 6 StrokeRoll **ADJUST: Attack 0–127**
 Turn a single drum hit into a six-stroke roll with this effect. ADJUST controls the attack of the first five repeats. 0 = loud to soft (normal echoes), 64 = five repeats of equal loudness, 127 = soft to loud (reversed echoes).

1.0 TapGated Rvb **ADJUST: Gate dB 0–85**
 This effect uses a tempo-controlled LFO as a rhythmic gate to the inputs of a large stereo chamber. The gate is opened every other beat for a duration of one eighth-note. Use this to add reverb to selected beats of a stereo source. (Try this one synchronized to MIDI with a drum machine as a source.) ADJUST controls the input levels in dB to the reverb when the gate is closed. 0 = always open (0dB), 85 = fully closed (-85dB). The Soft Row includes the LFO parameters so you can adjust the overall timing of the gate.

1.1 TapEkoGate 1 **ADJUST: GateWidth 0–127**
 This effect uses a tempo-controlled LFO as a rhythmic gate to the inputs of a delay and reverb combination. The gate is opened once every four beats for a duration of one eighth-note. ADJUST determines the portion of the four beats in which the gate is open. 0 = open for all four beats, 127 = open for only the first 16th note of four beats. The Soft Row includes the LFO parameters so you can adjust the overall timing of the gate.

1.2 TapEkoGate 2 **ADJUST: GateWidth 0–127**
 This is a variation of TapEkoGate 1 with different echo rhythms. ADJUST determines the portion of the four beats in which the gate is open. 0 = open four all four beats, 127 = open for only the first 16th note of four beats. The Soft Row includes the LFO parameters so you can adjust the overall timing of the gate.

1.3 TapEkoClear **ADJUST: GateWidth 0–127**
 This preset is similar to the two TapEkoGate presets, except that the rhythmic gate is also patched to clear the delay voices when it opens. This allows very high delay feedback values to be used without creating long echo trails. ADJUST determines the portion of the four beats in which the gate is open. 0 = open for all four beats, 127 = open for only the first 16th note of four beats. The Soft Row includes the LFO parameters so you can adjust the overall timing of the gate.

1.4 Tap Chamber1 **ADJUST: Width 0–90**
 This preset is a tempo controlled variation of SnareChamber. The effect is a tight chamber with liveness that is constantly changing. The change is tempo controlled. Press **Tap** to synchronize it to the beat. ADJUST controls the width of the reverb within the overall stereo image of the effect (0 = mono, 45 = stereo, 90 = surround). Use this to open up sampled drum mixes.

1.5 Tap Chamber2 **ADJUST: Decay 0–127**
 This is a version of Vox Chamber with a rhythmic twist. The width of the reverb, within the overall stereo image of the effect, is changed rhythmically by Sw 1. This change is tempo controlled. Press **Tap** twice to synchronize to the beat. ADJUST controls reverb decay.

**Rhythmic Echo and
Delay Effects
(P1 0.0 – P1 3.6) cont'd.**

- 1.6 LatchedEkos** **ADJUST: EchoWidth 1–99**
The inputs and outputs of stereo delays are gated on and off by two rhythmic switches. The Latch is used to trigger the AR envelope, which in turn alternates the left and right delay outputs. ADJUST controls how long the inputs to the delays remain open over a period of four beats.
- 1.7 X-PanEQ BPM** **ADJUST: Low Tone 0–60**
This effect cross-pans the inputs between independent left and right band pass filters and adds some bright, highly diffused reverb. The pan rate is tempo controlled. ADJUST controls the low frequency limits of both bands.
- 1.8 Pan->Eko BPM** **ADJUST: DarkKnob 0–127**
This effect pans the inputs across the stereo inputs of a reverb and independent left and right delays, each with slightly different EQ. The pan rate is tempo controlled. ADJUST controls the high frequency limits of both bands.
- 1.9 Tempo Verb** **ADJUST: Liveness 0–40**
In this tempo-based reverb effect, decay changes in tempo. Slow tempos yield longer reverb time; fast tempos result in shorter decay. Set tempo with two presses of **Tap**, or with MIDI.
- 2.0 Tempo Gate** **ADJUST: High Cut 0–50**
This heavily gated reverb effect has duration set by tempo. **Tap** in two quarter-notes to set the gate duration.
- 2.1 Tape Echo** **ADJUST: DarkKnob 0–127**
This preset simulates a stereo tape echo. The echo rate is tempo controlled. Press **Tap** to synchronize with rhythmic material. ADJUST controls high frequency damping – the echoes get darker as they repeat. The Soft Row includes parameters for adding and reverb as well additional controls for the delays and filters.
- 2.2 NonLinear 1** **ADJUST: EchoSlope 0–127**
This effect produces echoes with non linear decay. ADJUST controls the decay slope. 0 = loud to soft (normal echoes), 64 = six repeats of equal loudness, 127 = soft to loud (reversed echoes). In this preset the slope is set to produce a simple reversed echo effect. The repeat rate is tempo controlled. The Soft Row contains parameters for controlling the stereo image, adding reverb, scaling the repeat rate, and more.
- 2.3 NonLinear 2** **ADJUST: EchoSlope 0–127**
Similar to NonLinear 1, with some additional processing. Chorus and reverb have been added, and the delays bounce from side to side as they repeat. In this preset the slope is set to 64 to produce repeats of equal loudness. The Soft Row includes parameters for controlling the stereo image, chorus depth and rate, etc.
- 2.4 NonLinear 3** **ADJUST: EchoSlope 0–127**
This is a variation of NonLinear 2 with more radical processing and an inverted slope.
- 2.5 Six Across** **ADJUST: Spacing 0–100**
This multi-tap delay effect filters each voice to a specific bandpass with each tap positioned successively across the panoramic spectrum. ADJUST controls the overall spacing between the voices.
- 2.6 BandEko Rvb** **ADJUST: Center Fc 0–127**
In this preset, the outputs of a stereo band pass filter are sent to left and right rhythmic delays. These delays are in the reverb diffusor loop. The effect produces diffuse, highly colored echoes and reverb. Use ADJUST to set the center frequency of the band pass filter.

4.8 2WayTunnel ADJUST: Speed 1–100

This is a variation of IntoTunnel. The source approaches and enters the tunnel, then turns around and comes back. Use ADJUST to control the speed.

**Ambience Effects
(P1 3.7 – P1 4.9) cont'd.****4.9 FinishLine ADJUST: Speed 1–100**

This preset adds two pairs of stereo delays to the basic drive-by effect to simulate the 1st, 2nd, and 3rd place cars crossing the finish line. ADJUST controls the speed. Be sure to try this and the other drive-by effects with different types of source material. Almost any continuous source will produce interesting spatial sound effects. Low, buzzy synthesizer tones work particularly well.

Program Bank 2 (P2)**0.0 StereoLoPass ADJUST: CutOff 0–127**

This effect is a combination of a stereo low pass filter and a stereo reverb, with the two effects in parallel. Use ADJUST to set the cut off frequency of the filter. The reverb mix is turned all the way down — you can add reverb by changing the FX Mix parameter in the Soft Row, where you'll also find additional parameters for delay voices, and image.

**EQ Effects
(P2 0.0 – P2 1.0)****0.1 Low Pass HiQ ADJUST: Cutoff 0–127**

The same basic effect as StereoLoPass, but with feedback adjusted to produce a more resonant filter. ADJUST sets the cutoff frequency of the filter.

0.2 Low Pass LFO ADJUST: Depth 0–127

The cutoff of the stereo low pass filter is swept with a rhythmic LFO sine wave. Press **Tap** to synchronize the sweep with rhythmic material. ADJUST controls the low frequency limit of the sweep.

0.3 StereoHiPass ADJUST: Cutoff 0–127

A combination of a stereo high pass filter and a stereo reverb, with the two effects in parallel. Use ADJUST to set the cutoff frequency of the filter. The reverb mix is turned all the way down — you can add reverb by changing the FX Mix parameter in the Soft Row, where you'll also find additional parameters for delay voices, and image.

0.4 StereoB-Pass ADJUST: Center 0–127

A combination of a stereo band pass filter and a stereo reverb, with the two effects in parallel. Use ADJUST to set the center frequency of the filter. The reverb mix is turned all the way down — you can add reverb by changing the FX Mix parameter in the Soft Row, where you'll also find additional parameters for delay voices, and image.

0.5 Stereo Notch ADJUST: Center 0–127

A variation of StereoB-Pass which combines a phase inverted output of the band pass filter with unprocessed signal to create a notch filter. ADJUST sets the center frequency of the notch.

0.6 SweptNotches ADJUST: Rate 0–100

This preset produces vowel-like sounds by sweeping two pairs of notches with two independent time switches. This effect will produce very unusual tonal variations from broad band sources (rich pads, drums, industrial sound effects, etc.) It also generates a good deal of spatial movement within a stereo or Surround mix. ADJUST controls the rate of the sweeps.

0.7 Env Notches ADJUST: Release 0–100

This preset will produce vocalization effects from dynamic sources. The inputs are summed to mono, and the notch filters which are tuned to vocal formants are swept by the resulting input envelope. ADJUST controls the release rate of the input envelope.

EQ Effects
(P2 0.0 – P2 1.0) cont'd.

0.8 BandReject 4 **ADJUST: FX Mix 0–100**
Three independent modulators are used to sweep filters and pan the outputs of this preset. The result is an effect with constantly changing tonal and spatial characteristics. A touch of reverb adds some overall ambience. Use ADJUST to set the mix of filters and reverb.

0.9 WaaPedalEko **ADJUST: FeedBack 0–10**
Wah-wah with echoes. Foot pedal is patched to filter cutoff. ADJUST controls echo feedback.

1.0 RotorWaa **ADJUST: Rate 0–10**
A tempo controlled wah-wah effect. ADJUST controls the rhythm of the modulator.

Spatial Effects
(P2 1.1 – P2 2.4)

1.1 Movable Echo **ADJUST: Position 0-127**
This preset is designed for use with either stereo or Surround mixes. It is a dual delay effect that can be positioned anywhere between the center, side and rear channels. ADJUST sets the position. 0 = center, 64 = side channels, 127 = rear channel.

1.2 Movable Hall **ADJUST: Position 0–127**
Like Movable Echo, this preset is designed for use with either stereo or Surround mixes. It is a concert hall reverb effect that can be positioned anywhere between the center, side and rear channels. ADJUST sets the position. 0 = center, 64 = side channels, 127 = rear channel.

1.3 Go Away **ADJUST: How Far? 0–127**
Use this preset to take a stereo source and move it anywhere from in your face to far, far away. Use ADJUST to move the source away from you. 0 = unprocessed stereo, 127 = far away. As ADJUST is increased, EQ, reverb and stereo width are all changed to produce the composite effect. This effect is compatible with stereo and Surround mixes.

1.4 Circular Pan **ADJUST: Rate 0–100**
Similar to Go Away, this preset sums the inputs to mono and uses the LFO to control EQ, reverb and stereo width to pan the sound through a circular orbit. From right through center, to left through rear, to right. As the sound approaches the center, it grows brighter, louder and dryer. As it recedes towards the rear, it grows darker, softer and more reverberant. In a Surround mix, the center and rear positions of the orbit will feed only the center and rear channels of the mix. ADJUST controls the rate of the pan.

1.5 Spatial Hall **ADJUST: Position 0–35**
A multi-dimensional preset which changes as you increase or decrease the ADJUST knob value. This preset is not mono compatible.

1.6 Rear of Hall **ADJUST: Decay 0–60**
This is a really huge space and you're in the back of it. ADJUST changes the reverberation characteristics, making it boomier.

1.7 Backstage **ADJUST: How Far? 0–127**
Remember what the concert sounded like from the green room? If you need to re-create that ambience, this preset will take you there and let you wander around. Turn up ADJUST to travel further from the stage until, finally, you're out in the parking lot. The Soft Row provides reverb parameters that will let you fine tune the the hall to fit your needs.

1.8 Steered Rear **ADJUST: Decay 0–10**
The Width parameter steers this plate effect from front to back after the AR releases based on input level. ADJUST controls reverb decay. Due to the strong spatial positioning at the end of the decay, this preset is not mono compatible.

1.9 Too Deep! **ADJUST: Decay 0-40**
 The left and right envelope followers control the post delay glides while the AR generator controls reverb width. ADJUST controls reverb decay.

Spatial Effects
(P2 1.1 – P2 2.4) cont'd.

2.0 Dyna-Hall **ADJUST: Decay 0-130**
 A tamer version of Too Deep! No envelope chorusing. Good, beautiful, straight ahead, and spacious.

2.1 RotoRox **ADJUST: FX Mix 0-100**
 RotoRox crossfades deeper into two delay voices when the envelope follower detects an absence of input. Great vocal effects for thickly-produced rock and roll. ADJUST will add more or less reverb into the effects mix.

2.2 RotoRoomVox **ADJUST: Decay 0-100**
 This medium large sized room continuously changes spatial width according to the speed of the LFO which tracks the input. Faster with less input, slower with more input. ADJUST controls reverb decay. Nice roomy effect for background vocals.

2.3 RotoRoom **ADJUST: Decay 0-60**
 Similar to RotoRoomVox except the speed of the spatial width modulation is stable, with the speed of the LFO constant. Room is smaller, more dense-sounding and brighter.

2.4 RotoRoom#2 **ADJUST: Rt & Rate 0-60**
 Speed and reverb decay are tied to ADJUST. Way cool on a stinger sound effect! Dynamically spacious and not mono compatible.

2.5 Tremolo Tap1 **ADJUST: Depth 0-127**
 This is a basic tremolo effect with a small amount of ambience added. The effect is true stereo. The left and right channels are processed separately to maintain the image of stereo source material. The tremolo rate is tempo controlled (2 cycles/beat). Press **Tap** to synchronize the effect with rhythmic material. ADJUST sets the tremolo depth. 0 = no tremolo, 127 = maximum tremolo.

Gain Effects
(P2 2.5 – P2 4.0)

2.6 X-TremoloTap **ADJUST: Depth 0-127**
 This a variation of TremoloTap1. In this preset the left and right modulation are 90° out of phase, producing a stereo effect that doesn't collapse in a mono mix. If the input source is mono, the sound will seem to move from side to side. If the input source is stereo (or two different mono sources) the left and right channels will alternately grow loud and soft. The modulation rate is tempo controlled. ADJUST controls the tremolo depth for both channels. 0 = no tremolo, 127 = maximum tremolo.

2.7 Panner BPM **ADJUST: Pan Phase 0-1**
 This effect is a tempo controlled auto panner with the inputs independently panned left and right. ADJUST allows you to set the relative phase of the input panning. 0 = in phase, 1 = 90° out of phase. In the preset, the panning is 90° out of phase. If the input source is mono it will pan from side to side. If the input source is stereo (or two different mono sources), the two sources will chase each other between the speakers. Set ADJUST to 0 for "normal" auto panning.

2.8 Nice Pan! **ADJUST: FX Mix 0-100**
 This preset combines static time based delays which move back and forth in the stereo field with a short, bright chorus plate. ADJUST varies the delay and reverb mixing. Great for acoustic guitars.

**Gain Effects
(P2 2.5 – P2 4.0) cont'd.**

3.2 Spin & Duck **ADJUST: Spin Rate 0–127**
In this preset, panning is combined with 6-voice chorus delays and reverb to produce a rich spacious effect. ADJUST controls the panning rate. 0 = slow, 127 = fast. The delays are tempo controlled and ducked by input level. They won't be heard during active passages, but will fade up in the spaces between phrases.

3.0 MultiFxFade **ADJUST: FX Mix 0–100**
In this preset, the AR envelope is used to create a moderate fade-in of chorus, delay and reverb effects. ADJUST controls the mix of chorus/delay and reverb. The Soft Row has all the essentials for tweaking the three basic effects, as well as the AR envelope parameters so you can fine tune the fade in rate and threshold. Try this with guitars and keys.

3.1 Ghost **ADJUST: FadeShape 0–100**
Source material is accompanied by a ghostly image of itself. Not quite reverb, not quite backwards audio. ADJUST controls the contour of the fade in of the effect. This preset works well with short percussive sources as well as more sustained ones.

3.2 Ghost Flange **ADJUST: FadeShape 0–100**
This is a variation of Ghost with some flanging added. Try this with lead guitar. ADJUST controls the contour of the fade in.

3.3 GhostVibrato **ADJUST: FadeShape 0–100**
Another Ghost variation. This one will produce a delayed vibrato on sustained notes. ADJUST controls the contour of the fade-in.

3.4 AutoFadeln 1 **ADJUST: FX Mix 0–127**
This preset senses input level to produce an automatic volume swell into a chorus/delay reverb effect. Sounds great with guitar and keyboard chords. The fade in rate is moderate. ADJUST controls the mix of chorus/delay and reverb effects. The Soft Row includes parameters for all three effects as well as the envelope parameters which set the characteristics of the fade-in.

3.5 AutoFadeln 2 **ADJUST: Fade Rate 0–100**
This variation of AutoFadeln allows you to set the fade-in rate with ADJUST.

3.6 AutoFadeln 3 **ADJUST: Rvb Lvl 0–127**
This variation of AutoFadeln 1 has shorter delay times and a lighter touch on the chorus effect. ADJUST sets the mix of chorus/delay and reverb effects.

3.7 ChordSwells **ADJUST: Rvb Lvl 0-127**
A more dramatic version of AutoFadeln. The fade time is quite long, and the chorus and delay effects are fairly strong. Try it with sustained piano or guitar chords. ADJUST controls the mix of chorus/delay and reverb.

3.8 BowedChords **ADJUST: FX Mix 0–100**
A more subtle version of AutoFadeln. Chorusing is turned off and delays are more subdued. This is essentially a volume swell into reverb. Use it to pull cello-like tones from sustained notes or block chords. Very nice with grand piano. ADJUST sets the mix of clean echoes and reverb.

3.9 BowedEchoes **ADJUST: FX Mix 0–100**
In this preset, input level controls echo feedback as well as triggering the fade-in. Feedback is reduced when the signal is loud and turned up when the signal fades out. This produces echoes with soft attacks that appear when the input signal drops. ADJUST controls the mix of echoes and reverb.

- 4.0 Pedal Swell** **ADJUST: FX Mix 0–100** **Gain Effects (P2 2.5 – P2 4.0) cont'd.**
 This is a combination of four 400 ms delays, a slight amount of chorus, and just a hint of reverb. The foot controller is controlling the left and right input levels which allows you to get majestic volume swells. ADJUST controls the combination of delays and chorus with reverb.
- 4.1 Rez Climber** **ADJUST: Tuning 0–60** **Resonant Chord Effects (P2 4.1 – P2 4.9)**
 Try this preset with dialog or unpitched source material. It is a special effect that dynamically sweeps the resonators through the 2nd, 3rd, 4th and 5th pitches of the harmonic series. The sweep is controlled by the AR Env, which is triggered by mono input level. ADJUST sets the fundamental pitch for the series.
- 4.2 Chord Walk** **ADJUST: High Cut 0–50**
 This preset uses the resonators to generate a rhythmic chord pattern from unpitched source material. ADJUST controls the high frequency content of the chords. The time switches, Sw 1 and Sw 2 are used to change the chord root-note and mode and also vary the rhythm. Listen to this effect with a simple kick, snare and hi-hat pattern as an input source. Press **Tap** twice to synchronize the tempo of the effect with the tempo of the drum pattern.
- 4.3 Mars Bars** **ADJUST: High Cut 0–50**
 In this preset, the resonators are used to create a truly weird and spacey special effect. Use any continuous sound effect, dialog, or even instrumental tracks as source material. The tuning of the resonators is swept slowly through a series of pitches by the LFO. The resulting sound is quite unusual (an orchestra from another planet?). ADJUST controls the overall high frequency content of the effect. Be sure to check out the Soft Row, which contains parameters for tuning, voice assignment and more.
- 4.4 Modallmpulse** **ADJUST: Tone 0–50**
 The resonators in this preset are tuned to arpeggiate a modal 7th chord. ADJUST changes the overall tone of the arpeggiated notes. The rhythm of the arpeggio is tempo controlled. Press **Tap** twice to synchronize it to the beat. The effect works well with single percussion hits (try it with kick or snare). You can change the key, scale, and root note of the arpeggio by playing with the Pitch sub parameters in the Soft Row. You'll also find controls for reverb and delay there as well.
- 4.5 Major Minor** **ADJUST: Tone 0–50**
 This effect in this preset builds a 6-note modal chord one note at a time. Use a single percussion hit as an input source (a slowly repeating snare hit works well). The notes in the chord are added slowly over 24 beats. The effect is tempo controlled. Press **Tap** twice to synchronize it to the beat. ADJUST changes the overall tone of the chord notes. As the chord builds, it is changed rhythmically between major and minor scales. The root note of the chord is also changed in a rhythmic manner. The LFO controls the rate of the build and the major minor shift. Switch 2 controls the changing root notes.
- 4.6 MIDICHords** **ADJUST: Sparkle 0–5**
 This preset is driven by MIDI Note Number. Resonators follow the note in a diatonic tone cluster. ADJUST controls the brightness of the resonators. If the audio source is the same as the MIDI source (a synthesizer), the effect is a little like harmonization. If the audio source is different, the effect is much harder to describe. This preset will pass audio if there is no MIDI input.

**Resonant Chord Effects
(P2 4.1 – P2 4.9) cont'd.**

- 4.7 LvlSweeper** **ADJUST: Color 0–24**
This preset is driven by level. Any input that exceeds the input threshold will cause a little burst of resonators that quickly swirl through the stereo field. ADJUST controls the pitch range of the resonators.
- 4.8 Sweeper** **ADJUST: Pitch 0–24**
This preset is a resonant arpeggiator in which a tempo-driven LFO controls the resonator pitches. ADJUST controls the pitch range of the arpeggio effect.
- 4.9 MIDISustain** **ADJUST: Bright 0–5**
This preset requires MIDI note input or it will not pass audio. Resonators are assigned as the notes are played (when playing chords, it's best to spread them a little). Footswitch 2 works like a piano damper pedal. When the audio source is the same as the MIDI source, the effect is a little like playing a piano while holding down the pedal. When the audio source is different, well ... ADJUST controls the brightness of the resonators.

Program Bank 3 (P3)**Reverb Effects
(P3 0.0 – P3 2.8)**

- 0.0 Small+Stage** **ADJUST: Stage Lvl 0–50**
This preset combines a smooth, small reverberant space with several stage reflections. Use ADJUST to set the stage reflection level.
- 0.1 Small Room** **ADJUST: Liveness 0–60**
Use ADJUST to quickly change the ambient characteristics of this typically tight sounding room. Great for ADR work.
- 0.2 Living Room** **ADJUST: Decay 0–60**
Another ADR preset, medium spaced but with a short Rt. ADJUST quickly changes if not perfect for your application.
- 0.3 Brick Kick** **ADJUST: Liveness 0–100**
Kicks *ss on kick drums or the entire submix. ADJUST increases the liveness of the chamber.
- 0.4 Large Room** **ADJUST: Decay 0–60**
A perfectly smooth listening room with medium diffusion. Very natural sounding on any sound source. ADJUST lengthens or shortens the reverb decay.
- 0.5 SnareChamber** **ADJUST: Liveness 0–60**
Like Brick Kick, ADJUST increases the liveness of the space. A classic from the PCM 70.
- 0.6 Tiled Room** **ADJUST: Decay 0–60**
A future classic... ADJUST controls reverb decay.
- 0.7 Rich Chamber** **ADJUST: Decay 0–60**
Smooth and full sounding. ADJUST varies reverb decay.
- 0.8 Vox Chamber** **ADJUST: Liveness 0–60**
Combines recirculating echoes which fall away quickly once signal is absent. Increasing ADJUST lengthens the reverb decay, which will mask the reflection echoes. For vocals.
- 0.9 Locker Room** **ADJUST: Depth 0–127**
Just like in high school. ADJUST creates a deeper, more reverberant sound.
- 1.0 Wide Chamber** **ADJUST: Decay 0–60**
Big and wide sounding with a preset short Mid Rt. ADJUST will change that if necessary. Use on synth pads or vocals.

**Reverb Effects
(P3 0.0 – P3 2.8) cont'd.**

2.5 Plate4 Horns **ADJUST: Impact 0–100**
Bright and percussive for those horn tracks needing that certain edge. Use ADJUST to modify the attack and release characteristics.

2.6 Alley Slap **ADJUST: Pre Delay 0–100**
Great for any punctuated sound source — vocals, guitars, anything. Use ADJUST to match the delay to the music.

2.7 Drum Gate **ADJUST: Duration 0–70**
This inverse gated preset is low on diffusion and high on attitude. Made for drums and other high impact sources. ADJUST controls the duration of the effect.

2.8 Slope Down **ADJUST: Duration 0–100**
Very inverse sounding effect. ADJUST varies the length of the slope. The AR Envelope, triggered by mono level, cranks in a downward spiraling pitch shift. Unearthly on voices.

**Processed Reverb Effects
(P3 2.9 – P3 3.9)**

2.9 BigBoomRoom **ADJUST: BoomKnob 0–36**
The Envelope followers glide the left and right post delays giving a strong modulation effect to the reverb tail. ADJUST adds more or less boom. Use on punchy low frequency sound sources.

3.0 Whammy Hall **ADJUST: Decay 0–30**
If your guitar doesn't have a whammy bar, it does now. The AR generator is triggered from the mono level source. The AR generator is then attached to the LFO depth which drives the two Post Delays after the reverb. The Release constant is set rather long so that the depth reaches full scale after 2.2 seconds. ADJUST sets the reverb time.

3.1 JetChamber **ADJUST: Jet Knob 0–127**
A big chamber reverb with stereo flanging on the outputs. Use ADJUST to set the amount of "whoosh." The rate of the flange is controlled by the LFO. You'll find it in the Soft Row along with the essential reverb parameters.

3.2 EnvChamber **ADJUST: Jet Knob 0–127**
Similar to JetChamber, but here flanging is controlled by input level. The flange effect is most prominent when the input level drops. This lets you process drums with little or no reverb flanging while they are active, but individual hits and fills will have pronounced flanging during the reverb tail. This also works well with a variety of sources including acoustic guitar and piano.

3.3 Wizz and Wazz **ADJUST: Decay 0–127**
This tempo driven effect has delays that whiz from left to right. FX Mix is also linked to tempo, going slowly from delays to reverb, then abruptly back to delays. ADJUST controls reverb decay.

3.4 Sci Fi **ADJUST: Wiggle 0–127**
This preset uses an LFO modulated reverb for its basic effect. ADJUST controls the depth of the modulation. It will put a big spacious halo around unpitched sources, like drums. Lower settings of ADJUST will work best with pitched sources, although higher settings can yield some interesting sound effects. (Listen to a high piano note with ADJUST at about 100 –definite science fiction material!)

3.5 Wobble Plate **ADJUST: Wobble 0–30**
A different type of chorus plate. ADJUST controls glide response.

Alphabetical Index of Presets

2WayStreet	P1 4.6	EkoChorus	P0 0.1	MultiFx Fade	P2 3.0	Split Pitch?	P0 4.3
2WayTunnel	P1 4.8	Ekos 4 Drums	P1 3.3	Nice Pan!	P2 2.8	Steered Rear	P2 1.8
6 StrokeRoll	P1 0.9	Empty Stage	P1 3.9	NoCenter Eko	P0 4.8	Stereo Notch	P2 0.5
6 Vox Chorus	P0 2.3	Env Notches	P2 0.7	NonLinear 1	P1 2.2	StereoB-Pass	P2 0.4
6 Vox Flange	P0 2.6	Env:PanKorus	P0 2.5	NonLinear 2	P1 2.3	StereoEqEkos	P0 1.8
ADJToFreeze	P3 4.5	EnvChamber	P3 3.2	NonLinear 3	P1 2.4	StereoHiPass	P2 0.3
ADJToFreeze2	P3 4.6	EnveloVerb	P3 3.9	OffBeat Eko	P1 0.2	StereoLoPass	P2 0.0
ADJUpMyEchos	P0 1.9	FinishLine	P1 4.9	OffBeatEko2	P1 0.3	StereoTapDly	P1 0.1
Alley Slap	P3 2.6	Flange+Rvb	P0 1.3	OneShotCarBy	P1 4.3	Super Ball!	P3 4.0
AmbientCarBy	P1 4.4	Flange>Rvb	P0 1.2	Pan>Eko BPM	P1 1.8	Sweeper	P2 4.8
AutoFadeln 1	P2 3.4	Freez 2 of 8	P3 4.2	Panned Dlys	P1 3.0	SweepVerb	P3 3.8
AutoFadeln 2	P2 3.5	Freez 2over3	P3 4.3	Panner BPM	P2 2.7	SweptNotches	P2 0.6
AutoFadeln 3	P2 3.6	Freeze&Speed	P3 4.4	Pedal Swell	P2 4.0	Tap Chamber1	P1 1.4
AutoInfinite	P0 4.5	FSw2 Elevate	P0 2.0	PhoneOrRoom?	P1 3.7	Tap Chamber2	P1 1.5
Backstage	P2 1.7	FSw2 Freeze	P3 4.7	Piano Hall	P3 2.1	Tape Echo	P1 2.1
BandEko Rvb	P1 2.6	FSw2 Rotary	P0 3.0	Plate4 Horns	P3 2.5	TapEkoClear	P1 1.3
BandEkoSweep	P1 2.7	FSw2 Speedup	P3 4.8	PreciseGlide	P0 2.8	TapEkoGate 1	P1 1.1
BandReject 4	P2 0.8	Funkus Room	P0 0.8	PrecisionDly	P1 3.6	TapEkoGate 2	P1 1.2
BigBoomRoom	P3 2.9	Gate Chamber	P3 1.1	Prime Blue	P0 0.0	TapGated Rvb	P1 1.0
BowedChords	P2 3.8	Ghost	P2 3.1	RandomImages	P0 3.5	Tempo Gate	P1 2.0
BowedEchoes	P2 3.9	Ghost Flange	P2 3.2	Rear of Hall	P2 1.6	Tempo Verb	P1 1.9
Brass Plate	P3 1.5	GhostVibrato	P2 3.3	Remove Cntr	P0 4.6	Thunder FX	P0 3.7
Brick Kick	P3 0.3	Glide > Verb	P0 1.5	RezClimber	P2 4.1	Thunder FX 2	P0 3.8
ChaosImpuls	P0 3.9	Glide X-Ekos	P0 1.6	Rich Chamber	P3 0.7	Tight Space	P0 1.1
ChaseEcho	P1 2.9	Go Away	P2 1.3	Rich Plate	P3 1.7	Tiled Room	P3 0.6
CheapTV Room	P1 3.8	Good olPlate	P3 1.3	RotorCabinet	P0 3.1	Tiled Rotary	P0 3.3
Chord Walk	P2 4.2	Haas PanKnob	P1 3.4	RotoRoom	P2 2.3	Tomb Room	P1 4.0
ChordSwells	P2 3.7	HeadOn CarBy	P1 4.5	RotoRoom#2	P2 2.4	Too Deep!	P2 1.9
Chorus Plate	P0 0.5	IntoTunnel	P1 4.7	RotoRoomVox	P2 2.2	Tremolo Tap1	P2 2.5
Chorus Room	P0 0.6	JetChamber	P3 3.1	RotoRox	P2 2.1	TryTalk'n	P0 4.4
Chorus&Amb	P0 2.2	Large Room	P3 0.4	RotorWaa	P2 1.0	Under Water	P0 3.6
Chorus&Pan	P0 2.1	LatchedEkos	P1 1.6	RotoWood	P0 3.4	V-Eliminate	P0 4.7
ChorusToRvb	P0 0.7	LeviStutter	P3 4.1	RoughIdle FX	P0 4.1	VibroVerb	P3 3.7
Circular Pan	P2 1.4	LFO EQ Echo	P1 2.8	Round 147	P0 2.9	Vocal Hall	P3 2.3
Comb Room	P1 4.1	Living Room	P3 0.2	RoxStutter	P0 4.2	Vox Chamber	P3 0.8
Concert Hall	P3 1.9	Locker Room	P3 0.9	Rvb On L-R	P0 4.9	Vox Plate	P3 1.2
Concert Wave	P3 1.8	LongestLoop	P3 4.9	Sci Fi	P3 3.4	WaaPedalEko	P2 0.9
ConcertHall2	P3 2.0	Low Pass HiQ	P2 0.1	Shuffle Ekos	P1 0.5	Wet Chorus	P0 0.2
Deep Space	P3 2.4	Low Pass LFO	P2 0.2	Shuffles	P1 0.6	Wet Chorus 2	P0 0.3
DemonDescent	P0 4.0	LvlSweeper	P2 4.7	Six Across	P1 2.5	Wet Chorus 3	P0 0.4
Detune&Dbl	P0 1.0	MajorMinor	P2 4.5	Six Trips	P1 0.8	Whammy Hall	P3 3.0
Detune&Room	P0 0.9	Mars Bars	P2 4.3	Slap Plate	P3 1.4	Wide Chamber	P3 1.0
Detuned Ekos	P0 1.7	Medium Hall	P3 2.2	Sliding Eko	P1 0.7	Wizz & Wazz	P3 3.3
Dial a Delay	P1 3.5	MIDI Rotary	P0 3.2	Slope Down	P3 2.8	Wobble Plate	P3 3.5
Dly>EQ>Pans	P1 3.2	MIDIchords	P2 4.6	Small Room	P3 0.1	X Eko Flange	P0 1.4
Dotted 8ths	P1 0.4	MIDI sustain	P2 4.9	Small+Stage	P3 0.0	X-Pan Delays	P1 3.1
Drum Gate	P3 2.7	Mod Max	P0 2.7	SnareChamber	P3 0.5	X-PanEQ BPM	P1 1.7
Drum Plate	P3 1.6	Modallmpulse	P2 4.4	Spatial Hall	P2 1.5	X-TremoloTap	P2 2.6
Dyna Vibrato	P3 3.6	Movable Echo	P2 1.1	Spin & Duck	P2 2.9	Zoom Over	P1 4.2
Dyna-Hall	P2 2.0	Movable Hall	P2 1.2	Split C&E	P0 2.4	[n]Ekos/Beat	P1 0.0

MIDI Operation

All PCM 80 parameters, programs and registers can be accessed by MIDI. All MIDI applications require the PCM 80 to be connected with one or more MIDI devices with standard MIDI cables via the rear panel MIDI jacks.

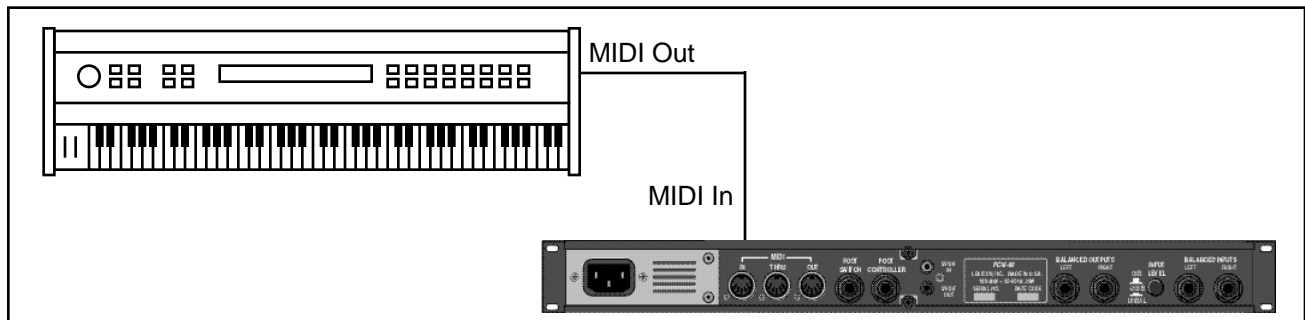
Selecting a MIDI Channel

MIDI controls, such as Transmit and Receive Channel selection are available in Control mode Row 3 MIDI. All of these controls are described in Chapter 2. Several are repeated here for your convenience.

Before using the PCM 80 with other MIDI devices, all devices must be set to the same MIDI channel. To set the PCM 80 to receive MIDI:

1. Set the controller you will be using (keyboard, sequencer, other PCM 80, etc.) to transmit on any MIDI channel (1-16).
2. On the PCM 80, press **Control**. Use Select and **Up** and **Down** to locate matrix position **3.1 Receive**.
3. Turn ADJUST to select **OFF**, **1-16**, or **OMNI** for receipt of MIDI messages.

Accessing Programs and Registers

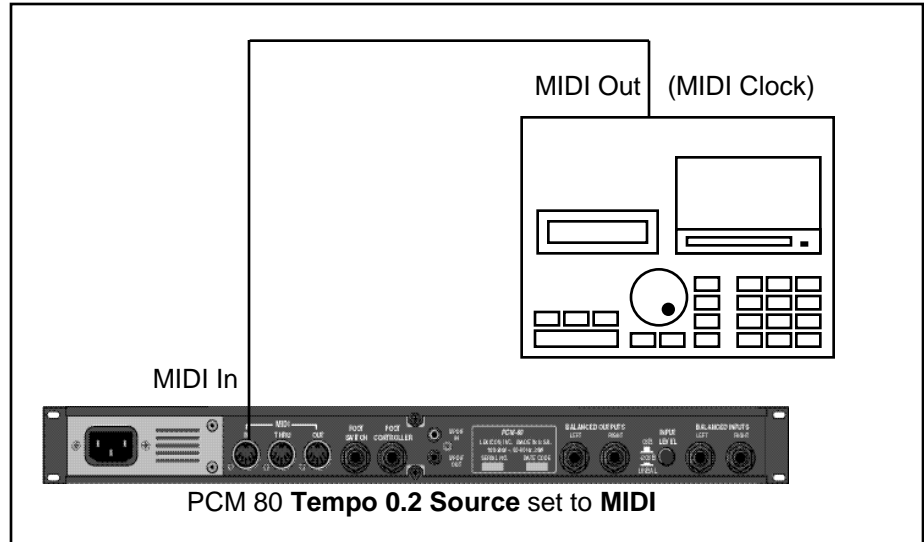


Some extremely useful effects can be created by controlling PCM 80 parameters remotely in real time. Almost all of the controllers found on a MIDI keyboard or MIDI foot controller (pitch benders, mod wheels, sliders, switches, breath controllers, foot pedals and footswitches) can be used to adjust PCM 80 parameters. We refer to this real time remote control capability as Dynamic MIDI®.

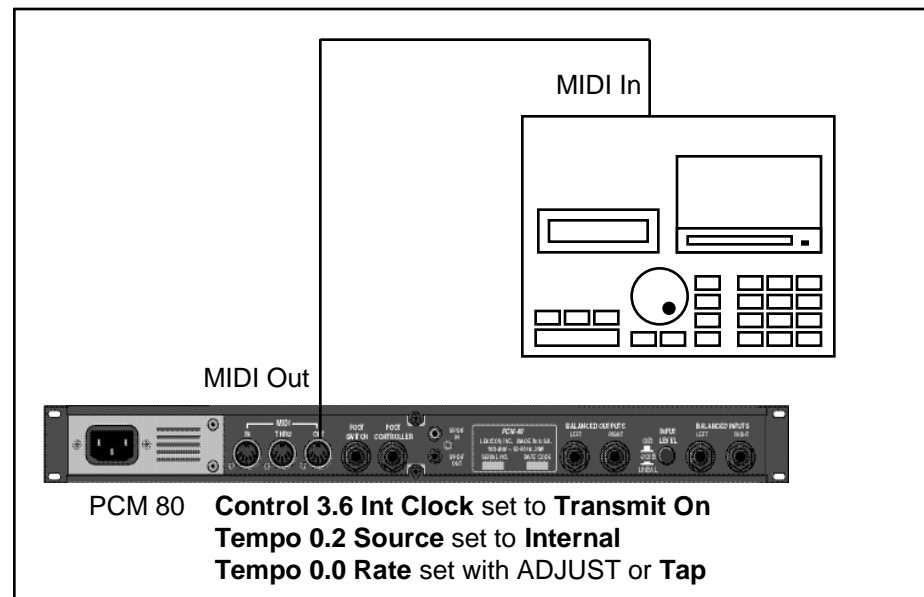
Sending a MIDI Program Change message (0-49) from the controller will load the corresponding PCM 80 register. If any MIDI sources are active as global or general purpose patches, moving the appropriate control on the controller will cause the patched destination parameter to change. (See *Patching*.) If you want to use Dynamic MIDI, but don't want the PCM 80 to load new registers when you change programs on your controller, set your controller so that it doesn't transmit Program Change messages, or set PCM 80 MIDI Program Change to Off at Control mode matrix location 3.3.

Controlling PCM 80 Tempo Rate with MIDI Clock

MIDI Tempo Control



Using the PCM 80 as a MIDI Clock Source



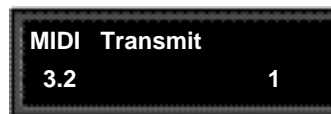
Controller quirks

Some synthesizers and controllers cannot send the full range of MIDI program change messages (1-128). Others may appear to be able to send only 32, but actually have a bank mode that *does* let you send all 128 program change messages. Also, be aware that some MIDI devices use a program numbering system that uses 0-127 instead of 1-128. If in doubt, see the manual for your controller.

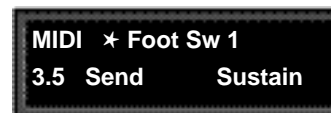
The ADJUST Knob, Foot Pedal, Foot Sw 1 and Foot Sw 2 as MIDI Controllers

You can choose to have the PCM 80 send MIDI Controller messages whenever you turn ADJUST (the soft knob in Program Banks or Register Banks modes), or to activate analog controllers connected to the rear panel Footswitch or Foot Controller jacks. This makes it possible to record real-time control of PCM 80 effects with a MIDI sequencer — A simple but quite powerful way to automate effects.

To send MIDI data from these controllers, first set Control mode 3.2 (**Transmit**) to the desired MIDI Channel. (The default is Channel 1.)



Once a transmit channel has been set, go to Control mode 3.5 to assign MIDI Controllers. Press **Load/★** to display the available controllers: **Foot Pedal**, **Foot Sw1**, **Foot Sw2** or **ADJUST**. Turn ADJUST to assign the MIDI Controller data to be sent when the displayed controller is activated. (The default assignment is **None**.).



When a PCM 80 controller is assigned to a MIDI Controller, the PCM 80 will respond to incoming controller messages as though its own controller were moved. In other words, if **FootSw1** is assigned to **Sustain**, the PCM 80 will respond to incoming Sustain messages as though FootSw1 had been activated.

Each PCM 80 preset has a unique soft knob patch that allows you to control the effect directly from Program or Register Banks mode with the ADJUST knob. You can also control the soft knob patch remotely from MIDI, or from the Foot Pedal.

Controlling the Soft Knob with MIDI

To control the soft knob with MIDI, set Control mode 3.1 (**Receive**) to the desired MIDI Channel. Set Control mode 3.5 (**ADJUST**) to the desired MIDI Controller such as **Mod Wheel**.

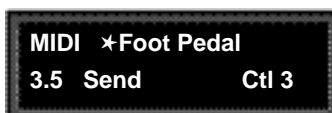
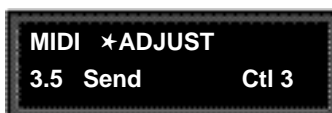


Now, the Mod Wheel on the MIDI instrument will control the soft knob patch of the running effect.

If you have a foot pedal connected to the PCM rear panel Foot Controller jack, you can use it to control the soft knob patch. (Note that no MIDI connections are required to do this.)

Controlling the Soft Knob with a Foot Pedal

Set both Control mode 3.5 **ADJUST** and Control mode 3.5 **Foot Pedal** to the same MIDI Controller.



Now, the foot pedal will control the soft knob patch of the running effect.

Program Change Messages

Reception of MIDI Program Change and Bank Select messages can be selectively enabled/disabled from Control Mode parameter 3.0, MIDI Pgm Change. The manner in which the PCM 80 interprets these messages is determined by the value of this parameter as follows:

Pgm Change: Off

All Program Change and Bank select messages are ignored. Pgm+ and Pgm- will load the next higher or lower program in the current bank.

Pgm Change : On

Program Change messages 0-49 correspond to PCM 80 Effects 0.0 -4.9 in the current bank. Program Change messages 50—127 are ignored. Pgm+ and Pgm- will load the next higher or lower program in the current bank.

The current bank can be changed with MIDI Bank Select Messages as follows:

- 0-3: Program Banks 0-3
- 4: Internal Register Bank
- 5-9: reserved
- 10-56: Memory Card Banks

The number of banks available on a given card will vary with card size as follows:

Card Size	# Banks
64	2
256	11
512	23
1 Meg	47

Pgm Change: Map

Program Change 0-127 can be mapped to any PCM 80 Effect in any internal or card bank. Two 128 element maps are stored internally, additional maps may be stored on RAM cards.

Map 0	Map 1
MIDI 0 = P0 0.0	MIDI 0 = P2 2.8
MIDI 127 = P2 2.7	MIDI 127 = R 4.9

Pgm+ and Pgm- will load the next higher or lower program in the map.

Pgm Change: Chain

Any Program Change number can be selected to load any one of ten customized effect "chains." Once a chain is loaded, effects in the chain are accessed by the controller patched to Pgm + and Pgm - (program increment and program decrement).

SysEx Automation

The PCM 80 will transmit SysEx automation messages when Control Mode parameter 3.4, MIDI Automation is set to On. All changes made by front panel operations are transmitted as PCM 80 SysEx messages. This is intended primarily for use by editor programs and in configurations where it is desirable for one or more PCM 80s to be slaved to a single PCM 80 acting as a + R V W. The current mode (Program Banks, Register Banks, Edit, Control or Tempo) of the Client does not follow the Host, but the actual parameter values do. (SysEx automation can also be stored on a sequencer and replayed in real-time. As a general rule, automating more than two or three SysEx program changes at once is not recommended.)

The PCM 80 can receive SysEx messages when Control mode 3.7 MIDI SysEx is set to **Receive On**. Note that when using SysEx automation, the device of the receiving PCM 80 must match the Target ID of the transmitting PCM 80.

The Target ID setting can be adjusted from Control 3.4 MIDI Automation. It is selected by pressing **Load/★** after setting Automation to **On**. The default setting for the Target ID is **All**.

The Device ID setting can be adjusted from Control mode 3.7 MIDI SysEx. It is selected by pressing **Load/★** after setting SysEx to **Receive On**. The default setting for the Device ID is **0**.

Controller Automation

For applications where it is desirable to "automate" changes made to PCM 80 effects with its own controls (ADJUST knob, Foot Pedal, Footswitch 1 or Footswitch 2), we recommend assigning the controllers to MIDI destinations and recording the changes with a MIDI sequencer (see Control Mode parameter 3.5, MIDI Destinations).

Reset All Controllers

The PCM 80 recognizes the "Reset All Controllers" message. When received, all patched parameters are reset to their stored values. Patched parameters may also be reset from the PCM 80 front panel —Control Mode parameter 3.0 (the message will be transmitted from the PCM 80 as well).

MIDI Clock and Clock Commands

The PCM 80 recognizes MIDI clock messages when Tempo Mode parameter 0.2, Tempo Source is set to MIDI. Any Delay or LFO parameter set to display tempo values will be synchronized to the tempo of the incoming MIDI clock.

MIDI Clock and Clock Commands are also available as Dynamic MIDI patch sources. The value of MIDI Clock when used as a patch source is a linear scaling of 0 to 127 (0 = 40 BPM and 127 = 400 BPM). The value of Clock Commands when used as a Dynamic MIDI patch source is 1 for START and CONTINUE and 0 for STOP.

Automation

Dynamic MIDI

The following MIDI messages are available as Dynamic MIDI patch sources:

- MIDI Controllers 1-119
- Pitch Bend
- After Touch (Polyphonic and Channel combined)
- Velocity (Note On)
- Last Note
- Low Note
- High Note
- Tempo (40–400BPM is converted to controller range 0-127)
- Clock Commands

These MIDI messages are also available as threshold sources for several Modulation parameters: AR Env, Latch, Sw 1 and Sw 2. They may also be used as a tap source for controlling Tempo.

MIDI Implementation Details, including System Exclusive documentation, are available to assist experienced programmers in developing software for use with the PCM 80. These can be obtained directly from Lexicon.
Request: PCM 80 MIDI Implementation Details.

Bulk Data Dumps

Control mode 3.8 (**MIDI Dump**) allows selection of the following types of bulk data to be dumped directly from the PCM 80 to another PCM 80, or to editor/librarian software.

Displayed Name	Description
CurrentPgm	Currently running effect
Bank R	Internal Register Bank
Bank C0-CK	Card Banks (card must be inserted)
Map 0, 1	Internal Program Change Maps
Map 2-33	Card Program Change Maps (card must be inserted)
Chain 0-9	Internal Program Chains
Chain 10-19	Card Program Chains (card must be inserted)
Int Chains	All Internal Program Chains
Ext Chains	All Card Program Chains (card must be inserted)
Setup C	Current Setup
Setup 0-4	Internal Setups
Setup 5-9	Card Setups

Use ADJUST to select the bulk data type. Press **Store** to transmit the data .

MIDI Implementation Chart

Lexicon PCM 80
Digital Effects System

Function		Transmitted	Recognized	Remarks
Basic Channel	Default Changed	1 1-16	1 1-16	
Mode	Default Messages Altered	X X	Mode 1, 3 X X	
Note Number		X	0-127	Last Note, Low Note, High Note used as controllers
Velocity	Note ON Note OFF	X	O 9n v = 1-127	used as controller
After Touch	Keys Channel	X X	X O	
Pitch Bend		X	O	
Control Change	1-119	OX	OX	ADJUST, Footpedal, Footswitch 1, and Footswitch 2 can be assigned controllers 1-119 for MIDI transmit
Program Change	True #	X	0-127	See Implementation Details
System Exclusive	Lexicon Real-time non Real-time	OX X X	OX X OX	product ID=6 device ID
System Common	:Song Pos :Song Sel :Tune	X X X	X X X	
System Real Time	:Clock :Commands	OX X	OX OX*	START, STOP and CONTINUE are patchable as a switch: START/CONTINUE=127; STOP=0
Aux Messages	:Local ON/OFF :All Notes OFF :Active Sense :Reset All Controllers	X X X OX	X O X OX	
Notes				

Mode 1: OMNI ON, POLY
Mode 3: OMNI OFF, POLY

Mode 2: OMNI ON, MONO
Mode 4: OMNI OFF, MONO

O : Yes OX: Selectable
X : No

Troubleshooting

This chapter is intended primarily to help you recognize some common error states which can be corrected from the PCM 80 front panel, or by simple means such as cable replacement. Any error states which are not covered here should be referred to your local dealer for service by a qualified technician.

In a low-voltage, or "brown-out" condition, the PCM 80 will freeze in its current state. None of the controls will have any effect. When power returns to a normal level, the unit will reset itself as though it had just been powered on. If the unit does not reset itself, turn the power OFF, then ON to resume normal operation.

Low Voltage

Temperature extremes may cause the PCM 80 to exhibit unpredictable behavior. If the unit has been subjected to temperatures below 32°F (0°C) or above 95°F (35°C), it should be turned off and allowed to return to normal temperature before use. The unit may be damaged by exposure to temperatures below -22°F (-30°C) or above 167°F (75°C), or by exposure to humidity in excess of 95%. If a unit exposed to such conditions fails to operate after it returns to a normal operating temperature, contact your local service representative.

Overheating

The PCM 80 doesn't respond to MIDI Program Changes.

Check **Receive** control at Control mode 3.1 and make sure it is set to **On**. Check the MIDI Channel selected as well as the MIDI Channel of the transmitting device. Make sure that **Pgm Change** at Control mode 3.3 is set to **On**. Also check MIDI In/Out connections between the units.

Common MIDI Problems

MIDI Program Change numbers are off by 1.

The PCM 80 transmits and recognizes ProgramChange messages 0-127. MIDI devices which transmit 1-128 rather than 0-127, will be off by 1. Simply adjust by 1 when working with such devices.

The PCM 80 doesn't respond to SysEx commands.

Check the **SysEx** setting (and the Device ID selection) at Control mode 3.7.

The PCM 80 does not transmit SysEx Automation commands.

Check the **Automation** setting (and the target device ID selection) at Control mod 3.4.

Operational Problems **The PCM 80 will not lock onto an incoming digital signal.**
Check the cables that you are using. **DO NOT USE ANALOG AUDIO CABLE TO CONNECT DIGITAL AUDIO.**

Also check to make sure that your input signal complies with S/PDIF format standards. The PCM 80 will recognize AES professional format signals from an appropriate connector, but will not necessarily read and transmit encoded information accurately.

No Digital Audio Output

Check the **Analog Lvl** and **Digital Lvl** controls at Control mode 0.1 and 0.2.

No Effects Output

Power On Behavior Check the setting of Mix Mode at Control mode 1.1. Also verify that any controllers patched to **FX Lvl**, **Input Level**, or **Mix** are not turned off.

The PCM 80 performs a series of self tests each time it is powered on, then displays the PCM 80 copyright notice. This should be followed by the display and loading of the last loaded effect. If this sequence does not occur, contact Lexicon Customer Service.

You can restore the PCM 80 to its default state *without* erasing registers by restoring the factory default setup:

Restoring Factory Default Settings

1. Press **Control**.
2. Use the **Up** and **Down** buttons to locate **Row 4 Setup**.
3. Turn SELECT to **4.1 Load**.
4. Turn ADJUST counterclockwise to select "Factory Settings".
5. Press **Load/★**. The PCM 80 will display the message "Setup restored".

The following table shows the parameters which comprise a setup, along with the factory default setting of each parameter.

Control Mode			
Matrix Location		System Parameter	Default Setting
Audio	0.0	Word Clock	Internal 48kHz
	0.1	Analog Lvl	100%
	0.2	Digital Lvl	0%
	0.3	Auto Lock	Off
	0.4	SCMS	Multi Copy
	0.5	Emphasis Bit	Pass Thru
	0.6	Output Level	+4dBu
System	1.0	Edit Mode	Go
	1.1	Mix Mode	Pgm
		Global Mix Value	100% Wet
	1.2	Tempo Mode	Pgm
		Global Tempo Value	120 BPM
	1.3	Bypass Mode	InputMute
		Bypass Src	Off
	1.4	Pgm Bypass	AllMute
1.5	Mem Protect	On	
1.6	Auto Load	Off	
1.7	Patch Update	Delayed	
MIDI	3.1	Receive	OMNI
	3.2	Transmit	1
	3.3	Pgm Change	On
		Pgm+	Off
		Pgm-	Off
		Map select	0
		Chain	MIDI
	3.4	Automation	Off
	3.5	Footpedal	None
		Sw 1	None
		Sw 2	None
		ADJUST	None
3.6	Int Clock	Off	
3.7	SysEx	On	
	Device ID	0	
3.9	Dump Speed	Slow	
Tempo Mode			
Matrix Location		System Parameter	Default Setting
Tempo	0.2	Source	Internal
Tap	1.3	Display	On

Reinitialization**Reinitializing will erase all registers and setups**

The following procedure will return the PCM 80 to the state it was in when shipped from the factory. This includes erasing all registers and setups, as well as restoring all of the default settings:

1. Press **Control**.
2. Use the **Up** and **Down** buttons to locate **Row 1 System**.
3. Turn SELECT to **1.8 Initialize**.
4. Press **Store**. The PCM 80 will display the message "Are you sure? (Press STORE).

If you don't want to reinitialize your unit, press any button *except* **Store** to return to matrix position 1.8.

If you press **Store** in response to this message, the display will flash "Restoring original factory settings" and your unit will be reinitialized.

PCM 80 Specifications

Audio Input	Connectors:	Combined 3 pole XLR and 1/4 inch T/R/S phone jacks (2)
	Impedance:	0 dB/BAL switch position: 100k Ω , balanced -20 dB/UNBAL switch position: 50k Ω , unbalanced
	A/D Dynamic Range:	100 dB 1 kHz, signal present, unweighted
	Levels:	0 dB/BAL switch position: -2 dBu min for full scale, +20 dBu max -20 dB/UNBAL switch position: -22 dBu min for full scale, 0 dBu max
	CMRR:	0 dB/BAL switch position: 40 dB minimum, 10 Hz to 20 kHz
Audio Output	Connectors:	1/4 inch T/R/S phone jacks (2); balanced XLRs, pin 2 "high" (2)
	Impedance:	125 Ω , each side, balanced
	D/A Dynamic Range:	95 dB 1 kHz, signal present, unweighted
	Levels:	+18 dBm max, full scale (+4 dBu setting) balanced, unbalanced +4 dBm max, full scale (-10 dBu setting)
	Protection:	Relays provided for output muting during power on/off
A/D Performance	Frequency Response:	10 Hz to 20 kHz, \pm 0.5 dB
	Crosstalk:	-65 dB max, 10 Hz to 20 kHz
	S/N Ratio:	100 dB min, 20 kHz bandwidth
	THD:	0.004% max, 10 Hz to 20 kHz
	Dynamic Range:	>100 dB, 20 kHz bandwidth
	Delay:	24 samples (0.54 msec for 44.1 kHz, 0.50 msec for 48 kHz)
	Frequency Response:	10 Hz to 20 kHz, \pm 0.5 dB
D/A Performance	Response:	10 Hz to 20 kHz, \pm 0.5 dB
	Crosstalk:	-80 dB max, 10 Hz to 20 kHz
	S/N Ratio:	100 dB min, 20 kHz bandwidth
	THD:	0.006% max, 10 Hz to 20 kHz
	Dynamic Range:	>95 dB, 20 kHz bandwidth
	Delay:	50 samples (1.13 msec for 44.1 kHz, 1.04 msec for 48 kHz)
	Frequency Response:	10 Hz to 20 kHz, \pm 0.5 dB
A/A Performance	Response:	10 Hz to 20 kHz, \pm 0.5 dB
	Crosstalk:	-55 dB max, 10 Hz to 20 kHz
	S/N Ratio:	90 dB min, 20 kHz bandwidth
	THD:	0.008% max, 10 Hz to 20 kHz
	Dynamic Range:	>94 dB, 20 kHz bandwidth, >92 dB per AES-17 section 7.3

Digital Audio Interface	Connectors: Coaxial, RCA type Format: conforms to S/PDIF IEC-958 consumer standards Sample Rates: 44.1 kHz, 48 kHz
Internal Audio Data Paths	Conversion: 18 bits DSP: 18 to 24 bits
Audio Memory Configuration	Base memory: Two 256k x 18 DRAMs User Expansion: Two SIMM sockets provided for either 1 Meg x 9, 4 Meg x 9 or 16 Meg x 9, 70 nsec DRAM modules
External Memory Card	Connector: Accepts PCMCIA Type I cards, 68 pins Standards: Conforms to PCMCIA 2.0 / JEIDA 4.0 Card Format: Supports up to 1MB SRAM (attribute memory not required)
Control Interface	MIDI: 5-pin DIN connectors provided for MIDI IN, THRU, & OUT Footswitch: 1/4 inch T/R/S phone jack provided for 2 independent momentary footswitches System detects normal-open, or normal-closed on power up Foot controller: 1/4 inch T/R/S phone jack provided for footpedal (100Ω minimum, 10kΩ maximum impedance)
General	Dimensions: 19.0"W x 1.75"H x 12.0"D (483 x 45 x 305 mm) 19 inch rack mount standard, 1U high Weight: Net: 6.4 lbs (2.9 kg) Shipping: 9.5 lbs (4.3 kg) Power Requirements: 100-240 VAC, 50-60 Hz, 35 W, 3-pin IEC power connector RFI/ESD: Conforms to FCC Class B, EN55022 Class B (CE), IEC 801-2, IEC 801-3 Environment: Operating temperature: 32° to 104°F (0° to 40°C) Storage temperature: -22° to 167°F (-30° to 70°C) Humidity: maximum 95% without condensation

Unless otherwise noted, all audio specifications assume rear-panel switch set to BAL, input level control is set for unity gain (0dB), and analog I/O connections wired for balanced configuration.

Specifications subject to change without notice.

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