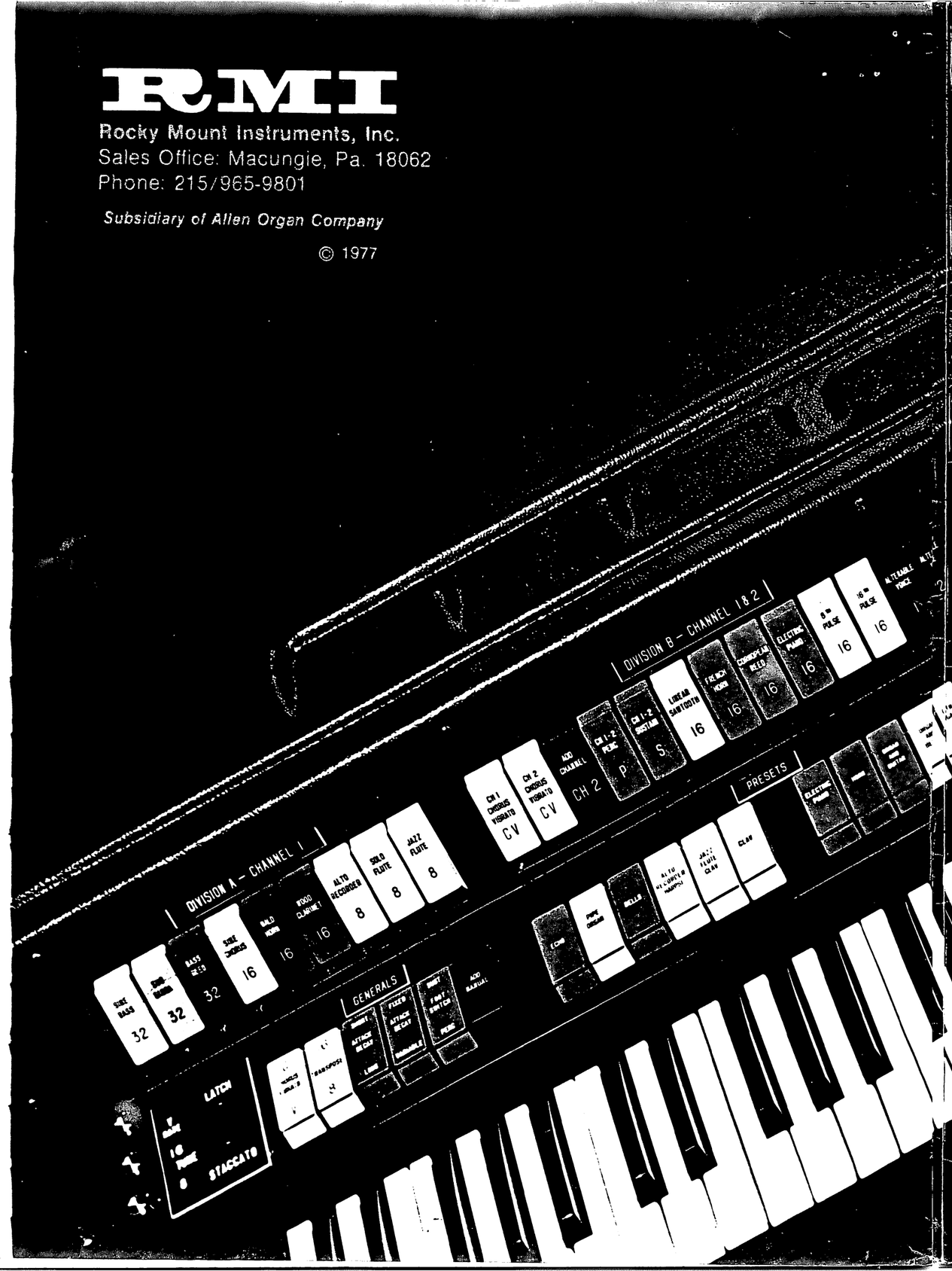
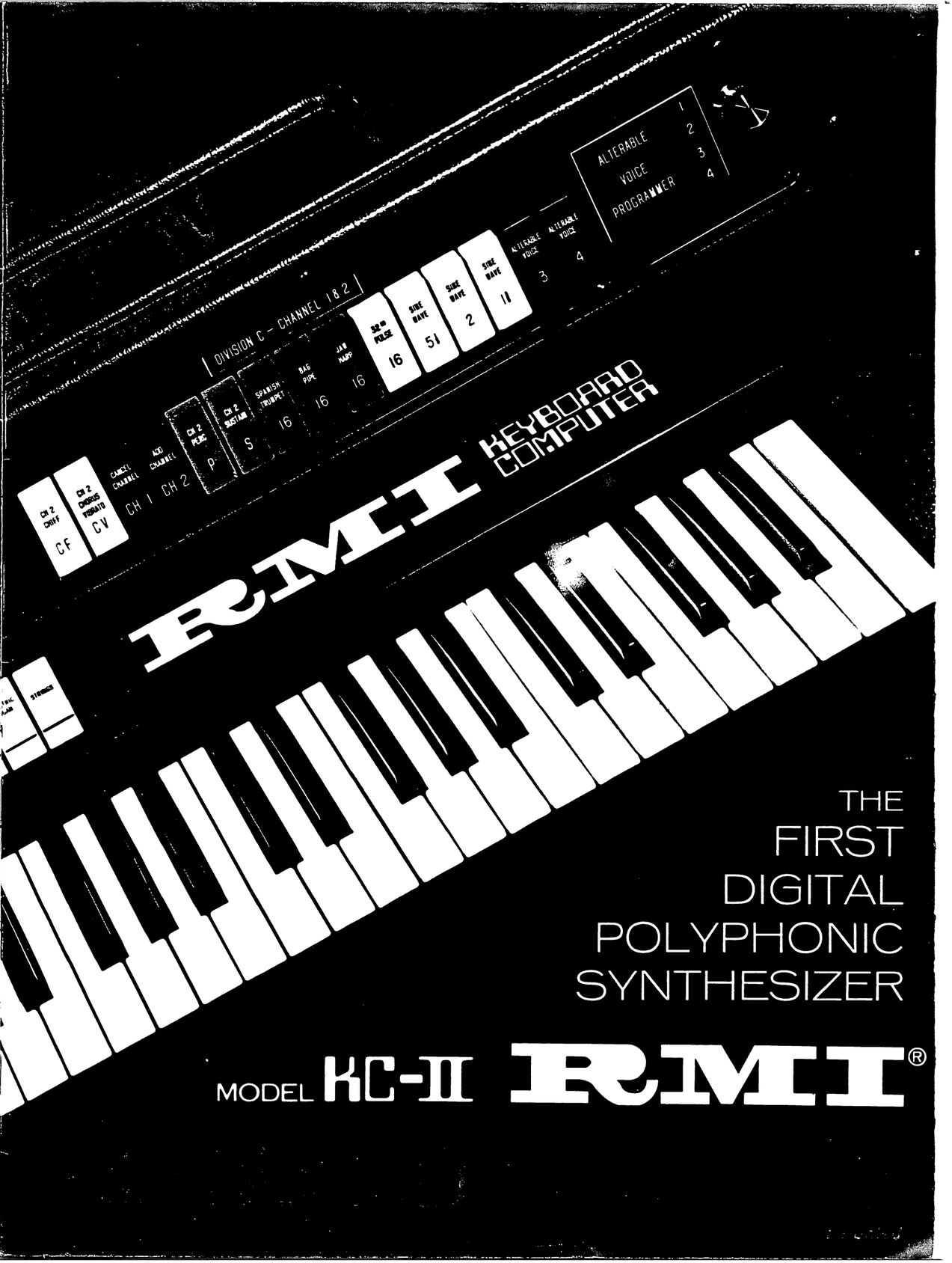
RMI

Rocky Mount Instruments, Inc.
Sales Office: Macungie, Pa. 18062
Phone: 215/965-9801

Subsidiary of Allen Organ Company





RMI KEYBOARD COMPUTER

Model KC-11 Keyboard Computer:

In 1974 musicians hearing the Keyboard Computer for the first time responded with comments like "Astounding!" or "Can't believe it!" The Computer's ability to polyphonically generate twelve voices simultaneously added to the excitement. The idea began to catch on. Some "big-name" artists picked it up. Concerts, record albums, and two years later, we realized the sound of the KC was here to stay. It was time to create KC-II. Making the Computer easier to play, we added a new Permanent Voice Memory containing popular KC sounds of the past few years, Presets for quick changes, a few extra pedal controls for further flexibility, and Rocker Controls with greater function description.

The RMI Keyboard Computer is: NOT a Piano . . . **NOT** a Synthesizer . . . **NOT** an Organ . . .

The Keyboard Computer Tone Generation System has: NO Audio Oscillators . . . **NO** Formant Filters . . . **NO** Organ Divider Circuits . . . **NO** Electro-Mechanical Moving Parts . . . **NO** Voltage Controlled Tracking Trims or Op Amp Off-Set Trims . . . **NO** Critical Periodic Calibrations to be Maintained.

The RMI Keyboard is truly a Musical Digital Computer:

If a sound is to be duplicated, the harmonic content of its waveform must be duplicated. Filter circuits can extract waveforms from oscillators. However, filtering is largely guesswork, and control of many complex waveforms is just about impossible, as anyone familiar with synthesizers will attest. A more predictable method has arrived. Allen Organ introduced a new system in 1971 to be shared by RMI—the Musical Digital Computer.

The principle of operation is similar to that of an artist's reproducing an enlarged picture on a billboard employing a grid of squares to aid their accuracy. The waveform to be reproduced is analyzed on a graph. Points where the waveform intersects the grid are assigned numbers and the numbers are stored in the computer. Reading this group of numbers out at the frequency of a given musical pitch regenerates the waveform. This concept provides an order of accuracy in waveshape control never before achieved. With all waveforms reduced to a series of numbers, the ability to repeat a given sound is absolutely precise and very quick—a feature concert and studio musicians alike will appreciate. To indefinitely expand the Computer's tonal range, these number series representing waveforms have been punched on standard computer cards—hundreds are available from an ever increasing Tone Card Library for use in the Computer's Card Reader. The most popular and useful sounds have been stored in a Permanent Memory LSI device that can be activated manually or by Twelve Presets. Sounds from the Permanent Memory and Card Reader can be mixed in any combination.

Presets allow instant change of contrasting sounds:

Strings—musicians who have heard agree nothing else approaches the realism of the KC strings. Attack/Decay and Vibrato are pedal-controlled. Even the "bowing noise" is heard.

Electric Organ—tell-tale sound of that famous electro-mechanical organ with drawbars, third harmonic percussion and two speed revolving speakers.

Organ and Bells—Variable with foot pedals from Bells to high-pitched funky organ percussion.

Organ and Guitar—Stereo effect. Guitar can be stylized with Pitch Bender pedal from a sliding Pedal Steel to Rock Guitar.

Horn—mellow and rich non-imitative sound good for jazz work.

Electric Piano—warm and realistic, complete with sustain pedal.

Clav—highly characteristic.

Jazz Flute and Clav—stereo effect. Jazz Flute complete with "over-blow" transients due to "tongueing".

Alto Recorder and Harpsichord—stereo effect. Exceptionally delicate and articulate.

Bells—clanging realism due to KC's forte in complex waveforms and chorus tuning.

Pipe Organ—Diapason Chorus with four-rank Mixture.

Echo—notes repeat like tape echo, but in a different tone color one octave lower. Rate is pedal-variable.

Add Manual—instantly combines manual set-ups with presets.

Other popular set-ups:

Calliope with Chiff, Cathedral Choir, Ring Modulator Gong, Steel Drum, Sax with Random Over-Blow Effect, Marimba, Tubular Chimes, Assorted Pulses for Funk sound, Several Bell effects, Jaw Harp, Bagpipe, Banjo, etc.

Processors Create Contrasting Voices in Stereo:

Twelve independent Digital Voice Processors are each capable of generating independent frequencies, attack/decay envelopes, and waveforms. Processors can be assigned to the keyboard in one, two, or three-to-a-key modes for multiple voice-per-key effects. Processors can be split in Stereo for contrasting effects—example: Alto Recorder vs. Harpsichord. Groups of Processors can be assigned various pitch deviations such as Chorus Tuning or Vibrato. Chorus Tuning is a phenomenon of acoustic instruments due to slight "imperfections" in tuning—slight beats are heard between two notes closely in tune.

Envelope Controls Provide a Degree of Sophistication beyond Synthesizers:

Digital Envelope Generation provides a stop-motion feature freezing a note or chord while other notes or chords can be played independently—handy for multiple keyboard performers who need a sustained chord on one instrument while playing another. Successive chords can be cross-faded or latched at any point in the fade. Percussion, Sustain, or Variable Attack/Decay can be assigned to different groups of Processors for multiple envelope effects in Stereo. Scaled Attack/Decay is an effect musicians have grown to expect from acoustic instruments—higher pitched notes are faster and lower notes are slower due to physical size and resonance of the instrument (example: Tuba vs. Piccolo). The KC offers two different curves of Scaled Attack, one Scaled Decay curve, a Pedal-Variable Attack/Decay, or an abrupt Staccato Attack/Decay for funky playing. Certain envelopes can be Delayed for Echo effects.

Pedal Assembly Provides Expression and Flexibility:

When both hands are busy at a Polyphonic keyboard, Pedal Controls become an absolutely necessary part of expression; therefore, RMI includes its pedal assembly at no extra charge. Volume Pedals control the left and right Stereo Channels independently. Length of Percussion, Sustain, and Variable Attack/Decay Modes are pedal-controlled. Pitch-Bending a Perfect Fourth sharp or flat is controlled by a spring-loaded pedal to assure return to standard pitch. Sustain Latch, Staccato Mode, Percussion, and Sustain are footswitch controlled. Vibrato intensity, a critical factor in music, varies from none to a shaking synthesizer effect with the Vibrato Pedal.

RMI is famous for its Rugged Construction and Quality:

Feel it. Lift it. Rap on the case—tough! Check out our legs—sturdy, but easy to set up. Open the lid and look inside—notice the neatness? Feel the natural wood key action with individually-adjustable tension, travel, and point-of-contact—we build it ourselves. Tilt the Rocker Controls—notice the feel? Rocky Mount Instruments are built to last.

Package:

High-impact molded case withstands rough handling on the road. Keyboard and controls have locking cover. Case: height 9-3/4″—width 44″—depth 24-1/2″—weight 99 lbs. Four heavy chromed steel legs unfold adding 26-3/4″ to total height.

RMI KEYBOARD COMPUTER

MODEL KC-II

FROM THE COMPANY WITH EXPERIENCE IN DIGITAL POLYPHONIC SYNTHESIS

RMI PIONEERS DIGITAL SYNTHESIS

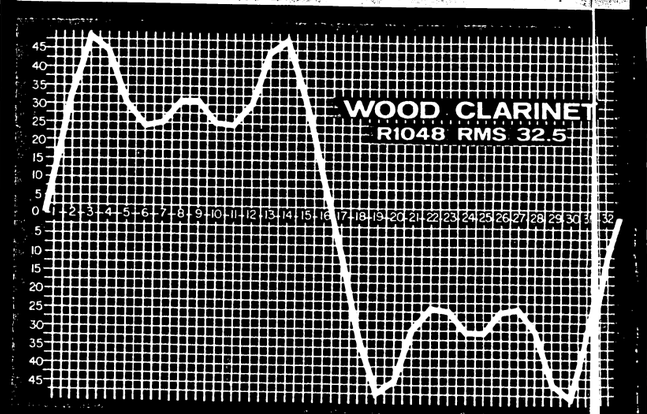
Forgotten the last time you used a mechanical adding machine? That's because everything is going DIGITAL! The reason—a desire for increased accuracy inherent in digital systems and high function density in a small, reliable, and economical package. Articles have proclaimed digital synthesis as the ultimate musical instrument system of the future. RMI is in that future NOW and it works! Since 1971, our parent company, Allen Organ, has been marketing musical instruments relying exclusively upon digital waveform generation. This experience has given RMI the knowledge to build a reliable, easily playable, and highly musical instrument with sounds musicians are seeking. You will find other companies just beginning to experiment while RMI's digital ability is already well-established.

NEW TONAL FREEDOM

Free from sawtooth or pulse wave "mother tones" of earlier synthesizers, RMI's digital system can create a wider range of timbres with greater precision and absolute repeatability. Controls are binary—on/off. Gone are the approximations, critical adjustments and unrepeatable "patches" associated with slidepots and knobs. Even the most complex effects are quick and exact.

DIGITAL WAVEFORM GENERATION

An order of accuracy in control never before achieved. To control sound is to control waveshape. Therefore better waveshape control means better sound control. KC-II employs no audio oscillators. Instead, waveforms are plotted on an amplitude-versus-time graph. Points of intersection on this grid are assigned binary code numbers representing the waveform. Even the most complex waveshapes can be "frozen" for accurate reconstruction at a later date. By reading out the entire group of numbers and translating them into relative voltages, at a rate of 440 times per second, for example, a tone of middle "A" can be generated. This tone will exhibit all timbre quality inherent in the waveshape. Timbre can remain stable regardless of frequency (pitch). Tracking problems, along with filters, are eliminated. A whole new world of exotic sounds opens up—both realistic and abstract.



PERMANENT WAVEFORM MEMORY

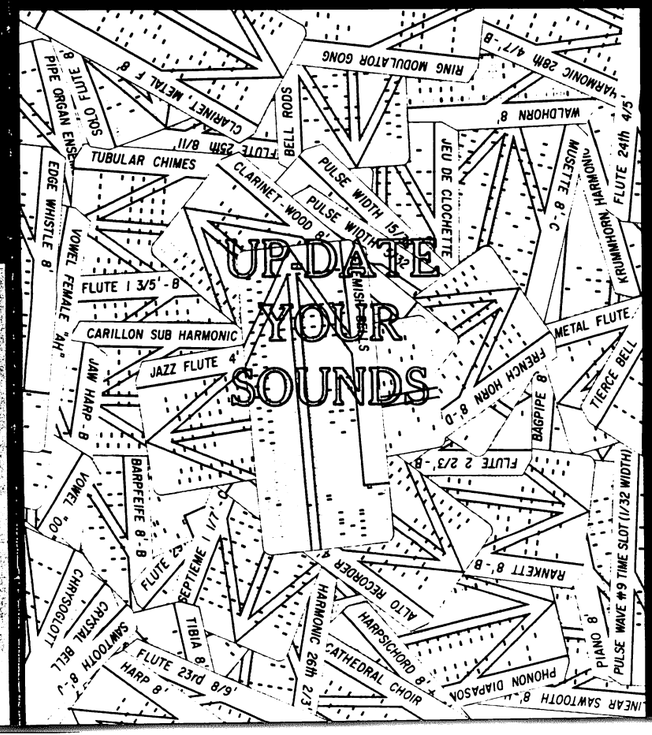
Years were spent working with musicians developing timbres constituting useful and popular sounds. These timbres, represented by 38 individual waveforms in binary code, have been permanently stored in the memory of KC-II. In live performance, these waveforms can be recalled instantly either individually or mixed in groups.

ALTERABLE WAVEFORM MEMORY

Although live performance demands certain rapid availability of "packaged" sounds, no performer likes to have creativity grounded by fixed options. Additionally, you don't want the sounds of your instrument to become obsolete with the advent of next year's model. Alterable Voice Programming solves both problems. An optical reader accepts Tone Cards which contain binary codes representing waveforms. A total of four cards can be programmed. Once programmed, these additional waveforms behave just like the permanent memory and can be used individually, in groups, or mixed with the permanent memory waveforms in any combination. Programming can be up-dated by merely slipping another Tone Card in and out.

TONE CARD LIBRARY

Our Tone Card Library is to the musician what a paint store is to an artist—it contains the materials in raw form. Currently, cards number in the hundreds with new sounds and variations under continual development. Each card contains not only timbre information, but also precise amplitude (R.M.S. value) and pitch data. Many cards are available in multiple amplitudes for mixing a wide variety of relative strengths. As many as 20 pitch references are available from 16' through 1/2' and including such esoteric fractions as 2 2/7', 1 5/11', and 8/9'. Creativity potential is staggering.

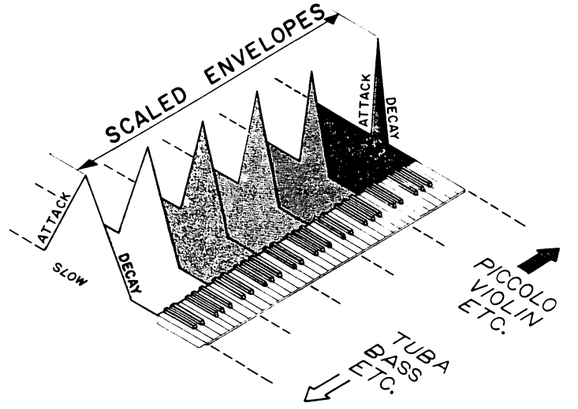


TWELVE INDEPENDENT DIGITAL ENVELOPE GENERATORS

Substantially increased control and musical merits are gained over voltage-controlled predecessors while critical calibrations are eliminated. Envelopes are plotted on amplitude-versus-time grids much like our digital waveforms. As attack and decay stages are "clocked", amplitude values rise and fall in precise sequence creating envelope curves. Several independent curves including an abrupt gating can be selected in combinations. Envelope timing can occur from two sources:

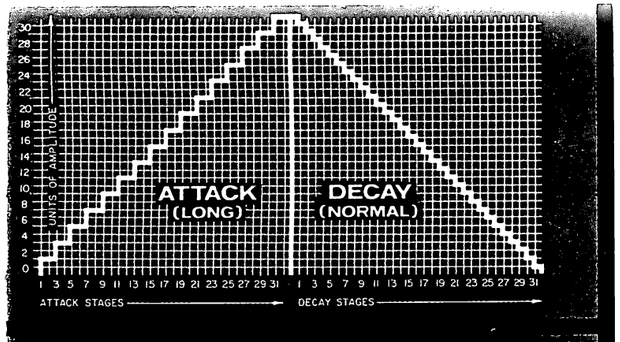
1. Variable Rate Pedal
2. Key Frequency (scaled attack/decay: high notes speak quickly, low notes speak slowly—12 independent rates possible simultaneously)

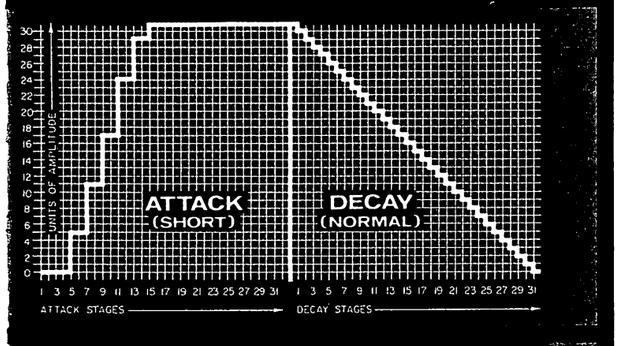
Clocking sources can switch automatically while crossing from attack to decay ramps or upon key release. Also, clocking can be stopped on specific voices to create "drones" while others are free to play. Envelopes can be mixed to obtain more complex curves or even envelope timbral changes. Total independent polyphony and creativity extend well beyond familiar ADSR devices.

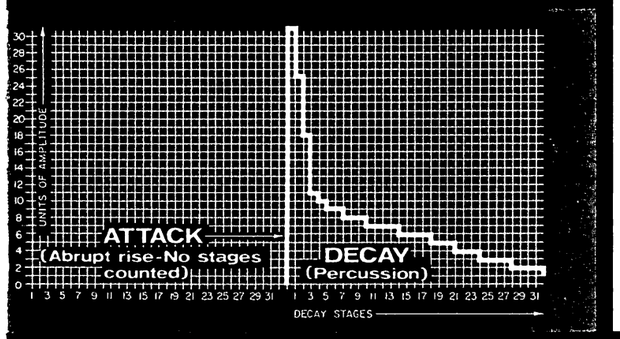


NATURAL NOISES IN ACOUSTIC INSTRUMENTS

Noises are a natural inherent characteristic of acoustic instruments: the squeak of round-wrapped guitar strings, the "chiff" of flutes and organ pipes, valve noises, air noises, etc. Musicians have become accustomed to hearing these noises integrated with the sounds of acoustic instruments. Remove these noises and the resulting sound will be unnatural—too perfect or sterile. Digital waveforms and envelopes integrate certain subtle noises with the playing of each note for a natural sound. As a result, KC-II seems to "breathe" when played. Cello, viol, or any bowed string is another example of this noise phenomenon. A well-rosined bow is sticky. Now notice, like the bow, the long attack ramp in the envelope graph is not smooth. There is a remarkable similarity in the subtle noises generated by the bow and slower digital envelopes. This factor adds to the excellence of the KC-II strings.



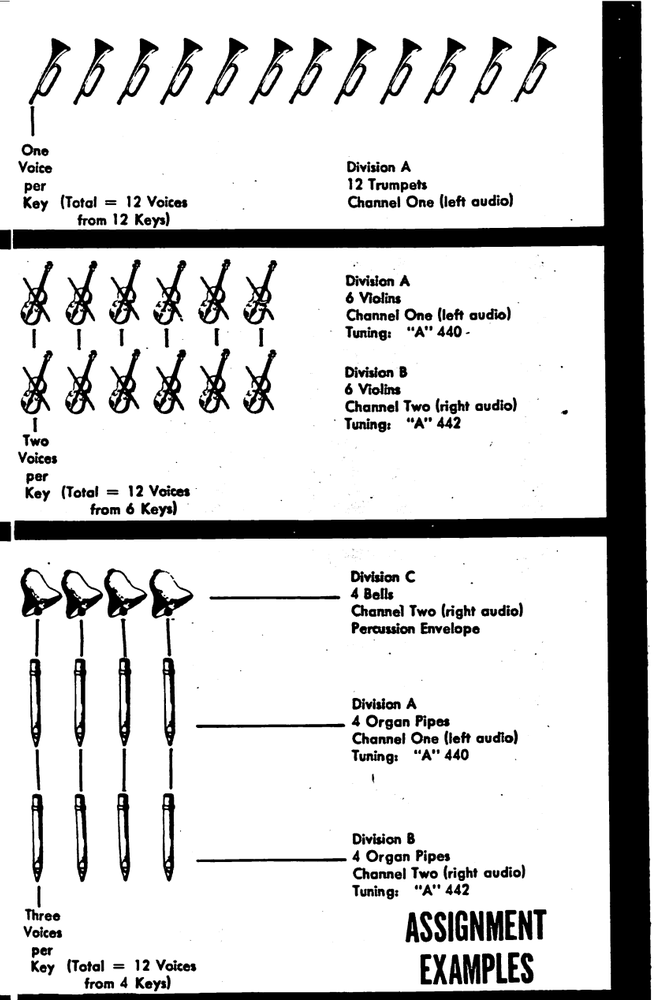




POLYPHONIC VOICE ASSIGNMENT— 12 VOICES

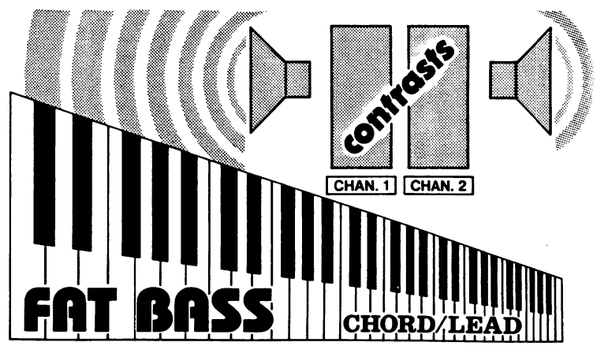
There is no "free lunch": the more you spend for each voice generating unit, the more sophisticated, flexible and better sounding it can be. Therefore, among keyboards in the same financial ballpark, those with more voice generators will, of necessity, have less control, and those with fewer voice generators can afford more control (over each sound). Also, the least control will come from systems whose generators are hard-wired to each key—one for every note. Such systems are inflexible and, in essence, are filtered organs. For example, when playing a 6-note chord on a 61-note organ approximately 9/10's of the tonal resources are lying dormant. The longer the keyboard, the more generators wasted. When you are paying for each generator, you want a more cost-effective system. RMI has a new approach.

Survey your manual anatomy—ten fingers? KC-II provides twelve voice generators (two more than you have fingers). In fact, you probably average somewhere between four and six voices at a time in most music (Bach did well with four). Many interesting effects and "fat" sounds are created by having multiple voices on each key. Dividing our twelve voices between Divisions A and B, A and C, or A, B, and C allows one, two, or even three voices per key. Selecting the proper assignment mode for your music will keep most of the voices speaking most of the time—an efficient use of your tonal resources. Now, even simple chords can create big, rich, and complex sounds.



SCALED ENVELOPES

Scaled envelopes are a natural phenomenon found in acoustic instruments. High-pitched instruments (example: piccolo, violin) tend to exhibit rapid attacks and decays due to their small physical size. However, a large tuba or bass viol would be much slower since it takes time for the air inside the case to begin oscillation. Once set in motion, and due to case resonances, oscillation continues slightly beyond the time when the stimulus (blown air, bowing, etc.) is removed. A large chord played on KC-II could have as many as twelve different attack and decay rates simultaneously. This feature lends great plausibility to orchestral effects.

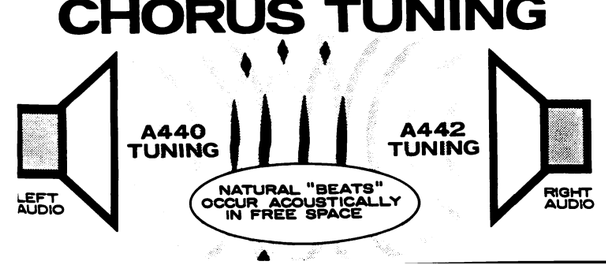


CONTRASTING VOICES— LIVE PERFORMANCE FLEXIBILITY

Predictable and accurate control over quick changes is the secret to live performance. KC-II provides much of the flexibility of double keyboards: contrasting envelopes and waveshapes can be assigned opposite audio channels for rapid control with pedal faders. Contrasting effects can even be mixed in a single channel with a third effect on the opposite channel, keeping your audience guessing. Fat and rich bass lines from the lower end of the keyboard are available simultaneously with clean and brilliant chords or lead lines from the upper end—all without split keyboard problems. Digital waveforms make it possible.

DIGITAL CHORUS/VIBRATO

One of the beauties of acoustic instruments is their slight imperfection in pitch when played in ensemble. KC-II has stored this "imperfection" precisely for recreation of the phenomenon. Chorus de-tuning or digital vibrato can be selected individually for Divisions A, B, or C. Channel One can have vibrato on a Flute Solo while non-vibrato Bells emanate from Channel Two. Both digital and master pedal vibratos are synchronized and rate adjustable.



PRESETS ALLOW RAPID-FIRE CHANGES

Strings—typical electric string machines are buried in the mix while KC-II's realism merits solo work. Proper waveshape maintained to the extremities of the keyboard and independent envelopes contribute authenticity. Details such as variable phrased vibrato and variable attack/decay (pedals) are musically convincing. Even string pizzicato can be added by footswitch. Chords can be "latched" to free hands. "Bowing noise" is the final touch.

Electric Organ—the old tone-wheel and drawbars sound has been captured complete with third harmonic percussion and two-speed rotary speakers. Staccato footswitch is percussion cancel. Vibrato pedal is tremolo control.

Organ and Bells—very commercial. 1′ sine tone pedal variable from long wailing sustained percussion to a short funky "popcorn" percussion—all on top of an organ sound.

Organ and Guitar—B-3 effect in Channel One with pedal steel or rock guitar in Channel Two. Pitch Bender creates slides up to a fourth. Pedal faders make rapid changes.

Horn—Rich, fat, and breathy. Scaled attack/decay. Just the raw material for "synthesizer licks" (pitch bends and vibrato). Addition of percussion pedal creates piano.

Electric Piano—8′ transpose is warm and realistic with sustain pedal. 16′ takes on an electric bass in lower end. Latch pedal creates a mellow organ or holds notes or chords while the remainder of the keyboard is free.

Clav—funky metallic sound (very popular). Decay is pedal-variable from "loose" to "tight".

Jazz Flute and Clav—highly realistic metal flute contrasts clav in opposite audio channel.

Alto Recorder and Harpsichord—wood flute contrasts plucked strings in opposite audio channels. Exceptionally delicate and articulate.

Bells—clanging realism due to KC-II's forte in complex waveforms and chorus tuning. Decay is pedal-variable.

Pipe Organ—diapason chorus with 4-rank mixture. The Allen Organ heritage shines here.

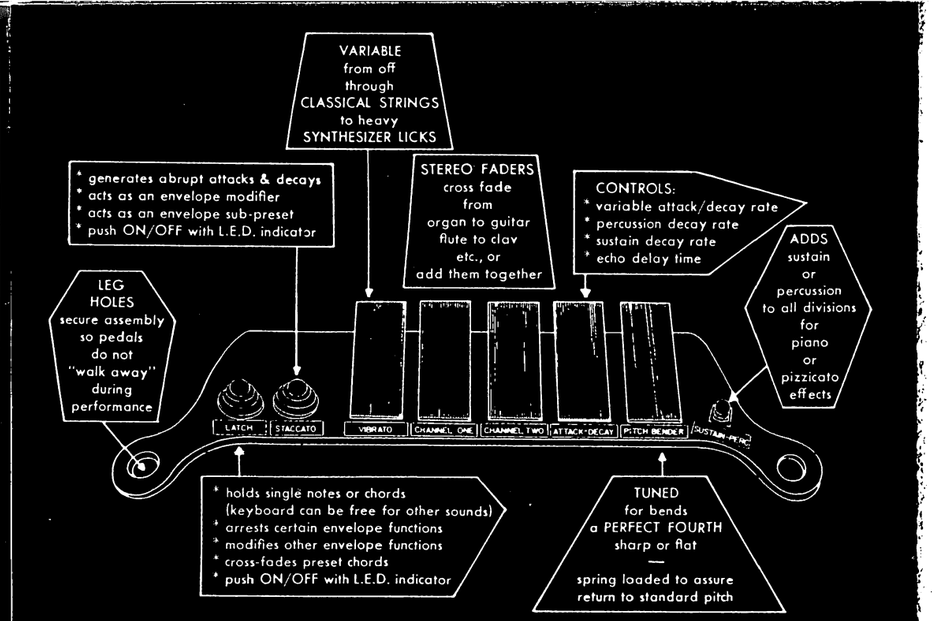
Echo—notes repeat like tape echo, but in a different timbre one octave lower. Delay time is pedal-variable.

CUSTOM SET-UPS: DO-IT-YOURSELF SOUNDS

While playing on a preset, you can create your own sounds one tab at a time. When ready, turn off the preset and your custom sound is on (presets override custom set-ups). For further flexibility, your custom sounds can be added to any preset with the Add Manual tab. You can play non-stop for hours continually changing to new effects. Our comprehensive Owner's Manual currently contains over 50 creative "patches". Some of the favorites are: Sax with random over-blow, Vibes, Marimba, Steel Drum, Banjo, Dynamic Brass (timbral change), Honky-Tonk, Choir, and Abstracts.

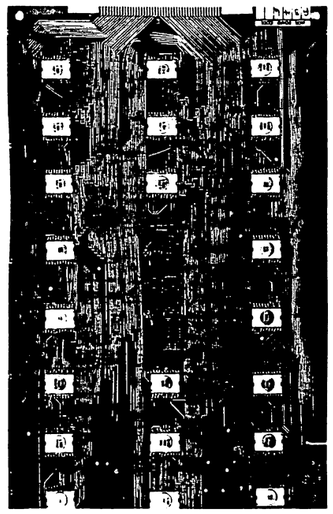
PEDAL ASSEMBLY IS INCLUDED

With a Polyphonic Synthesizer, serious professional keyboard people concentrate on their music with both hands on the keys. Attempts at reaching for controls destroy the natural flow. Therefore, musical expression such as Pitch Bend, Vibrato, etc., must come from the feet. KC-II's Pedal Assembly is included as an integral part of the instrument, not an accessory. Musicians will find KC-II a full-time instrument—much like driving a sports car. Tooling through your licks takes on new expression. Envelopes can be compressed or expanded right in the middle of your most difficult runs. KC-II responds as an extension of your body.



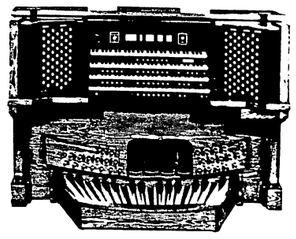
PLUG-IN CIRCUITRY

It is our belief that a musician who makes a substantial investment in a major keyboard relies upon that instrument. Expensive and lengthy "down time" on the job is intolerable. KC-II functions are divided into five plug-in boards. In the event of failure, a quick exchange plugs you back in business. Pictured on the right is our main computer board—a "chip" off the old block below.



RMI's FAMOUS RUGGED CONSTRUCTION AND QUALITY

Heritage dates back to 1939 with our parent, the Allen Organ Company. Musicians are the benefactors. The same quality level as Allen is maintained and many parts are identical. For example, all control tab legends are engraved. Our front panel is routed out of wood. RMI keyboards are literally a "piece of the rock" from giant four-manual consoles. Key action is natural wood with individually-adjustable tension, travel, and point-of-contact. Our legs are sturdy, but quick and easy to set up. Expensive extra travelling cases are unnecessary with RMI because we build our instruments into an enclosed case. We invite you to look inside any instrument before you buy, particularly ours—you will see the difference.
Rocky Mount Instruments are built to last.



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Rocky Mount Instruments, Inc.,
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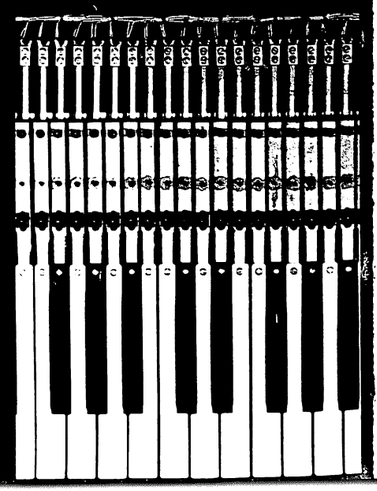
PACKAGE

Case: height 9-3/4″, width 44″, depth 24-1/2″
Legs: add 26-3/4″ to height
Pedals: height 3″, width 46″, depth 13″
Power: 90 watts @ 117 vac—50/60 hz



RMI

KEYBOARD COMPUTER

MODEL KC-II

OWNERS MANUAL

OWNERS MANUAL

Dear KC-11 Owner:

Congratulations! You have chosen a unique instrument that will no doubt cause you to stand out as a musician.

Your decision to purchase the Keyboard Computer was probably based on the sounds you heard either on the demonstration record or in person at a live demonstration. We would agree that the sound of an instrument is its most important quality. Instant-action Presets controlling the most popular sounds allow you quick access to a wide variety of effects, however, the potential of this instrument extends far beyond the Presets. We would like to see you realize the greatest return on your investment by exploring the total potential of your Computer.

This Owner's Manual is a comprehensive collection of data gathered over a period of years beginning in 1974. Contributions in the form of Set-Up Sheets and ideas have been made by owners like yourself. Blank Set-Up Sheets are provided for your convenience to jot down new sounds. If you create some new Set-Ups you feel are unique, please send them our way - the Owner's Manual is loose-leaf and we up-date it from time to time.

Finally, if you are to realize the full potential of your KC-11 you must give the Owner's Manual a thorough reading - at least once. There is much more to the Computer than meets the eye from the front panel. Should you get in a bind understanding some part of the instrument, we are as near as your phone (no collect calls, please).

Enjoy the knowledge that your sounds will eventually affect the music business as have synthesizers. Good luck.

Sincerely,

Clark A. Ferguson
RMI Performing Artist

TABLE OF CONTENTS

INSTANT KC-II -- OR HOW TO START PLAYING IMMEDIATELY WITHOUT MUCH READING

1. Place all control tabs in NORMAL or OFF position - push top end.
2. If red LATCH or STACCATO lights are lit, push corresponding foot switch to cancel.
3. Open CHANNEL 1-2 and CHANNEL 2 pedals - toe down all the way.
4. Place LEFT FOOT on VIBRATO pedal.
5. Place RIGHT FOOT on ATTACK-DECAY pedal.
   (Do not allow your foot to catch on an adjacent pedal).

NOW, YOU ARE READY TO TRY THE PRESETS

1. Select one preset at a time - start with STRINGS.
2. Use 3-voice "open" harmony - large spaces between voices.
3. Notice you hear 2 strings playing for every key you hold - Chorus Tuning.
4. Adjust ATTACK-DECAY time (right foot) while repeating a chord - listen.
5. Add some VIBRATO (left foot) as each musical phrase builds.
6. Try TRANSPOSE 8 (under GENERALS) for high violins.

NOW, YOU ARE READY TO TRY OTHER PRESETS

1. Notice the word "priority" and an arrow to the right. When more than one preset is turned on, the one farthest to the right will be in operation.
2. As you change from one preset to the next, you will notice that adjustments will be required in the ATTACK-DECAY time (right foot) to obtain realistic musical results - experiment with extremes. Some presets will not be affected by the ATTACK-DECAY pedal: Pipe Organ & Clav.
3. Some presets will sound best with VIBRATO added - STRINGS particularly.
4. Some presets have contrasting instruments in Stereo. Open and close CHANNEL 1-2 and CHANNEL 2 pedals independently.
5. Experiment with effects LATCH, STACCATO, and SUSTAIN-PERC pedals have on the presets.

THERE IS A LOT MORE TO THE COMPUTER THAN MEETS THE EYE

So, read your Owner's Manual.

RMI Keyboard Computer Audio Requirements

Probably the most unique single feature of the KC is its ability to control waveshape and thereby control even the most complex harmonic content. When one has paid substantially for such an instrument that can generate an extremely wide range of sound, it would follow that the audio system through which you will hear this instrument should also be of the same wide-range calibre, if you are to hear what you paid for.

There are probably numerous excellent systems manufactured by many companies that would give successful results with the KC. Since we cannot investigate all of them, here are some general guidelines to follow to make your own choice.

The KC requires "flat" response. An absolutely flat system would respond with equal efficiency at all frequencies of the audio range. The term "flat" is in quotes, however, since it is not technically possible today to build an absolutely flat system. This need not become a problem, but instead an advantage. The most critical part of the range in creating the realism in imitated instruments that the KC is so famous for is the mid-range and upper frequencies. Frequencies lying in this area must remain in precise and proper proportions to each other if realism is to be achieved. While the lower end is certainly important to high fidelity, if lows tend to roll off or drop out, most of the realism will still be present. The lower end provides a sense of power - the listener feels the results on the floor and on his or her chest and it adds emotion to the music. However, in many situations where KC players work in a band, there is a bass player and the bass portion of the spectrum is delegated to that instrument. Since the KC player would not want to fight the bass player, a drop off in the bass range of the KC audio system is a definite advantage even though it is not flat. A KC performer doing a solo gig, however, would want plenty of bass power since he would be called upon to create his own bass lines.

What type of equipment does flat response require? Almost without exception flat response requires some form of multiple speaker system. Due to efficiencies and inefficiencies in mechanical design, certain types of speakers are more efficient operating in different portions of the audio range. Of course, the end result is to have the entire range covered with equal efficiency. In general, larger speakers cover the bass, medium size

cover the mid-range, and very small ones cover the upper end. No company has ever successfully covered the entire range with one speaker.

Most bass speakers are of the paper cone variety, and a very common and efficient size is fifteen inches. These speakers must be mounted in one of several types of cabinets. Horn-loaded cabinets tend to be very efficient by nature but in a rather narrow band of frequencies, causing a "boominess" quality. Ducted or ported cabinets are a little less efficient, but their efficiency is spread over a wider range of frequencies. Finally, sealed or "air-suspension" cabinets offer the very best in wide-range coverage of the bass range; however, their efficiency is very poor causing them to require substantial amounts of amplifier power for the same volume levels.

Mid-range speakers commonly used in the hi-fi industry are also of the paper cone type, due to their physical ability to cover a given range with relatively equal efficiency. Such devices as rubber or cloth edges further expand range and ability to generate transients - so critical to percussive attacks. These types of mid-range speakers are generally sealed from the rear and therefore do not react with the cabinet in which they are installed. Horn-loaded compression drivers (known as mid-range horns) are more frequently used in the P.A. and musical instrument business due to their well-known ability for penetration. Once again, horns are highly-efficient but at the sacrifice of wide range response, although some people will tell you they can be equalized flat. Solo instruments, guitar and voice sound okay through horns due to the fact that most of the audio being generated by these sources falls within the range of the horn. However, full range instruments like the KC and particularly "string" keyboards sound like horn or brass sections when heard through horns. Avoid using horn speakers when trying to achieve flat response for keyboards.

Tweeters is the term applied to upper range speakers and most hi-fi manufacturers again stick with the paper cone or dome type for the same reasons outlined before. Horn tweeters tend to become "peaky."

When choosing the speaker system for your KC, check out the types of speakers used and how many. You should try for all paper cones or dome type (avoiding horns) and try for at least a three-way system - bass speaker, mid-range speaker, and tweeter. Better systems will usually have more than one of each mid-range and tweeter. If you are in doubt, try the KC Strings Preset through the system you are considering. Can you imagine yourself in the

middle of a real string quartet, or does it sound electrically amplified?

Amplifiers should be chosen AFTER you have chosen your speaker system, because speaker requirements have everything to do with amplifier power. Obviously more and larger speakers will require more power; however, there are other factors to consider - efficiency. Flat systems with crossovers absorb the most power for the amount of volume they deliver (they are inefficient), and generally, the flatter a system becomes, the more inefficient it becomes. Of course, the flatter the system becomes, the better it tends to sound to the ear. Power requirements go up and down and so do cost, weight and physical size. For most people a compromise must be made somewhere. Where is the best place to compromise without sacrificing performance? Usually in the bass end, since this is the range that requires the most amplifier power, the most expensive speakers, the largest cabinets, and creates the most weight. Once you have made final decisions about your speaker system, make absolutely sure that you purchase adequate amplifier power so that "clipping distortion" does not occur on the heavy transients frequently generated by the KC or during heavy bass passages. Remember, if you are playing in a band that already has a bass player, you will not need as much bass power.

Bi-amping, tri-amping, quad-amping? These are terms applied to the technique of using independent amplifiers for each speaker range. For example, a tri-amp system would have three amplifiers - one for bass, one for mid-range, and one for the tweeters. This technique does provide the ultimate in high volume undistorted sound reproduction; however, the cost is quite high. If money is no issue, this is no doubt the way to go.

Stereo? The KC is definitely conceived as a stereo instrument and certainly there is no question that the very best results are achieved using dual amplifiers driving dual speaker systems. However, there may be situations where stereo is not needed, such as in film and video work or even some bands using a mono P.A. system, particularly if volume levels are more critical than tone quality.

RMI, realizing the requirements of an audio system made by the KC, has designed an amplifier and speaker system particularly suited to these requirements. The system is called a 360-K which includes one 360 amplifier head with one K-180 five-speaker three-way cabinet and a switchable crossover for mid-boost. The amplifier head has 180 watts RMS power. Two 360-K systems

are required for stereo. This 360-K System is excellent for any type of keyboard instrument. In fact, you will hear sounds from your keyboards you never heard before due to the "flat" response. You will find information on this amplifier contained in this section on audio.

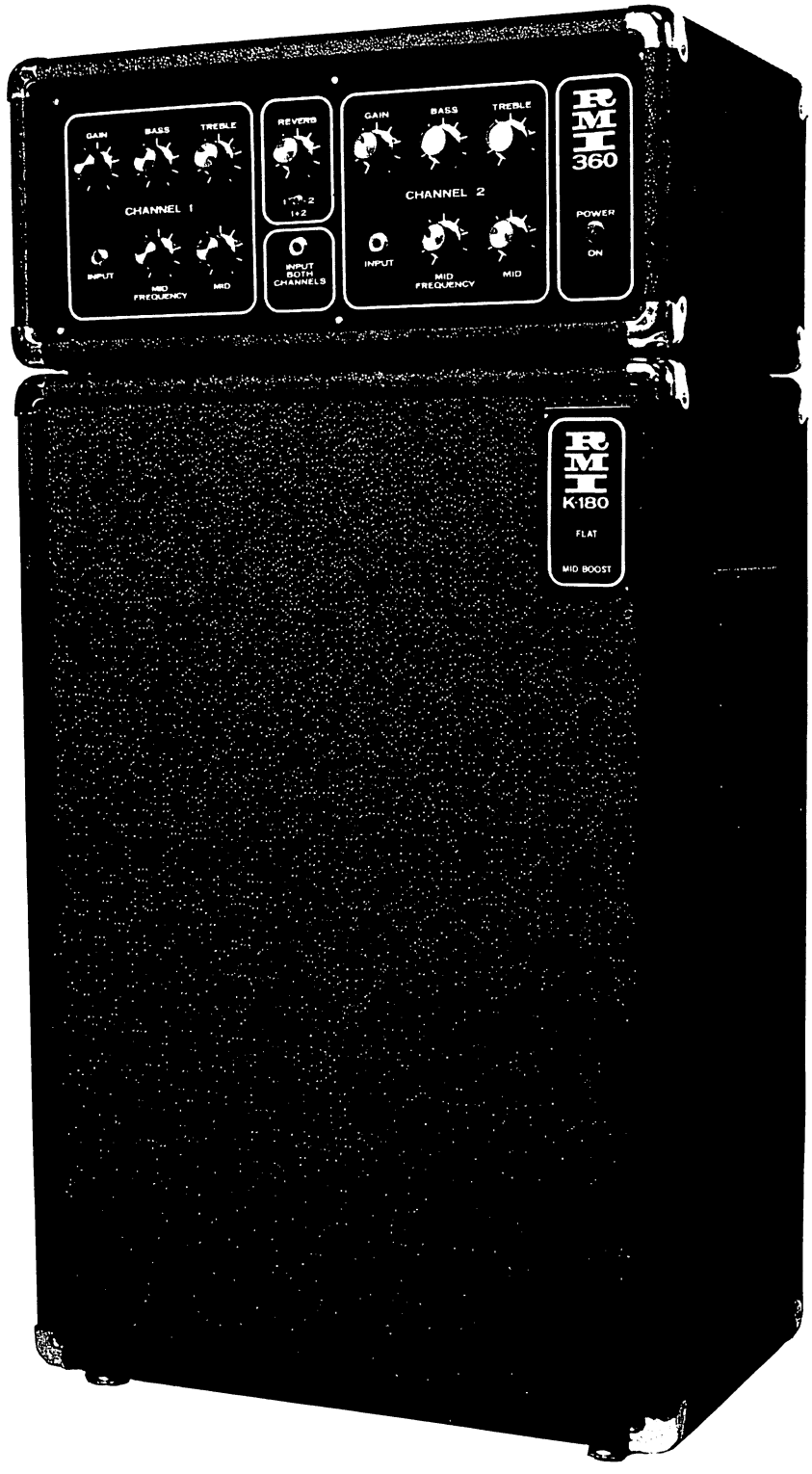
Setting Up Your KC for Performance. Assuming you have removed the cover and unfolded the legs, you are ready to connect the pedals and audio. Locate the metal jack panel under the KC on the right side. Note the polarizing key way in the plug and jack for the pedal cable. Insert plug and screw retainer ring to secure. To insure that the retainer ring does not "seize," back off one quarter turn from "snug." Remaining are two quarter-inch phone jacks labeled "1" and "2" - outputs for the left and right stereo channels. The output impedance is around 150K ohms (very high) with the volume pedals full open, and the level is low (like a dynamic microphone or a guitar). Two audio cables are provided with your KC and these should always be used rather than other types for two reasons: 1. RMI uses RG-59U transmission cable for low loss of highs and reliability, and 2. RMI plugs are all-metal construction with strain reliefs for long-lasting durability and freedom from hum. A pre-amplifier will be required ahead of your power amplifier to boost the signal - this feature is already incorporated in most amplifier heads and mixers. The response curve should be essentially flat - that is, no EQ (no cut or boost). Some microphone mixers have a high frequency boost built in - find some way of eliminating or attenuating this high boost or it will cause unnecessary buzz in the softer and more mellow KC sounds. Be sure the input impedance of your amp or mixer is at least above 100k ohms. If not, add resistance in series with the "hot" audio lead (this can be done in an adapter box or inside the cable plug). If impedance is much lower than 100k, there is a good possibility that the clock R.F. (radio frequency - 3-4meghz) will travel down the audio line into the amplifier causing a "zinging" or whining noise in the audio. No harm will be caused, but it can become distracting if the levels are high enough. A clue to the existence of this phenomena is that it changes pitch with the Pitch Bender pedal.

Now, you should be ready to set levels. If you are running mono, both channels will be mixed into one at the mixer - do not use a "Y" connector or closing the volume pedal of one channel will short out the other. In fact, make sure that your mixer has isolation between the "hot" leads of the inputs or shorting will still occur (only the very cheapest mixers do not have input

isolation). Select the Electric Organ Preset, open Channel One and Channel Two pedals fully, and hold a three-note chord between the third and fourth octaves and hold one note in the bass in the first octave (you can even activate the Sustain and Latch pedals to hold the chord while you make adjustments and listen at various locations in the room). First make sure all EQ controls (if there are any) are in the "zero" or "flat" position - you want to hear exactly what the KC is generating, no more, no less. If you are in mono, turn the Channel One input volume up to about two-thirds of what you would like to be full volume, then set Channel Two to equal it - with both together, you should achieve full volume; if not, adjust both accordingly. It is important that both channels be of equal volume so that certain effects between channels can be created. It is also of equal importance that both channels have the same degree of "flatness" in their response. Channel balancing is even more critical in stereo. Once you think you have a volume and EQ balance, sit down at the KC and make a quick pedal switch from One to Two - are they the same (there will be a small amount of residual percussion decay added to Channel One, making the channels not exactly equal). Now, change to the Strings Preset - both channels should be exactly equal. How are the highs? Does it sound like sitting in the middle of a string quartet? If it doesn't, there is work to be done. Speaker placement is very important since the highs, so critical to strings, are very directional. Point the speakers and/or tweeters specifically toward both the performer (yourself) and the audience or whoever is to hear it. Bass speakers should always be placed next to a large plane that is part of the room - sitting on the floor and/or against a wall. It is in this manner that the bass "couples" with the room. The Electric Piano Preset has the most transient generation and the Electric Organ Preset has the most mid-range transient generation - use these presets, one, then the other, to check for amplifier "clipping distortion" (use same chord and bass as before, only keep repeating). Set both channels equal and as high as you want before distortion sets in on the attack of the chord. Be advised that amplifier "clipping distortion" is not only an unpleasant sound, particularly in transistor amplifiers, but it also generates an infinite order of super high frequency odd harmonics that can easily channel the amplifier's power into destroying tweeters (a mishap not uncommon with today's high power amplifiers).

RMI

360 SERIES AMPLIFIER — and — G-180 B-180 K-180 SPEAKER SYSTEMS



No matter what instrument you play the RMI 360 Amplifier Head will deliver the output. A unique Equalizer System in this head gives the performer unusually wide versatility from "flat" response for many keyboards to the customized "peaks" and "valleys" needed for Bass and Guitar. All you do is select the proper RMI Speaker System for your job: model G-180 with JBL High Efficiency for High Volume applications like Guitar or RMI Electra-Pianos, model B-180 with "Rock-Solid Bottom" for your Bass Axe, or model K-180 with "Flat" response necessary for the RMI Keyboard Computer or Synthesizers.

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

RMI MODEL 360 AMPLIFIER HEAD

Two Input Channels: Variable Gain Input circuitry (unlike standard attenuators) allows an unusually wide range of input levels without sacrificing dynamic range of the instrument. Input clipping is virtually eliminated. Both High and Low Impedance input signals are accepted without loss of level or gain in distortion.
Input Sensitivity: 47mv—4.0 volts RMS yields full output into 4 ohms.
Input Impedance: 300k ohms Channel One and Channel Two inputs (independent).

Input Both Channels: Parallel Input designed for use with one guitar to allow flexibility of using EQ controls of both channels together. This feature also permits rapid change between preset EQ settings. Input Impedance 150k ohms.

Equalization Controls: Placing all EQ controls at the 12 o'clock position renders the system "flat". For guitar, special "active" circuitry provides extreme "boost" and "cut" deviations. Variable Frequency Control for the critical Mid-Range Band offers a new area of creativity in generating Response Contours. All EQ controls are duplicated for each channel.

Bass Cut & Boost:	± 18db @ 100hz with 6db/octave slope
Treble Cut & Boost:	± 20db @ 10khz with 6db/octave slope
Mid-Range Cut & Boost:	± 14db @ Top End Band
	+ 22db @ -80db @ center of Bottom End Band
Variable Mid-Range Frequency:	Top End Band 176-900hz with 6db/octave slope
	Bottom End Band 112-470hz with 6db/octave slope

Reverb: Master Level Control affects both channels. Three-way switch turns reverb on Channel One, Channel Two, or Both. Jack for Foot Switch control on rear panel. Unique Constant-Current Drive circuit assures quiet clean response. Unit is particularly insensitive to physical shock.

Amplification: 180 watts RMS into 4 ohms @ less than 1% THD
110 watts RMS into 8 ohms @ less than 1% THD
IM .15% @ 4 ohms with 1.0 volt input/20 volts composite output
IM .075% @ 8 ohms with 1.0 volt input/20 volts composite output
Bandwidth ± 1db @ 30hz - 125khz
Solid-State and Short-Circuit Proof

Power Requirements: 117VAC 50/60hz-full output draws approximately 300 watts

Package: Height 9-1/2″ — Width 21-5/8″ — Depth 13-3/8″ — Weight 31 lbs.

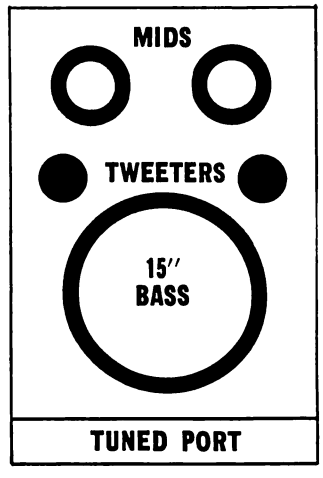
RMI SPEAKER SYSTEMS

Model G-180: JBL 15″ Full Range with Two Tweeters. A highly efficient unit with extra available Mid-Range Energy. Recommended for High Volume applications with RMI Electra-Pianos or other instruments. Dual Parallel Jacks allow use of two model G-180's in parallel for additional power. 8 ohms each.

Model B-180: Single 15″ Heavy-Duty Bass Speaker for use with Bass Guitar, Manual Bass, or Organ Bass Pedals. Special flat wound copper ribbon voice coil vented for dissipation of heat. 4 ohms.

Model K-180: Five-Speaker Three-Way System providing the "Flat" response required by RMI Keyboard Computer or Synthesizers. Crossover switchable from "Flat" to "Mid-Boost" for extra "Punch". Two Tweeters, Two Mid-Range, One 15″ Bass Ported and Tuned for ultimate efficiency. 4 ohms.

model K-180



Package: Height 31-1/2″ — Width 21-5/8″ — Depth 13-3/8″ — Weight 62 lbs. approximate. Rugged corners, recessed handles, convenient size and weight for ease in carrying. Ported and Tuned for maximum use of bottom end. Applies to all models.

RMI ROCKY MOUNT INSTRUMENTS, INC. Sales Office: Macungie, Pa. 18062 Phone: 215/965-9801

360 AUDIO SYSTEMS: DIFFERENCES IN APPLICATIONS

The RMI 360 Amplifier has been designed with the power and wide tonal range to allow the musician great amplifying flexibility. When this amplifier is matched with the proper speaker cabinet, an optimal Audio System is developed for each application.

The 360-G Audio System, consisting of a 360 Amplifier and a G180 Cabinet, is a high efficiency system which is recommended for guitars and many keyboards when higher amplitude is needed. The RMI Electra Piano, among other electric pianos, will not be able to achieve highest volume with the 360-K amplifier/speaker due to heavy "piano attack". When highest volume is required, always use the 360G. We have included the same tweeters used in the "K" cabinet in the "G" cabinet. The 360-G also has a 15" JBL speaker which is highly efficient -- it concentrates amplifier power in the mid-range area where the human ear is most sensitive. This increase in volume is achieved at some sacrifice of "flat" response, particularly in the bass area. However, by properly manipulating the equalizer controls on the amplifier, the system can be made more "flat".

A musician who needs even more volume can use two G180 speaker cabinets with the 360 amplifier head -- the cabinets are 8 ohms and two can be plugged in parallel for 4 ohm operation to increase volume. There are two jacks on the back of the cabinet. The K180, however, is of 4 ohms impedance, and only one can be used with each amplifier.

The 360-B Audio System, consisting of a 360 Amplifier and a B180 Cabinet. allows the Bass guitarist to achieve a solid sound from a system that is practical in size.

Remember, when highest volume is an important part of the musician's needs, the 360-G should be used. When "flat" response is the most important requirement, the 360-K should be chosen.

The 360-K Audio System, consisting of a 360 Amplifier and a K180 Cabinet, was designed for "flat" response, specifically to make the Keyboard Computer sound its best. In order to achieve "flat" response in an audio system, the sound must be able to spread over the entire audio range with equal efficiency. The model 360-K does exactly that. In the process the power of the amplifier is also spread over the entire audio range. The model 360-K will make most keyboard instruments sound better. However, there is a point of caution - some customers may require even more volume. With the crossover switch on the K180 speaker cabinet in the "Mid-Boost" position and the Equalizer Controls adjusted for less bass and extra treble

and mid-range, a higher level of volume can be created with the Keyboard Computer and many synthesizers using the 360-K. Other keyboard instruments may require a more efficient speaker cabinet. For these cases we advise the G180 Cabinet.

WARNING - K180 Cabinet: Due to the large amount of power available from the 360 amplifier, prolonged use at high volume with excessively boosted mid or treble may cause crossover and/or tweeter damage to the K180 cabinet.

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CONTROL FUNCTIONS

So that you may begin playing immediately, the following is a brief description and simplified listing of control functions minus Voice and Preset listings and void of theory and practice details.

DIVISION "B":

CH 1 CV - CHORUS or VIBRATO for DIVISIONS "A," "B," & "C," CHANNEL ONE.

CH 2 CV - CHORUS or VIBRATO for DIVISION "B" only, CHANNEL TWO except voices engraved in RED - CHANNEL ONE.

ADD CH 2 - Activates DIVISION "B."

PERC CH 1-2 - Activates PERCUSSION modes in DIVISIONS "A" and "B."

SUSTAIN CH 1-2 - Activates SUSTAIN modes in DIVISIONS "A" and "B."

Voices engraved in RED will be heard only in CH 1.

DIVISION "C":

CH 2 CF - CHIFF - A phenomenon of low wind pressure pipe organ attack. Speaks the 2-2/3' pitch during attack only, then employs a staccato decay abruptly. Also used to delay Bass Reed 32' (Div C) for Echo effect. ADD CH 2 must be activated to operate Chiff.

CH 2 CV - CHORUS or VIBRATO for DIVISION "C" CHANNEL TWO.

CANCEL CH 1 - Eliminates voices being heard initially through DIVISION "A" CHANNEL ONE.

ADD CH 2 - Activates DIVISION "C."

PERC CH 2 - Activates PERCUSSION mode in DIVISION "C."

SUSTAIN CH 2 - Activates SUSTAIN mode in DIVISION "C."

Voices engraved in RED will be heard only in CH 1.

GENERALS:

"V" RATE - Sets the speed of all VIBRATOS including the VIBRATO Pedal.

TUNE 16' - Establishes tuning of instrument when TRANSPOSE tab is in 16' position.

TUNE 8' - Establishes tuning of instrument when TRANSPOSE tab is in 8' position.

LATCH Indicator Light - Indicates LATCH mode in effect - SUSTAIN oscillator stopped.

STACCATO Indicator Light - Indicates STACCATO mode in effect.

CHORUS/VIBRATO - Selects between CHORUS or VIBRATO for all divisional CHORUS/VIBRATO controls.

TRANSPOSE 16/8 - Allows octave transposition without loss of notes from either end of keyboard. PITCH BENDER bends sharp in 16' position - flat in 8' position.

ATTACK SHORT/LONG - Selects SHORT or LONG attack curves for all divisions.

ATTACK/DECAY FIXED/VARIABLE - Selects FIXED attack/decay which is scaled proportional to key frequency or VARIABLE ATTACK/DECAY which is controlled by the ATTACK/DECAY Pedal.

FOOTSWITCH SUSTAIN/PERC - Selects PERC or SUSTAIN functions to be activated in all divisions by footswitch.

ADD MANUAL - Returns control of tabs cancelled by presets for adding sounds to the presets. TRANSPOSE, FOOTSWITCH, and ADD MANUAL tabs are not cancelled by presets.

ALTERABLE VOICE PROGRAMMER & CARD READER:

Additional waveforms can be programmed into ALTERABLE VOICES 1 and 2 in DIVISION "B" and ALTERABLE VOICES 3 and 4 in DIVISION "C." The voice number to be programmed is selected by the rotary knob. Select the desired Tone Card and insert with arrow up and pointing toward the card reader slot. No particular care is necessary in inserting the cards - the reader is optical and reads faster than you can physically insert the cards. As many as four cards can be programmed at a time (one into each voice). After the voices have been programmed, they can be heard by activating the ALTERABLE VOICE tab just like any of the fixed memory voices. Inserting new cards in the same ALTERABLE VOICE previously programmed with another card will up-date the program by erasing the old card. Power failure or turning the computer off momentarily will also erase all four memories. There is also an experimental blank tone card at the end of the pulse wave series in the RMI Tone Card Library. This card will erase an existing waveform when inserted. Interesting effects can be created by slow or partial insertion.

LATCH PEDAL:

Stops Sustain Oscillator. "Freezes" SUSTAIN and VARIABLE ATTACK/DECAY envelopes. Pedal function is "push on" "push off" with indicator lamp on control panel.

STACCATO PEDAL:

Selects abrupt STACCATO attack and decay modes. No curves are used - no stages are clocked. The STACCATO mode is incompatible with all other envelope modes and will either override or negate their effects. STACCATO mode will "dump" any notes or chords held in the LATCH memory. When added to PERCUSSION mode, voices affected by PERCUSSION mode will appear "dead." This effect can be useful as a preset to kill one division employing PERCUSSION.

VIBRATO PEDAL:

Gradually adds VIBRATO to all divisions by means of frequency modulation of the voltage-controlled master clock. A switch in the fully-closed position completely stops the VIBRATO. A spring stop engages the pedal at the last 1/2" of travel just before the amount of VIBRATO becomes excessive. The intensities before the spring are realistic for natural instruments such as strings. Intensities beyond the spring are intended for heavy effects such as synthesizer vibrato.

VOLUME PEDAL - CHANNEL 1 & (2 RED):

The function of this pedal is almost self-explanatory. The RED 2 engraved on the name plate indicates that those voices engraved in RED on the control panel will appear in CHANNEL ONE even though the ADD CH 2 control tab may be on. Best results are achieved with the pedal full open. Set the maximum volume required at the amplifier controls.

VOLUME PEDAL - CHANNEL 2:

Volume for CHANNEL 2.

ATTACK/DECAY PEDAL:

Controls the rate of the SUSTAIN oscillator. The SUSTAIN oscillator counts the ATTACK and DECAY stages for PERCUSSION, SUSTAIN, and VARIABLE ATTACK/DECAY envelopes. Fully closed (heel down) is maximum SUSTAIN oscillator rate for fast envelopes - fully open (toe down) is minimum rate for slow envelopes. It will be necessary to vary the ATTACK/DECAY Pedal when changing from preset to preset (example: PIANO is best long, STRINGS are best medium to short).

PITCH BENDER:

The PITCH BENDER Pedal is spring loaded in order to return to its native pitch when the foot is removed. When the TRANSPOSE tab is in the 16' position the pedal will bend about a perfect fourth sharp. When the TRANSPOSE tab is in the 8' position the pedal will bend about a perfect fourth flat. If the exact interval of a perfect fourth is desired, 16' and 8' tuning controls can be adjusted, however, the TRANSPOSE tab may not transpose an exact octave when the controls are adjusted for perfect fourth tuning.

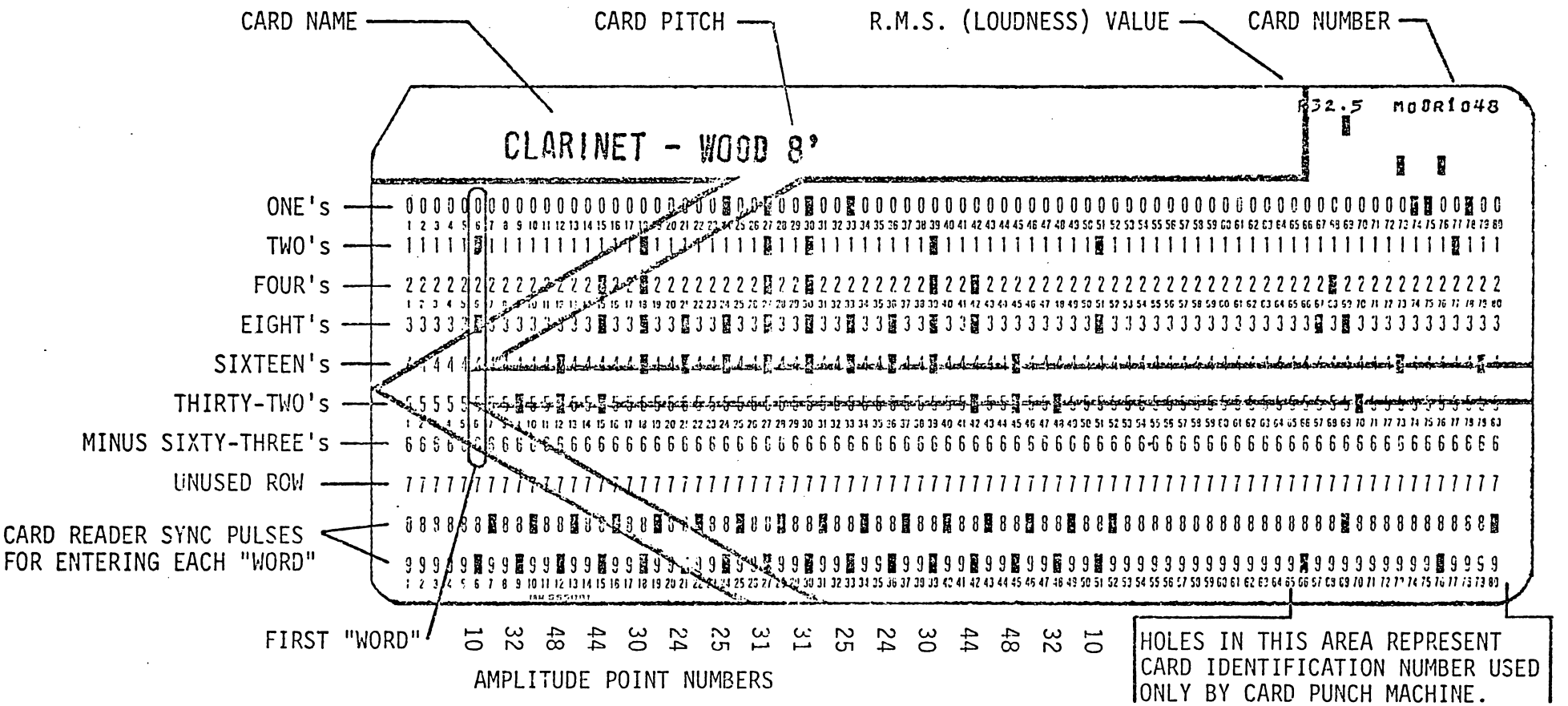
SUSTAIN/PERCUSSION PEDAL:

This pedal will activate PERCUSSION or SUSTAIN modes in all divisions simultaneously. The SUSTAIN/PERCUSSION FOOTSWITCH control tab in the GENERALS division on the control panel selects whether the pedal will activate SUSTAIN modes or PERCUSSION modes. The SUSTAIN position is effective for the PIANO preset. The PERCUSSION position is effective for creating pizzicato on the STRINGS preset.

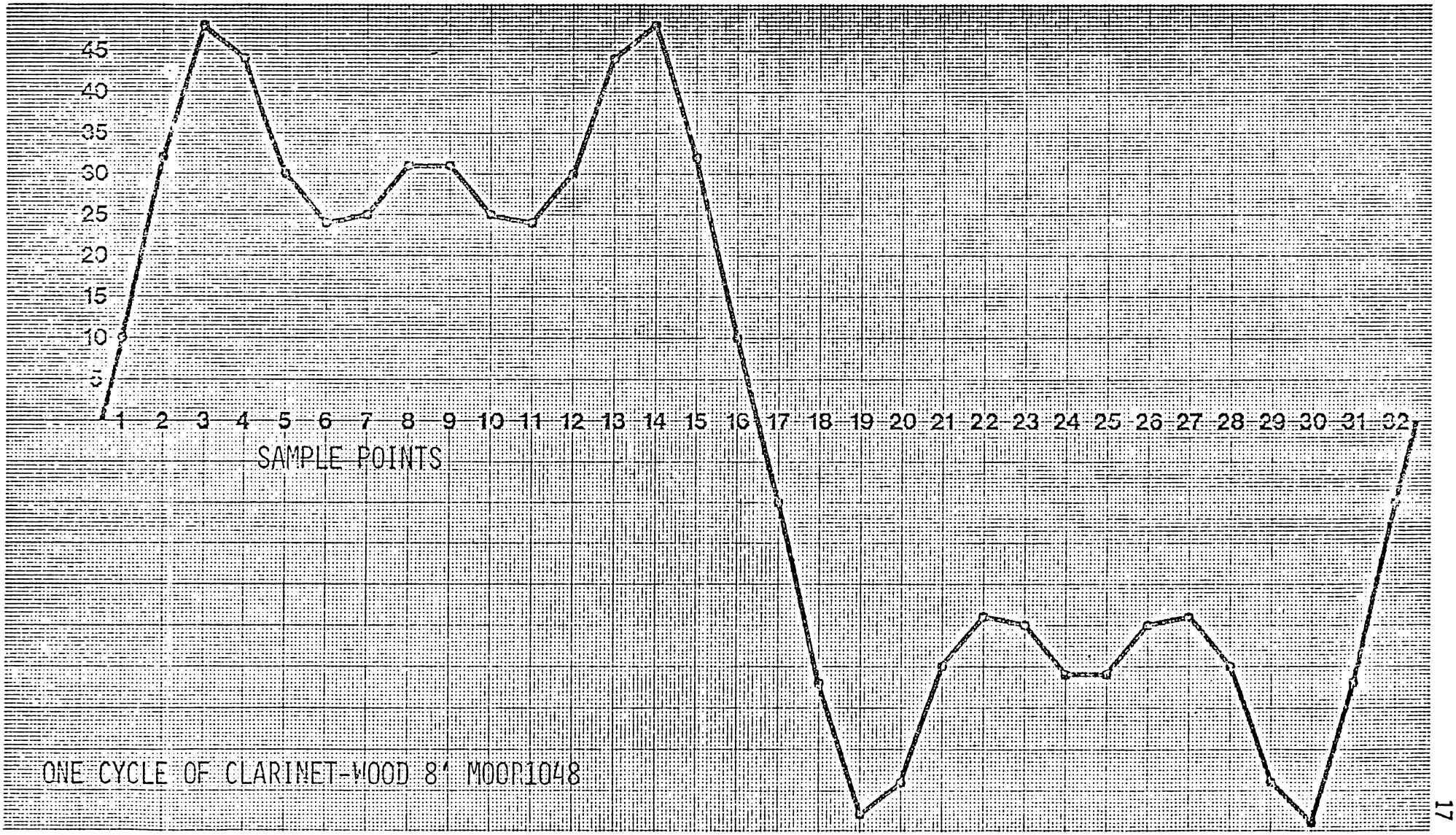
If a specific sound is to be duplicated or generated, the harmonic content of its waveform must be duplicated. Simply, to control the sound is to control the waveform. Analog synthesizers start with an oscillator that generates geometric waveforms such as a sawtooth or square or pulse wave. These waveforms are rich in their own inherent series of harmonics. Control over the harmonic content is exercised by filtering out frequencies above or below certain points or both, and sometimes resonating certain frequencies or bands of frequencies. Although it has been proven that a wide assortment of sounds can be generated in this manner (in fact, the analog synthesizer takes on a familiar sound in the hands of most players) precise control of particularly the more complex waveforms is just about impossible. Another problem plaguing analog circuits is their ability to be infinitely-variable. Infinitely-variable circuits, of course, allow infinitely-variable tonal possibilities, however, the problem is a human engineering one - people cannot remember settings. It becomes highly difficult to recreate sounds achieved earlier. The Keyboard Computer uses an entirely different method void of audio oscillators and filters.

Instead of modifying an already existing waveform, the KC generates a new and independent waveform for each sound. The concept is similar to an artist's palette where a large number of discrete colors are mixed, but never actually altered. Because of this system, any sound ever created on the KC can be readily and precisely recreated at any time without guesswork. The KC principle of waveform generation is similar to that of an artist's reproducing an enlarged picture on a billboard employing a grid of squares to aid their accuracy. The waveform to be reproduced is analyzed on a graph. Points where the waveform intersects the grid are assigned numbers and the numbers are stored in the computer. Reading this group of numbers out at the frequency of a given musical pitch regenerates the waveform. Although without an infinite number of intersection points on the grid absolutely precise resolution is not possible, this system definitely provides a substantial improvement in accuracy of waveshape control over any other commercially-available system.

Changes in tonal color are accomplished by changing waveforms, adding waveforms together, or cross-fading between opposite channels having different waveforms. Dynamic changes in tone color (changes during attack or decay) are accomplished by assigning different waveforms to different envelopes. Example: a percussive bright sound can decay to a mellow sustained sound by percussing a brilliant



TONE CARD HOLE DESIGNATION



waveform while at the same time sustaining a mellow waveform. This procedure may not be as flexible as VCF modulation by an envelope generator, however, it is highly repeatable and predictable.

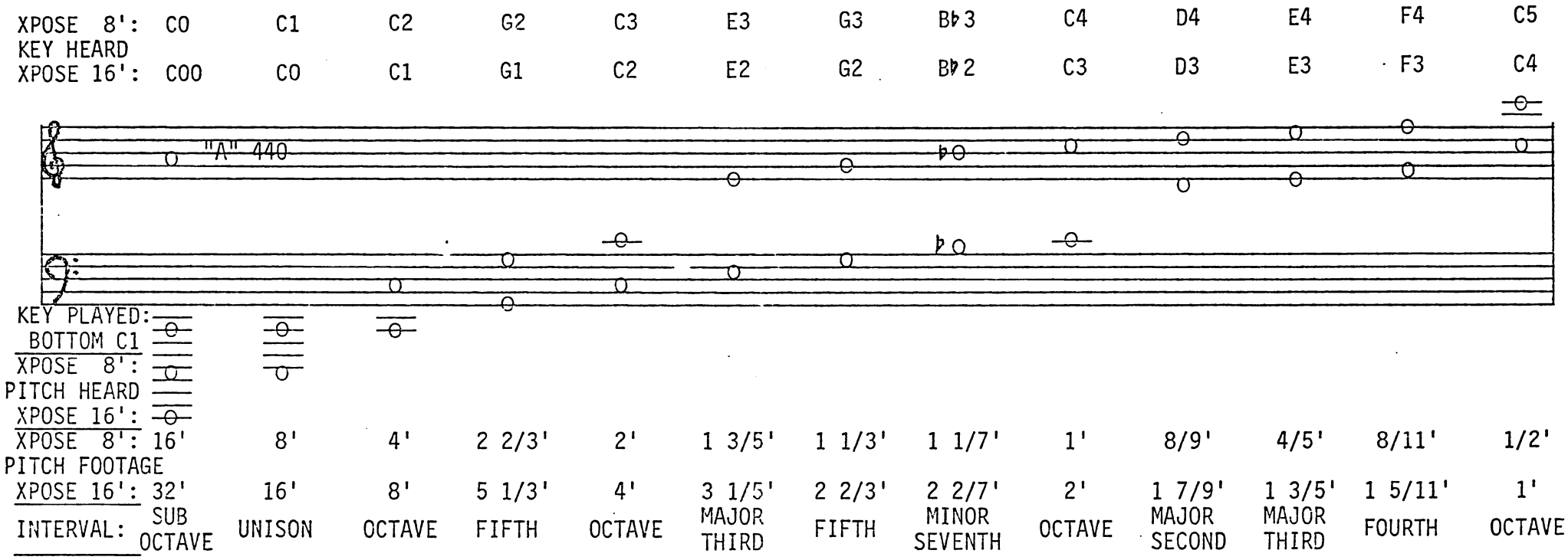
PITCHES

In the group of control tabs labeled GENERALS is a tab engraved TRANSPOSE 16/8. This is a device for changing the pitch of the whole keyboard by one octave. The "normal" position is "16" and the "8" position raises the whole keyboard one octave. Many of the tabs in the upper row also have numbers to designate the pitch of the tone colors they activate. When the TRANSPOSE tab is in the "16" position all tone color pitches are in effect as engraved, however, when the TRANSPOSE tab is in the "8" position pitches of all the tone colors are raised by one octave - the numbers engraved on the tabs must be divided by 2 in your mind.

This numbering system for pitches has been a tradition in the pipe organ building trade for hundreds of years. The concepts have served organists and musicians effectively over the years and have been carried over to electronic organs and even some synthesizers. Harpsichords even borrowed the concept to denote relative pitch of string "registers." Pipe organs, in actuality, are nothing more than a sophisticated collection of whistles of assorted lengths. The longer the whistle, the lower the pitch - the shorter the whistle, the higher the pitch. According to laws of physics, when the length of a pipe is cut in half, its frequency doubles, jumping an octave higher. Cutting a pipe in less than half will cause its frequency to rise less than an octave, such as a musical interval of a fifth, or third. There are mathematical formulas for calculating length versus pitch.

At standard or unison pitch (that of a piano) middle "A" in the third octave of a five octave organ keyboard (that of the KC) will sound at 440 cycles per second. The termination used by pipe organs for this pitch range is 8', because the lowest and longest pipe ("C" at the bottom end of the keyboard) would have a length of 8'. The same concept continues upward in octaves, 4', 2', 1', 1/2', with various fractional intervals in between such as thirds and fifths.

A pitch range starting at the half-foot length at the bottom of the keyboard would easily run beyond audibility before it reached the top note. Carrying this concept in the opposite direction or lower in pitch and longer in length, the pitch would eventually become a series of pulses to the listener, no longer appearing as a tuned pitch (the actual point at which this phenomenon occurs is a matter of opinion). The musical usefulness of these lower sounds (16' and particularly the 32') is mainly that of providing an emotional sensation by physically shaking the body of the listener and the floor he stands on - sort



When Bottom C1 is played in the Transpose 8' position, Pitch Footages will be heard at the pitches of the upper row of notes on the staff. When Bottom C1 is played in the Transpose 16' position, Pitch Footages will be heard at the pitches of the lower row of notes on the staff. Pitches heard will correspond with pitches engraved on Voice Tabs only in the Transpose 16' position (normal position). Pitches heard will correspond with pitches printed on Tone Cards only in the Transpose 8' position (octave higher). Voice Tab pitches in the Transpose 8' position are calculated by dividing by 2. Tone Card pitches in the Transpose 16' position (one octave lower) are calculated by multiplying by 2. 3 1/5', 2 2/7', 1 7/9', & 1 5/11' do not appear on Tone Cards of Voice Tabs, but are theoretical calculations of Tone Card pitches transposed to the 16' position.

Fractional pitch footages are actually natural harmonics which are members of the overtone series. For visual convenience these fractional pitches have been placed on the staff, however, they are not part of the tempered scale and are therefore only approximations on the staff. Harmonic intervals have a more musically-pleasing effect upon the ear than tempered intervals when added together for building up a full ensemble.

PITCH FOOTAGE CHART

of a total involvement experience. In fact, a lot of the grandeur and romance of large organs can be attributed to this shaking effect. Of course, if you want to create these floor-shaking effects you will need large speakers and plenty of amplifier power.

Organ keyboards have a unison or native pitch of 8'. The fundamental pitch is 8' and harmonics may be added above and sub-harmonics may be added below. Tone Cards were originally designed for the manuals of the Allen Digital Computer Organ to create Alterable Voices from the 8' unison pitch through the higher harmonics. Since there are fewer requirements for tone color variation in the pedal division, there are no 16' Alterables. The manual (keyboard) of the RMI Keyboard Computer is a different story - since there is no KC pedalboard for bass lines, all of the bass lines must come from the manual, therefore, the manual has the optional ability to transpose down one octave. The 16/8 TRANSPOSE tab on the KC is normally in the lower 16' position (unlike the organ) so that your left hand can play the bass lines. In the 16' TRANSPOSE position voices inside the KC that were originally 16' now become 32', extending the range even further down. If you have the audio equipment to handle this range, the results are staggering. Remember, the pitch footages engraved on the Voice Tabs correspond to the 16' TRANSPOSE position - the normal position. Card Reader or Alterable Voices will sound one octave lower than the pitch designated on the card when in the 16' TRANSPOSE position. In the 8' TRANSPOSE position pitches on the engraved Voice Tabs will be raised one octave - you will have to mentally divide by 2. All Alterable Voices, however, will sound the same pitch designated on the card.

PITCH CHARACTERISTICS AND USAGE

Organists as a lot are generally familiar with the characteristics of fractional pitches such as 5-1/3', 2-2/3', 1-3/5', 1-1/3', and occasionally a 10-2/3', which we do not chart since it is not available on the KC. There are, however, some very useful fractional pitches that are not so common - 1-1/7', 8/9', 4/5', 8/11', and 1/2'. The 1-1/7' is probably less popular due to its dissonant characteristic - it sounds a minor seventh from the octave pitch. Dissonances, however, are quite prominent in the harmonic structure of many natural instruments, such as bells and other percussions (notice that the 1-1/7' is one of the first options in the ADD MANUAL Set-Up for the BELLS preset). 8/9' is also dis-

sonant, sounding a major second interval from the octave. Although the remaining 4/5', 8/11', and 1/2' are not dissonant, one possible reason for their lack of popularity is the difficulty for pipe organ builders to manufacture pipes in this extremely high-pitched range - not only are the pipes short in length, but the thickness of their metal begins to approach that of paper in some cases. Electronic organ manufacturers have avoided use of these higher pitches for a different reason - the great cost of additional oscillators. The KC, however, is not aware of any intrinsic difficulty in generating these pitches since they are merely computed rather than involving hardware for each pitch. As a result, a myriad of unique and interesting tone colors is available for experimentation. Some of the higher pitches run out of the range of human audibility before they reach the top end of the keyboard - the sound is still being generated at the top end of the keyboard, but it cannot be heard. The point in the keyboard where certain higher pitches become inaudible will vary between people. In general, women are more sensitive to highs than men, and all people begin to drop off in high-pitch sensitivity with older age. Musicians who have subjected their ears to extremely high-level audio for prolonged periods of time (such as during rock concerts) often experience a loss in sensitivity to high pitches.

There are a few general guidelines that can be followed for effective use of all of the available KC pitches. Unison and octaves when used together and particularly when they are adjacent to each other (example: 16' - 8' - 4') tend to give a sense of power since the pitches enforce each other in octaves. Non-adjacent octaves or unison and octaves create an "open" or "hollow" effect due to the pitches missing in between (examples: 8' & 2', 16' & 4', 8' & 1/2'). The lowest pitch becomes the "fundamental" and the higher pitch provides the clarity. If the upper pitch is high enough such as a 1' or 1/2', a "sparkling" quality is created. This effect is particularly enhanced if the fundamental pitch is void of any harmonics such as Tone Card "SINE 8' #F1167." In the 32' sub octave range some literally earth-shaking effects are possible. Couple the sub octave with three or four adjacent octaves (32', 16', 8', 4', 2') and you have the beginning of an organ sound. From here it can take one of two directions - that of the electronic sound, or that of the pipe sound. The electronic is characterized by rather simple tone colors, such as sine waves at the six pitches listed - the pipe is quite complex in contrast. The pipe organ requires Diapason or Principal tones mixed with some flutes. Some reeds could be added for color or warmth.

Finally, to bring out the top end so that the melody line can be clearly heard mixtures are added. Mixtures are combinations of fractional pitches and other higher pitches for the purpose of bringing out melodic clarity. A single mixture Tone Card can have as many as five pitches such as the CORNET V (pronounced: "cor-nay"). The Roman numeral "V" refers to the number of "ranks" or pitches it produces. If pipes were involved, there would be five different sets of 61 each to cover the keyboard range. Since the concept of mixtures is that of adding highs to the ensemble, then it follows that the pitches should be as high as possible. If pipes are used, there is a physical limit to how small a pipe can be practically manufactured. If even the smallest pipe is placed at the top of the keyboard, then by the time the pitches descend chromatically to the bottom of the keyboard, the pitch has become too low to add clarity. Therefore, as pitches approach becoming too low "breaks" are made back up to higher pitches. Several "breaks" may occur in the total range of the keyboard. Like the pipe organ, the Permanent Memory of KC voices includes a special R.O.M. containing III rank and IV rank mixtures. The unique pipe organ "breaks" feature of doubling back has been programmed into this special KC R.O.M. for additional realism. If you run a chromatic scale of the entire keyboard on the Pipe Organ preset you will hear this effect. Tone Card mixtures will not exhibit "breaks" since they are processed in a different part of the computer. Unlike the pipe organ, however, there is no limitation due to physical size in the upper end, and the Tone Card mixtures can continue on up to beyond audibility if necessary.

Pitch Characteristic and Usage Chart:

1/2' - The highest possible pitch. Adds "sparkle" at the Octave interval. Will run beyond audibility at the top end of the keyboard. If you are listening to the 1/2' alone (not a musically-useful mode) you will notice a sub-tone or harmonic that occurs along with the fundamental pitch when played in the upper end of the keyboard. This phenomenon is inherent in the digital processing system and not heard when the 1/2' is used with a lower pitch as intended.

8/11' - Adds "sparkle" and color since it speaks the interval of a Fourth above the Octave.

4/5' - Adds "sparkle" and color since it speaks the interval of a Major Third above the Octave. If the fundamental pitch to which the 4/5' is added is high enough (example: 4' & 4/5') some dissonance can occur when chords are played lower on the keyboard. The secret lies in the interval of the Major Third - note the following example: 4' & 4/5' Tone Cards played in the Transpose 16' position will sound at 8' & 1-3/5' pitches. A Major Triad chord "C"-"E"-"G" played in the 2nd Octave will sound C2-E2-G2 from the 4' Tone Card and E3-G#3-B3 from the 4/5' Tone Card (one Octave plus a Major Third higher). The third Octave is in the range of most melodic lines and fundamental pitches and as a result the ear will hear a clash between the "G" in the fundamental 4' and the "G#" in the 4/5'. Also there will be a clash between the "C" from the 4' and the "B" from the 4/5'. By choosing an 8' fundamental the chord would by necessity be played higher on the keyboard in order to achieve the same fundamental pitch and the 4/5' harmonic pitch would be moved up one Octave - there would be more distance between the two and less chance for the ear to compare intervals. The upper pitches would then lie more in the range of upper harmonics rather than melodic line fundamentals. Intervals of Fourths and Fifths do not cause as much of a clash when closely spaced from the fundamental since their intervals are natural extensions of most harmony.

8/9' - Adds "sparkle" and dissonance since it speaks the interval of a Major Second three octaves above the fundamental.

1' - Adds "sparkle" and reinforces melody line since it speaks the Octave. Available in several intensities and colors: Sine 1' @ 63 RMS (loudest), Fife 1' @ 33 RMS, Fife - Harmonic 1' @ 25 RMS, and Sifflote 1' @ 10 RMS. Particularly effective with bells or as percussion with a mellow 8' card with Fixed Attack/Decay.

1-1/7' - Adds a clanging dissonance since it speaks the interval of a Minor Seventh. Particularly effective with percussions and bells.

1-1/3' - Adds "sparkle" and color, speaking two octaves and a Fifth above the fundamental.

1-3/5' - Adds color (no particular "sparkle" since pitch is lower). Speaks two octaves and a Major Third above fundamental. Dissonance can occur - see 4/5' explanation.

2' - Reinforces melody line, also good for percussions - many variations in tone color and intensity available.

2-2/3' - Adds warmth and color, speaking one octave and a Fifth above fundamental. Tends toward "fat" or mellow tone colors when mixed with fundamental. When "percussed" at high RMS values creates typical B-3 Hammond sound.

4' - Adds warmth and reinforces melody - speaks octave.

8' - Fundamental.

16' - Sub Octave - creates depth.

FIXED VOICES

The top row of control tabs on KC-II is primarily made up of Fixed Voices. In June of 1974 when the RMI Keyboard Computer was first introduced, these Fixed Voices were not available. At that time the Fixed Voices of the Allen Theatre Organ had been installed in the Keyboard Computer. The instrument was new and it was not known what sounds would be effective or become popular. The card reader was used almost exclusively to program the sounds. During the following three years many fine musicians experimented with combinations of cards. Some of these musicians sent us their ideas so we could share them in the Owner's Manual with others. We soon discovered a group of popular sounds that almost everybody used and liked. At this point, we collected those cards necessary to create the sounds and designed a special Read Only Memory device containing all of the tonal information. This new R.O.M. has now replaced the Allen Theatre Organ Fixed Voices previously used in the Keyboard Computer.

The Fixed Voices Chart shows R.M.S. values, the cards from which they were derived, the channel assignment, tonal quality, and their intended use. You should notice some of the following points when reading the chart:

1. Control tab pitch engravings are one octave lower than Tone Card pitch listed in the Fixed Voice "chip."

2. BASS REED 32' (div c) is native to DIVISION "C" and therefore falls under the control of DIVISION "C" control tabs as do other voices in DIVISION "C." This particular voice can be delayed when used with CHIFF and VARIABLE ATTACK/DECAY, as in the ECHO preset.

3. Some control tabs activate or key more than one voice from the Fixed Voice memory in order to gain volume (mostly percussion voices).

4. Channel Assignment - voices in DIVISION "A" are permanently assigned to CHANNEL ONE. Voices in DIVISION "B" can be additionally assigned to CHANNEL TWO with the ADD CHANNEL tab. Voices in DIVISION "C" also can be additionally assigned to CHANNEL TWO with further provision for cancelling their initial CHANNEL ONE assignment. Those voices in DIVISIONS "B" and "C" that are engraved in RED will continue to be heard in CHANNEL ONE when they are assigned to CHANNEL TWO, they will still come under the influence of all CHANNEL TWO CHORUS/VIBRATO and

PERCUSSION or SUSTAIN controls. The SINE WAVE 2' voice keys two independent voices internally in the computer - one of the voices remains in CHANNEL TWO, the other moves accordingly. This tab falls into both categories - you may find it engraved in BLACK or RED depending upon point in production.

5. "SPG" series Tone Cards refers to "Special Geometric." These cards were conceived as geometric shapes (pulse waves) rather than specifying their harmonic content. Geometric waveforms have their own inherent series of harmonics - the waveshape determines the harmonic content. Our computer terminal can "call up" a program to calculate the R.M.S. value (relative loudness) of any card that has been generated from harmonic content information; however, it cannot calculate the R.M.S. value of geometric waveforms. You will notice that the "value" column has "XX.X" for all of the pulse waves, since the values are not available.

	control tab name:		usage:	channel:	value:	card name:		card number:
DIV A:	SINE BASS	32'	adds soft depth (keys two voices)	1 1	33.8 10.9	Tibia Tibia	16' 16'	32F0308 A-B 32F0308 A-B
	SUB GAMBA	32'	adds rich depth	1	29.9	Diaphone	16'	32F0342
	BASS REED(div c)	32'	adds colorful depth to Pipe Organ	1	18.0	Contra Fagotto (swell)	16'	S02R1117
	SINE CHORUS	16'	electronic organ ensemble 16' 8' 4' 2'	1	39.8	Sine Chorus "C"		16F1327
	WALD HORN	16'	mellow reed with heavy twelfth - smooth	1	29.8	Waldhorn	8'	M00R1324
	WOOD CLARINET	16'	solos or marimba percussion transients	1	32.0	Clarinet	8'	16R1450
	ALTO RECORDER	8'	solo flute, highly imitative	1	43.4	Alto Recorder	4'	M00F2065
	SOLO FLUTE	8'	solo flute, loud and pure	1	57.7	Flute "B"	4'	16F2253
	JAZZ FLUTE	8'	solo flute, highly imitative	1	39.2	Jazz Flute	4'	16F2335
DIV B:	LINEAR SAWTOOTH	16'	string ensemble	1 & 2	30.3	Linear Sawtooth "H"	8'	16S1111
	FRENCH HORN	16'	fat & mellow ensemble - B-3	1 & 2	29.5	French Horn "D"	8'	16R1184
	CORNOPEAN REED	16'	rich & warm ensemble - Horn Preset	1 & 2	24.5	Cornopean "B"	8'	M00R1012
	ELECTRIC PIANO	16'	fat & mellow ensemble - pure & bassy	1 & 2	38.2	Piano	8'	16D1118
	8th PULSE	16'	rich & fat - Clavinet, Sax, Banjo	1&2 RED	XX.X	Pulse Width 1/8	8'	SPG2004
	16th PULSE	16'	rich & nasal - Clavinet, Sax, Banjo	1&2 RED	XX.X	Pulse Width 1/16	8'	SPG2002
			(keys two voices)	1&2 RED	XX.X	Pulse Width 1/16	8'	SPG2002
DIV C:	SPANISH TRUMPET	16'	rich & brilliant - Guitar & Pipe Organ	1 & 2	38.7	Spanish Trumpet	8'	M00R1254
	BAG PIPE	16'	nasal, increases toward 4th harmonic	1 & 2	31.0	Bagpipe	8'	16R1502
	JAW HARP	16'	twangy - use w. Bagpipe for funky Clav.	1 & 2	27.0	Jaw Harp "B"	8'	16R1427
	32nd PULSE	16'	nasal narrow pulse - Clavinet Preset	1 & 2	XX.X	Pulse Wave 1 Time Slot	8'	SPG1001
			(keys two voices)	1 & 2	XX.X	Pulse Wave 1 Time Slot	8'	SPG1001
	SINE WAVE	5 1/3'	loud quint - intended for percussion	1&2 RED	44.8	Flute "B"	2 2/3'	M00F3186
			(keys three voices)	1&2 RED	44.8	Flute "B"	2 2/3'	M00F3186
			(keys three voices)	1&2 RED	14.1	Nazard	2 2/3'	S02F3186
	SINE WAVE	2'	loud octave - intended for percussion	1 & 2	63.0	Sine	1'	16F1289
			(keys two voices)	1&2 RED	63.0	Sine	1'	16F1289
	SINE WAVE	1 3/5'	loud tierce - intended for percussion	1&2 RED	45.4	Flute 24th	4/5'	M00F9183
			(keys two voices)	1&2 RED	45.4	Flute 24th	4/5'	M00F9183

TONE CARDS

Each RMI Keyboard Computer owner is provided at purchase (original ownership only) with a carefully-selected group of 15 Tone Cards. These cards have been selected to provide most of the sounds required to accomplish the Set-Ups contained in the Owner's Manual and allow as much further creative flexibility as possible. As Set-Up additions to the loose-leaf Owner's Manual occur or as new sounds, effects or Tone Cards, are created the selection of these 15 initial cards may change. As the performer becomes familiar with the card sounds and their use in the instrument, additional cards may be ordered directly from the factory. Two Tone Card Libraries are published periodically. They are the RMI Library, containing the sounds frequently used by Keyboard Computer performers, and the Allen Organ Library, containing sounds usually associated with pipe organs. There is, however, some duplication between the two. A copy of either library can be obtained by writing the factory in Macungie, Pennsylvania. The list also serves as an order blank. The owner places a check mark beside the desired cards and encloses payment for the total. A copy of the current library will be returned along with the cards.

Spend a lot of time listening to each card individually. Categorize the sounds - mellow and fat, brilliant and thin, nasal, flute-like, bell-like, etc., close-spaced harmonics such as the Spanish Trumpet or wide-spaced harmonics like the Jaw Harp. Close-spaced harmonics sound coherent, while wide-spaced harmonics can be picked out individually by the ear. Be absolutely sure that you are using a flat audio system to audition the cards, otherwise you will get a false idea of their sound.

Tone Cards - R.M.S. Values

The two digit number appearing to the left of the following card identification numbers is called an intensity index or R.M.S. value (Root Mean Square). An example is 32 R1184. RMS values currently range up to 64. Generally speaking, the higher the number, the louder the tone, however, a bright reed tone, indexed at 15, will sound "louder" than a simple flute tone similarly indexed at 15. This is a natural phenomenon caused by the greater efficiency of the upper harmonics in the bright reed as heard by the human ear.

Within a particular family of tones (brass, strings, reeds, etc.) the index numbers or RMS values should be both helpful and accurate. When using only one sound at a time, it is best to have the highest possible RMS value on the card

in order to maintain a good "signal to noise ratio." One way of achieving a high RMS value is to "double up" the card, or insert it into two adjacent Alterable Voices such as 1 & 2 or 3 & 4. When a card is "doubled", its RMS value doubles. Most of the cards listed in the RMI library have high values. Some cards may be loud enough not to require doubling.

A performer can use the RMS values to advantage when seeking a specific balance between two sounds, such as an organ sound with percussion like the "B-3 type sound." The card used for the percussion tone is the 2-2/3' "B" having an RMS value of 44. Each tone color has an inherent limit on the amplitude that can be achieved while still maintaining the same tone color. The 2-2/3' "B" is at its fullest value. If a greater contrast is desired between the percussion and organ tone, merely lower the value of the organ tone (the French Horn card from which there are four values to choose) and turn up the amplifier gain, returning the organ tone to the previous level, while raising the level of the percussion tone. Of course you will notice that the percussion tone is already "doubled" in Alterable Voices 3 & 4 (see Set-Up Sheet for Electric Organ Preset).

Tone Cards - Custom Cards Policy

From time to time we receive requests for tone card sounds other than just RMS value variations of existing cards, such as a real piano, trumpet, guitar, Electric Piano, etc. What must be realized about these instruments and similar sounds is that all have the unique characteristic of changing their tone color upon the attack and/or decay of the note. Of all the many unique, realistic, and phenomenal things that the RMI Keyboard Computer accomplishes, dynamic tone coloring is not one of them - it would seem amazing enough that it has high reliability in returning precisely to a specific sound when desired.

All of this is not to say that dynamic tone coloring "effects" cannot be created. Example: A mellow tone can be programmed in Division "B" while a brilliant tone is programmed in Division "C" with a percussion envelope. As the key is played, both tones are heard, then the brilliant percussed tone slowly dies away leaving only the mellow tone from Division "B".

Current RMI Tone Card Library Categories (subject to change)

Mellow Ensemble: Warm, close-spaced harmonics, fat and mellow. Notice the French Horn variations "A" through "D" - you may choose RMS values from 23 to 30. There are slight changes in harmonic content, basically fundamental, first, and second harmonic. The elimination of higher harmonics causes the mellow tone color. The French Horn has a heavy fundamental with first and second harmonics in descending order. All of these cards will make good background accompaniment in chords against other percussed voices.

Strings: Rich, close-spaced harmonics. Most cards have all 16 harmonics represented in a descending taper from the fundamental (see the Sawtooth Harmonic Content Chart). The Violin 8' - B is the sound of string pipes used in the old Wurlitzer theatre pipe organ of silent film days. The most effective string card is either Sawtooth 8' - A or the Linear Sawtooth 8' - H.

Brilliant Reeds - Percussion: Unusual, colorful tones of widely varying harmonic content. "Rawk," "Razz," and "Buzz Horn" are comic names applied to non-imitative sounds for sake of identification. The Jaw Harp exhibits a unique "non-linear" characteristic due to its harmonic layout: there is a group of harmonics around the fundamental such as the French Horn, then, unlike the French Horn, there is a vacant space, and finally a cluster of harmonics around the 16th harmonic. When the keyboard is run chromatically with the Jaw Harp, both the fundamental "cluster" and the upper "cluster" are heard throughout the lower and middle octaves; however, as the fundamental approaches the top octaves, the upper harmonic "cluster" begins to run out of the range of human hearing, leaving only the fundamental "cluster" to be heard. In essence, the card appears to change tone color over the range of the keyboard. The effect is very pleasing when playing bass lines in the lower octaves and right-hand configurations in the upper octaves. Due to the "bite" of their upper harmonic development, these cards are highly effective when percussed. The Edge Whistle is just a name for identification purposes - there really is no such instrument, but you can have fun fooling your friends (hope we don't get a letter from someone holding a degree in Edge Whistle performance).

Solo Flutes: The most colorful sounds, Alto Recorder and Jazz Flute, are included in the Fixed Voice specification of KC-II. All cards in this category are intended for solo use for the most effective results. Two-part harmony,

however, can be very effective if interesting counterpoint is maintained. There are also some times when even three parts can be effective - the lower voices take on the role of accompaniment in fourths, fifths, or sixths against an obvious solo line above.

Organ - Pipe & Electronic: SINE CHORUSES "A," "B," & "C" are the only electronic organ sounds in this category. Other cards are for pipe organ sounds. PIPE ORGAN ENSEMBLE "B" offers an alternate to the PIPE ORGAN preset on KC-II - the mixture is included in the card and is of a lesser intensity. The Flute Chorus can be used with either the PIPE ORGAN preset or the PIPE ORGAN ENSEMBLE cards "A" or "B" for a fatter sound (more body). Reed choruses are used to add color, brilliance, or "fire" to the ensemble. They can also be used alone or with the BASS REED 32' as a contrast to the diapason/flute sound. Mixtures are like the seasoning added to a fine meal - they bring out what is essentially already there. Mixtures cannot be used alone. They add upper clarity and help to maintain the audibility of the melody line on top when such harmonically complex sounds as a diapason chorus are employed. As much as certain wines and spices go best with certain meats, certain mixtures are best suited to either reeds or flues (diapasons or flutes). The reason lies in their harmonic content - some complement while others clash. You will notice that each mixture is described as to its best use. The BAROQUE ENSEMBLE card is a combination of two pitches of flutes - desirable for light contrapuntal work.

Vowel - Human Voice: Probably the most unique characteristic of the human voice as a musical instrument is its ability to gradually change tone color during a note or phrase. Of course, the Keyboard Computer waveforms do not make such changes; however, the performer may cross-fade between different tone colors programmed into opposite audio channels. Even the use of the same tone in both channels is effective when Chorus is used to cause a frequency change between channels. For some ideas on the subject, try the set-up sheet for "Cathedral Choir and Bells."

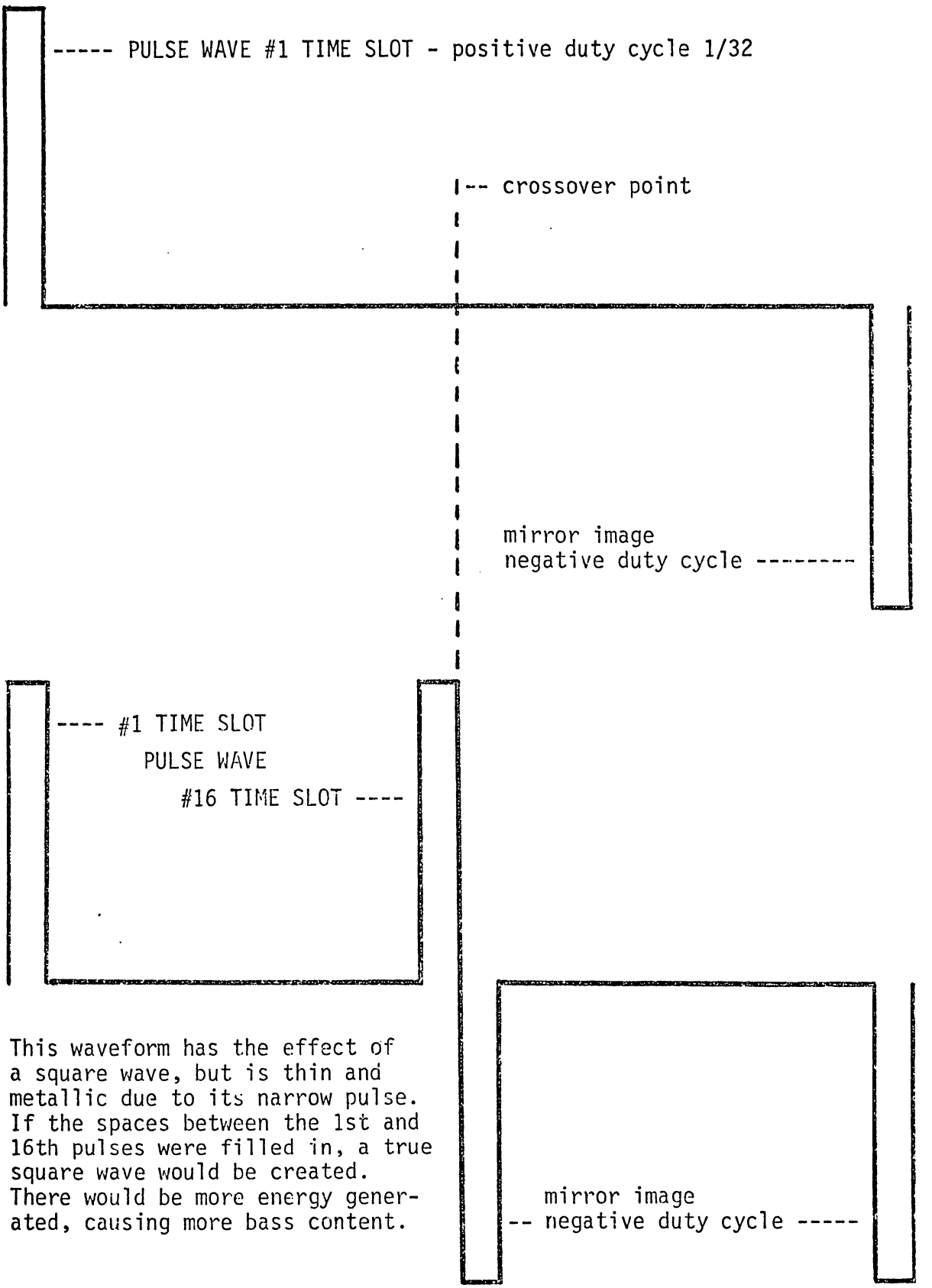
Harmonics - Percussion: These cards are basically sine tones representing the fundamental, various harmonics or overtones above the fundamental. Each of these cards is greatly effective when used as a quickly percussed sound that dies away leaving a fundamental-like tone held. The "B-3 Type" sound (electric organ preset) is a good example. Due to the "short-lived" nature of quickly percussed

sounds, it is often necessary to insert the card into two adjacent Alterables (1 & 2 or 3 & 4) to double the amplitude of the sound so that the percussed tone will have a good impact during its brief envelope.

Bells: Bell cards are most effective inserted in Alterable Voices 1 and/or 2, along with Percussion, Sustain, and Chorus. Some interesting variables are the Attack/Decay pedal, omitting Sustain, or adding one of the Harmonics cards in Alterable Voice 1 or 2. Usually both audio channels One and Two should be heard full and equal, however, special effects can be had by cross-fading. Use "Piano" and insert a "Ring Modulator."

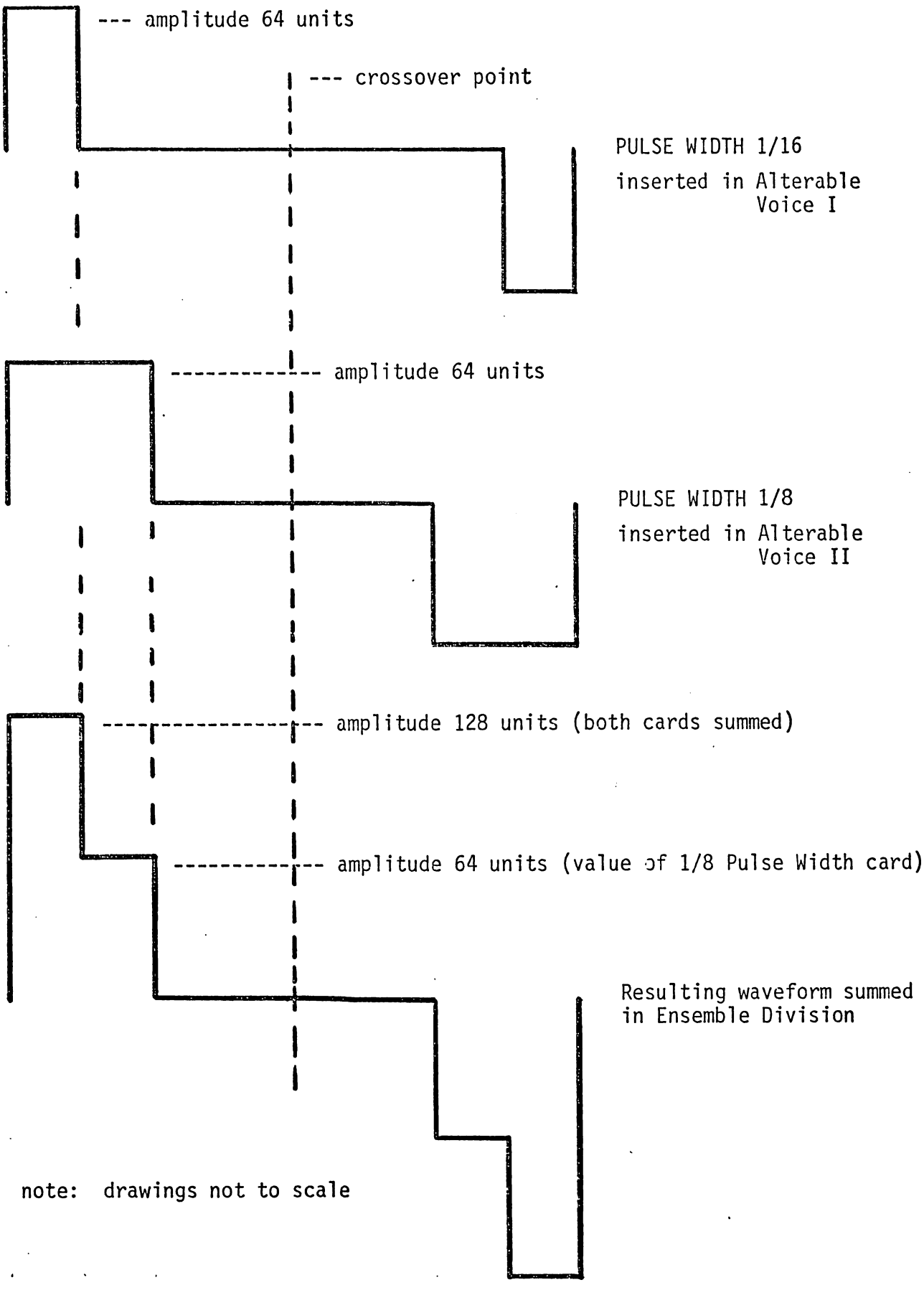
Geometric Waveforms: Card description is by geometric shape rather than sound or harmonic content. Performers who are familiar with analog synthesizers will recognize these waveforms. The Pulse Width series has positive-going duty cycles represented by a fraction. Pulse Width 1/2 would be 50% positive duty cycle, or a square wave. Keep in mind that the Computer also generates a negative duty cycle that is a "mirror image" of the positive cycle, creating a symmetrical waveform. All 16 of the series may be heard in succession in an experiment: turn off A.C. power briefly to "clear" the Alterable Voice memories, then slowly program the Pulse Width 1/2 into the reader while holding a chord - you will hear a 1/32 pulse width first, followed by 1/16, 3/32, 1/8, etc., until the card is all the way in at 1/2 pulse width. By slowly inserting the Blank card (number 00000 listed at the end of this group) the process can be reversed. Different Pulse Width cards can be added in Alterable Voices 1 & 2, or 3 & 4 to create staircase waveforms - one step per card. Pulse Width cards 1/16 and 1/8 together make a good rich staircase waveform, particularly effective for use with external filtering or "wah" pedal devices. Pulse Wave #1 Time Slot is a 1/32 pulse wave starting at the beginning of the cycle. Pulse Wave #2 Time Slot starts 1/32 later, causing a different phase relation. Each successive time slot number is an additional 1/32 later. It is interesting to note that slots #1 and #16 sound alike, as do #2 and #15, #3 and #14, etc., because of the symmetry. However, if #1 and #16 are mixed together, for example, in Alterable Voices 1 & 2 they will have the effect of a thin, metallic, square wave. Experiment with as many as four cards mixed together in the Alterable Voices. See Set-Ups for SAX for staircase wave applications.

EXAMPLE: MIXING PULSE WAVES



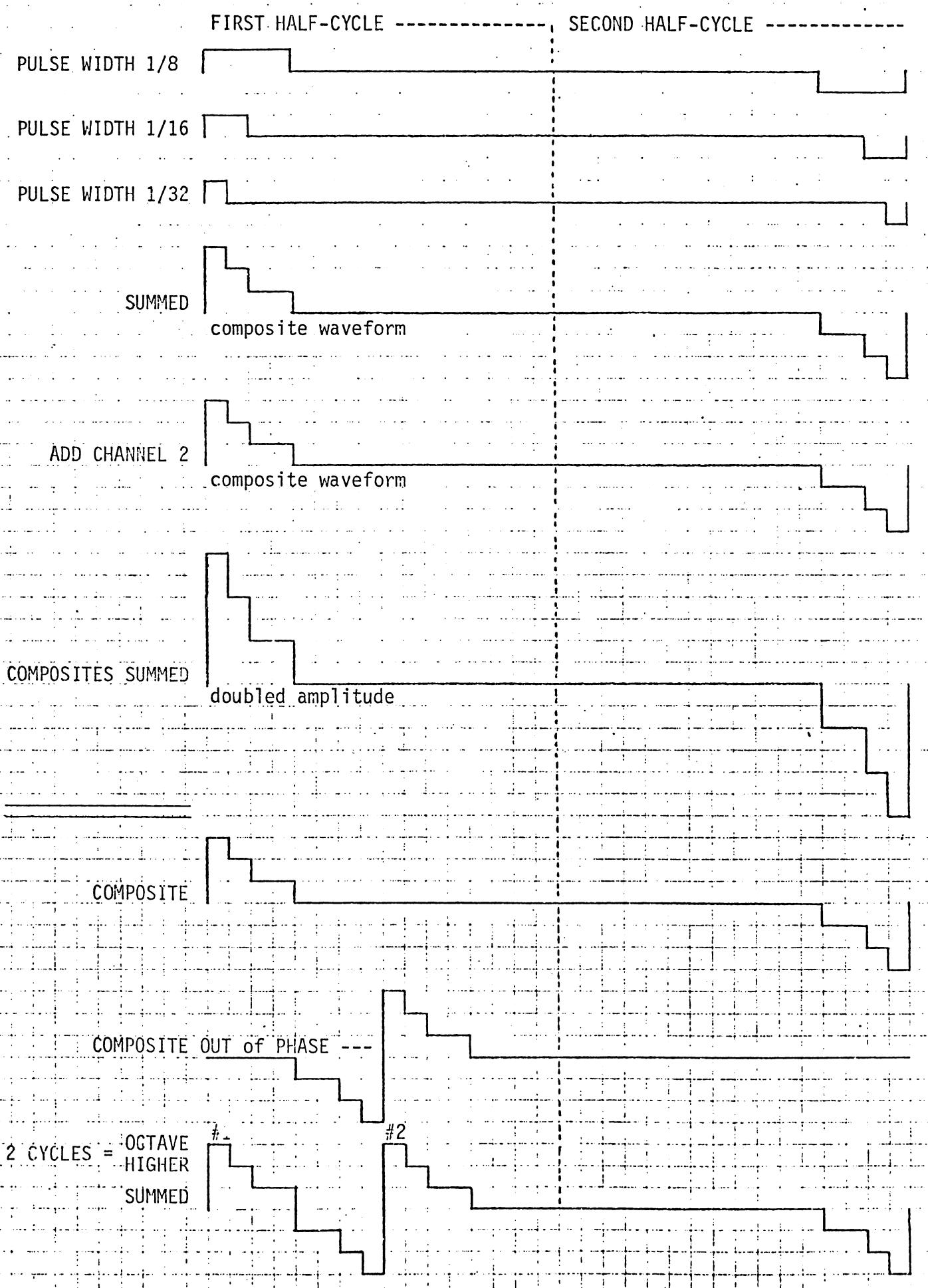
This waveform has the effect of a square wave, but is thin and metallic due to its narrow pulse. If the spaces between the 1st and 16th pulses were filled in, a true square wave would be created. There would be more energy generated, causing more bass content.

EXAMPLE: MIXING PULSES TO CREATE STAIRCASE WAVEFORM



note: drawings not to scale

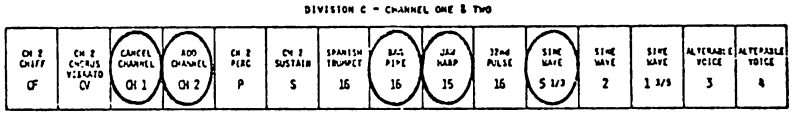
SAX SET-UP: RANDOM TONE CHANGE and/or OCTAVE JUMP (explanation)



VOICE COMBINATIONS

Sounds available from the Fixed Voice Memory in DIVISIONS "A," "B," and "C" are generally of solo nature, that is to say they are of a high R.M.S. value (loud). Most Voices, with the exception of the sine waves, are highly colorful and individualistic. It is this highly colorful and individualistic quality that lends to the beauty of tone color generated by the Keyboard Computer. Casual mixing of different tone colors can not only destroy this individualistic beauty of tone color, but it can also result in a rapid build up of total R.M.S. value or amplitude (volume). Also keep in mind that some of the voice control tabs activate more than one voice internally (SINE BASS, 16th PULSE, 32nd PULSE, SINE WAVES 5-1/3, 2, 1-3/5). It is not difficult to create a set-up that will over-drive your audio system (of course, no harm will come to the Computer).

The best approach is to select one or, at the most, two voices in each division that is to be used. One exception to this rule is the pulse waves - the narrow widths (16th & 32nd) do not have exceptionally high RMS Values and as a result, you will find that one of the SAX set-ups employs all three pulse waves in the same channel. The other exception to the rule when three or four Voices may be selected in the same division is when they are being split into opposite audio channels - example: BAGPIPE, JAW HARP, & SINE WAVE 5-1/3, with "CANCEL CHANNEL 1" and "ADD CHANNEL 2."



The SINE WAVE 5-1/3, since it is engraved in RED, continues to be heard from the CHANNEL ONE audio system while the other voices have been cancelled from CHANNEL ONE and added to CHANNEL TWO.

Here are some Voices that can be added together effectively in the same audio channel:

DIVISION "A" - SINE BASS 32 + SINE CHORUS 16

DIVISION "B" - FRENCH HORN 16 + CORNOPEAN REED 16
CORNOPEAN REED 16 + ELECTRIC PIANO 16 (PIANO preset)
ELECTRIC PIANO 16 + FRENCH HORN 16 (a little loud)
8th PULSE 16 + 16th PULSE 16 (also 32nd PULSE 16 in DIV "C")

DIVISION "C" - SPANISH TRUMPET 16 + BAGPIPE 16
SPANISH TRUMPET 16 + JAW HARP 16
BAGPIPE 16 + JAW HARP 16
32nd PULSE 16 can be added to any of the above combinations in DIVISION "C" since its RMS value is not high. It is, however, a geometric category waveshape (not harmonic) and as a result a harmonic order not present in either voice may occur when they are added - the effect may be desirable.

ALTERABLE VOICES behave just like additional Fixed Memory Voices that are engraved in BLACK or WHITE (excluding those engraved in RED which assign only to Channel One). The performer must exercise equal caution when adding ALTERABLE VOICES to the Fixed Memory Voices so as not to destroy the individualistic character of the tone color or to build up the RMS level to the point of overdriving the audio system. In fact, it is even possible with reckless addition of voices to raise the RMS level in the Computer to the point where "digital clipping" will occur inside the Computer. No harm will occur to the Computer if the limit is exceeded; however, distortion can occur and the audio level will probably be higher than you or your audio system can tolerate.

If additional volume of a given Fixed Voice relative to other Fixed Voices is required, its RMS value can be "doubled" by adding in the ALTERABLE VOICE the same card representing that Fixed Voice (see Fixed Voices Chart on page 29 for name and number of Tone Cards representing Fixed Voices).

The best general guideline for selecting combinations of voices or Tone Cards is "have a good reason for your selection." Of course random chance, if carried out indefinitely, would eventually lead to all of the best possible combinations, but you can save much time by thinking it out in advance.

The following examples may give you some ideas of reasoning behind combinations:

1. Add SEPTIEME 1-1/7' "A," "B," or "C" Tone Cards to the BELLS preset to bring out a clanging dissonance - like a cracked bell!
2. Add FRENCH HORN 16' (Div B) to the HORN preset for "fatness."

3. Add BARPFEIFE "B" Tone Card to the SPANISH TRUMPET 16' (Div C) for a good variation on Guitar sound (CANCEL CH 1, ADD CH 2, & PERC CH 2).

4. Add any one of the HARMONICS category of Tone Cards to any other Fixed Voice or Tone Card (especially BELLS) to bring out a specific harmonic (see Pitch Characteristic and Usage Chart on page 25).

5. Add any one of the MELLOW ENSEMBLE category of Tone Cards to any other Fixed Voice or Tone Card to add "fatness."

6. Add any one of the BRILLIANT REEDS category of Tone Cards to any other Fixed Voice or Tone Card to add "richness" or "bite."

7. Add any mixture Tone Card (from ORGAN - PIPE & ELECTRONIC category) to the SINE WAVE 8' (HARMONICS category) to create new bell sounds - use PERC & SUSTAIN controls.

PROCESSORS

Probably the most difficult concept to understand is the actual method of tone generation employed by the RMI Keyboard Computer. Most musicians and technicians are already familiar with tone generation methods employed by analog synthesizers and electronic organs. These instruments have in common a pitch generating device (Voltage-Controlled Oscillators or Frequency Dividers) producing not only a pitch, but also an inherent waveform or tone color (Sawtooth or Pulse Wave). In order to obtain control over the harmonic content of the final sound, some sort of filtering system must be employed to subtract the unwanted harmonics. Other methods that can be used on some synthesizers are Pulse-Width Modulation for obtaining a certain category of sounds and Frequency Modulation where, if accurate enough frequency control is possible, a wide variety of sounds is available.

The RMI Keyboard Computer tone generation system bears no resemblance to any of the aforementioned systems. The Computer employs a group of 12 independent Digital Processors each for the purpose of generating a complete "voice." The term "voice" is placed in quotes since it is being used for a different meaning. Earlier, "voice" was referred to as meaning a particular tone color or waveshape, such as the Fixed Voice Memory containing all of the various tone colors (waveshapes). The term "voice" can also apply to a part of the harmony such as Soprano, Alto, Tenor, or Bass in four-part harmony. If you were to play a three or four note chord on the keyboard, it would be described as having three or four "voices." Of course, there can be more than four "voices." A "voice" in this sense would involve a given pitch exhibiting a specific tone color with the ability to control the Envelope (attack/decay parameters). The Keyboard Computer has the ability to generate 12 of these "voices" simultaneously. The attack and decay of each note as it is played and released is independent from the others - there are no shared envelopes where the entire keyboard output is passed through a single "gating" device such as a Voltage-Controlled Amplifier (found in many string machines). Individual waveforms are generated digitally. A new and independent waveform is used for each new tone color, rather than altering existing waveforms.

The most popular and useful sounds are a series of binary numbers stored in a Read-Only-Memory LSI device (the Fixed Voice Memory).

The ALTERABLE VOICE PROGRAMMER (card reader) provides an external source of binary numbers representing waveshapes (Tone Cards). Voices selected from the Fixed Voice Memory sum with each other or with the ALTERABLE VOICES. The summing is digital, distortion-free, and perfect - even the softest and most subtle voice will make its contribution to the ensemble. If several voices are selected in a given processing channel, they will all be summed into a single series of numbers representing the proper composite. It is this final number that is read out at a frequency representing the given musical pitch.

ENVELOPE GENERATION

The term "envelope" is commonly applied to mean the duration of a musical note - its complete life from "attack" to "decay." The envelope can be graphically expressed as a rising line to show the attack (rise in amplitude versus time), and a falling line to show decay (fall in amplitude versus time). Each Processor has the ability to generate an independent envelope, and since there are twelve Processors, the Computer can generate as many as twelve envelopes simultaneously.

Envelopes in the Keyboard Computer are generated digitally in steps or stages of increasing and decreasing amplitude. The concept is analogous to the illusion of motion created by a rapid series of still pictures as employed in movies.

Envelope information is permanently stored in the Computer in a manner similar to the Fixed Voice Memory on a Read Only Memory or ROM. This envelope memory contains four independent curves represented by a series of numbers: LONG ATTACK, SHORT ATTACK, NORMAL DECAY, and PERCUSSION DECAY (see pages 47,48,49) There are 31 units of amplitude ranging from zero. These numbers serve as multipliers for the series of numbers representing the waveform. When the waveform is multiplied by the 31 value amplitude, the maximum volume would be achieved; when multiplied by zero, the minimum. Numbers in between give varying degrees of amplitude.

The attack and decay slopes have each been divided into 32 stages according to progression in time. As the attack stages are clocked, the amplitude multiplier number increases in value until the highest value is reached (31). If the key is held, this highest value will be maintained. When the key is released, the decay stages will be clocked causing a decrease in the value of the multiplier number. The stages can be clocked from one of two possible sources: (1) the Sustain Oscillator - a variable device whose speed is controlled by the Attack/Decay Pedal (5-800hz) or (2) a rate proportional to the frequency of the key being held.

When attack/decay clocking is proportional to the frequency of the key being held, a musical phenomenon called "scaled attack/decay" occurs. This effect is found between different instruments in an orchestra. Smaller instruments with inherent lesser material or physical cases enclose less air volume. For example, piccolos tend to have the ability to speak quickly and extinguish their notes rapidly. Larger instruments such as tubas have a substantial amount of metal enclosing a rather large air mass. A tuba would be slow to begin oscillation,

but once set in motion would also be slow to cease, due to resonance of both the air column and the physical case. If you turn on the PIPE ORGAN preset and compare the attack/decay time of the notes in the top octave with those in the bottom octave you will notice a substantial difference.

The Computer has the ability to select from the two attack curves and two decay curves as needed. It can also select between clocking sources as needed, compressing or stretching the envelope shapes to musical needs. Different Processors can be assigned different envelope functions in opposite audio channels simultaneously, such as Sustain and Percussion. The following are some common envelope combinations, their curves, and clocking procedures - refer to the graphs on pages 47,48,49.

1. ATTACK/DECAY FIXED: Optional "SHORT" or "LONG" attack curves. Decay curve is "NORMAL." Both attack and decay curves are clocked proportional to the key frequency. If as many as twelve different keys are held, then there will be twelve different rates of attacks and decays.

2. ATTACK/DECAY VARIABLE: Optional "SHORT" and "LONG" attack curves. Decay curve is "NORMAL." Both attack and decay curves clocked by Sustain Oscillator and speed variable by ATTACK/DECAY Pedal. At slower settings it is possible to hear individual attack stages of the first note played, since it is heard against a background of silence. If this effect is undesirable, mask it by slowly opening the Volume Pedal on the first note, as done on the CATHEDRAL CHOIR effect. Remember, Processors are still active until the final stage of the decay curve, even if your finger is no longer on the key. When playing long and slow envelopes it is wise to keep track of how many notes you are playing, because the chord just released will still have active Processors assigned to it. It is possible to run out of Processors and find "dead" notes until other Processors become available.

3. PERCUSSION: An abrupt STACCATO attack is selected, therefore, no attack stages are clocked - just an immediate rise to #31 level amplitude. The PERCUSSION decay curve is selected. Decay stages are clocked by the Sustain Oscillator while the key is depressed. Remaining decay stages are clocked proportional to key frequency upon key release. Decay time is variable by the ATTACK/DECAY Pedal, since it controls the Sustain Oscillator.

4. SUSTAIN: Optional "SHORT" or "LONG" attack curves. Decay curve "NORMAL" is selected. Attack stages are clocked proportional to key frequency. Decay stages are clocked by the Sustain Oscillator beginning upon release of the key. Sustain length is controlled by the ATTACK/DECAY Pedal.

5. PERCUSSION with SUSTAIN: This combination employs a different set of rules. An abrupt STACCATO attack is selected - no attack stages are clocked. The PERCUSSION decay curve is selected. Decay stages are clocked by the Sustain Oscillator while the key is depressed, however, remaining stages are also clocked by the Sustain Oscillator upon the key release. This combination is used for bells to obtain a continued ringing.

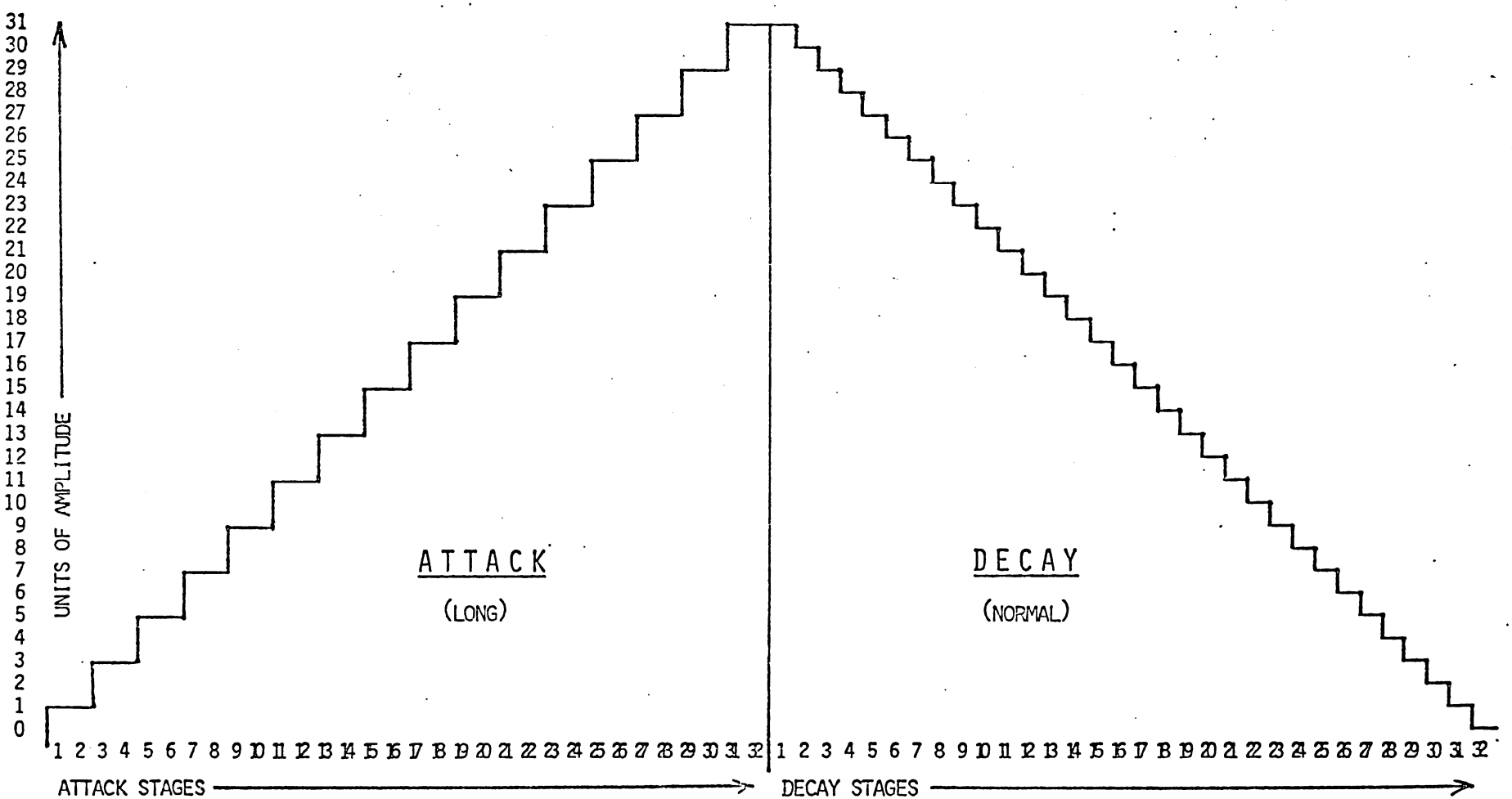
6. PERCUSSION with LATCH: Activating the LATCH footswitch stops the operation of the Sustain Oscillator and any clocking it might do. Compare the following description with #3 PERCUSSION if the Sustain Oscillator were disabled. An abrupt STACCATO attack is selected - no attack stages are clocked. The PERCUSSION decay curve is selected. Full amplitude is maintained like an organ until key release, at which time the entire decay stage series is clocked proportional to key frequency. This combination is effective for a percussive organ envelope.

7. STACCATO: Selection of abrupt staccato attack and decay is made. No curves are used - no stages are clocked. The STACCATO mode is imcompatible with all other envelope modes and will either override or negate their effect. Staccato mode will "dump" any notes or chords held in the LATCH memory. When added to PERCUSSION, STACCATO mode will render all notes "dead." STACCATO mode is for funk key-slapping technique like clavinet playing. Use with rich waveforms.

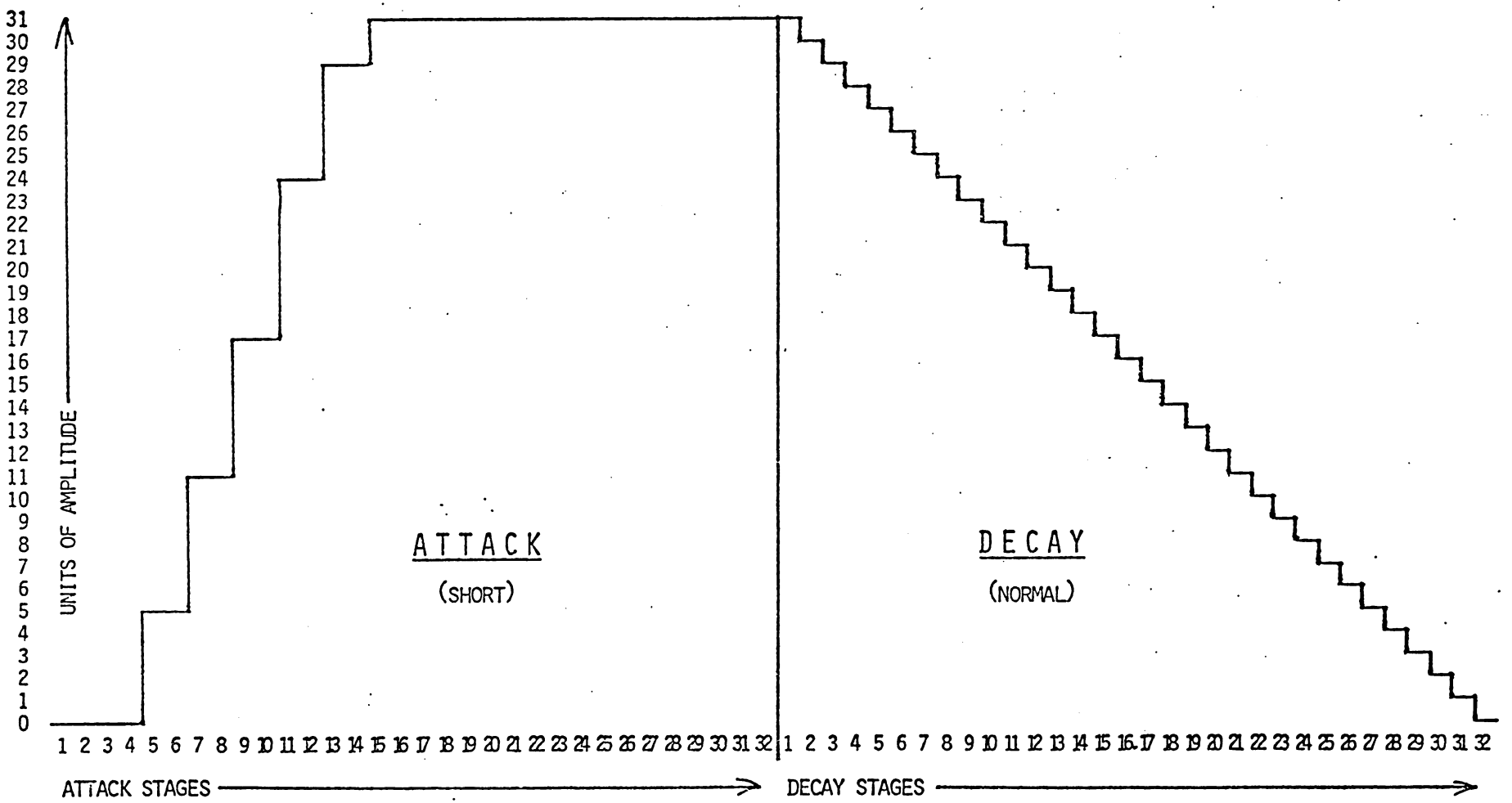
8. SUSTAIN with LATCH: Any given Processor or group of Processors can be "parked" in the LATCH mode indefinitely while the remainder of Processors continues to attack and decay or be played upon. If, for example, a sound in DIVISION "C" is to be latched, the SUSTAIN must first be activated (ADD CHANNEL 2 and SUSTAIN CH 2). Push the LATCH Pedal so the indicator light comes on - now the Sustain Oscillator has been stopped. Play a note. It will attack clocked proportional to the key frequency (see item #4 SUSTAIN), but it will never decay, since the decay stages are clocked by the Sustain Oscillator and it is not running. While the note or notes are latched, other

notes can be played in modes not requiring the Sustain Oscillator such as ATTACK/DECAY FIXED. Be sure to remove the SUSTAIN mode tab before playing additional notes or they too will latch.

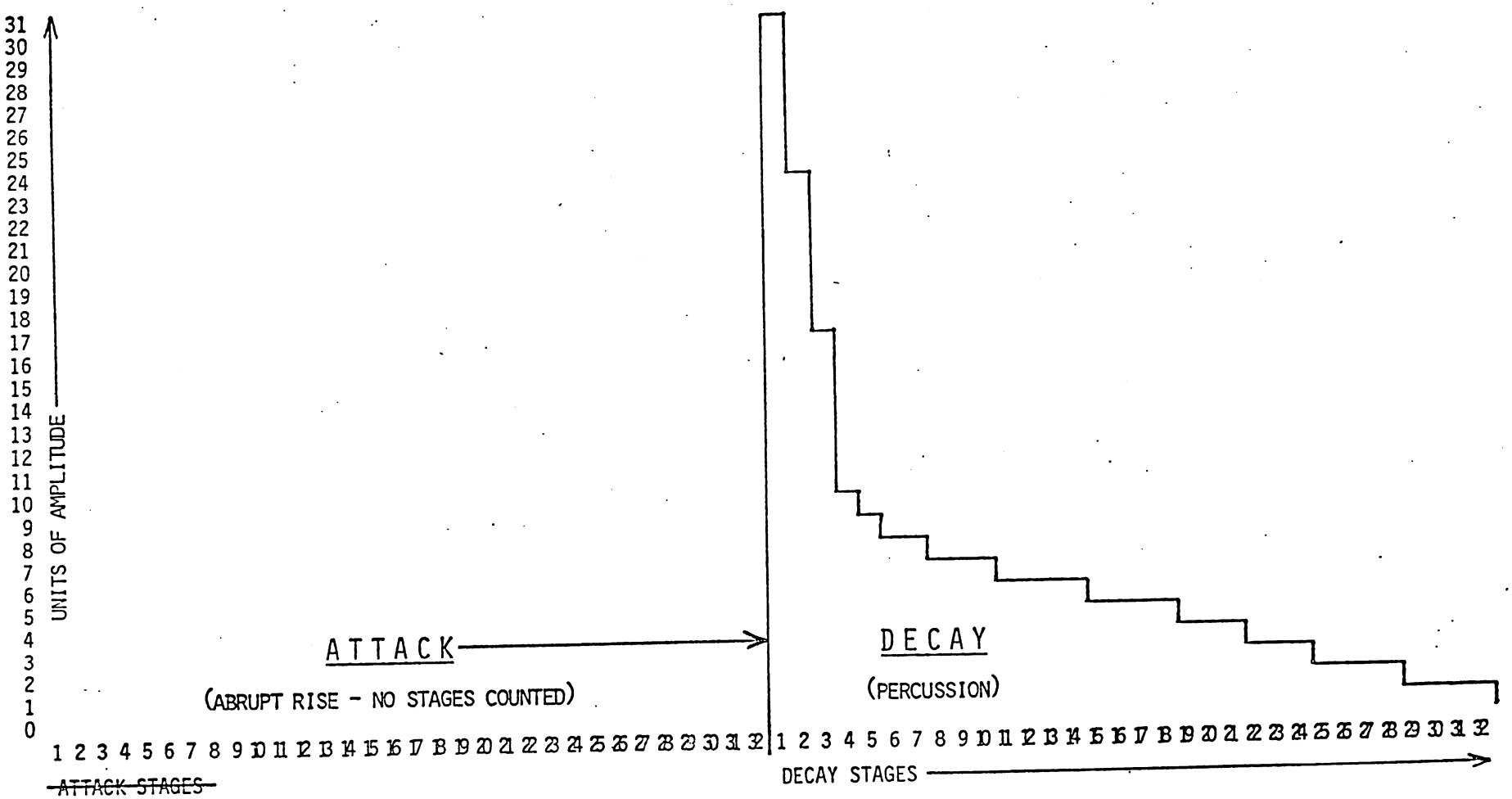
9. ATTACK/DECAY VARIABLE with LATCH: The STRINGS preset is a good example of an ATTACK/DECAY VARIABLE mode for demonstrating the LATCH effect. Set the ATTACK/DECAY Pedal in the fully-open "long" position for sake of demonstration. Play a three-note chord and wait for it to rise to full amplitude. When it reaches full amplitude, turn on the LATCH Pedal - you got it, you can remove your hands and the chord will hold indefinitely. If you held only three notes, the chorus effect on the STRINGS preset will have activated a total of six Processors; there are six more available. While the chord is latched, carefully select another three-note chord not employing any of the three notes used in the previous chord (remember which ones they were?). Play this new chord - you will hear nothing, because the Sustain Oscillator is not running and cannot clock the necessary attack stages; however, the Processors have been activated and assigned to the keys, so you can remove your hand. The chord has been latched. If you turn off the LATCH Pedal allowing the Sustain Oscillator to run again, you will hear the previous chord begin to decay and the new chord begin to attack. If you are quick enough to catch the new chord before it decays, you can start the whole procedure over again. Be sure you load the next new chord when the previous chord is at full amplitude and the old chord has decayed completely. If one of the notes or Processors of the old chord is still lingering, there will not be a sufficient number of Processors available for the new chord. A little practice with this technique will give you a new facility in handling multiple keyboards on stage live. For example, you can prepare a large string chord for a finale with the volume pedals closed while you are playing another keyboard. At the end just kick open the volume pedals and there is your climax.



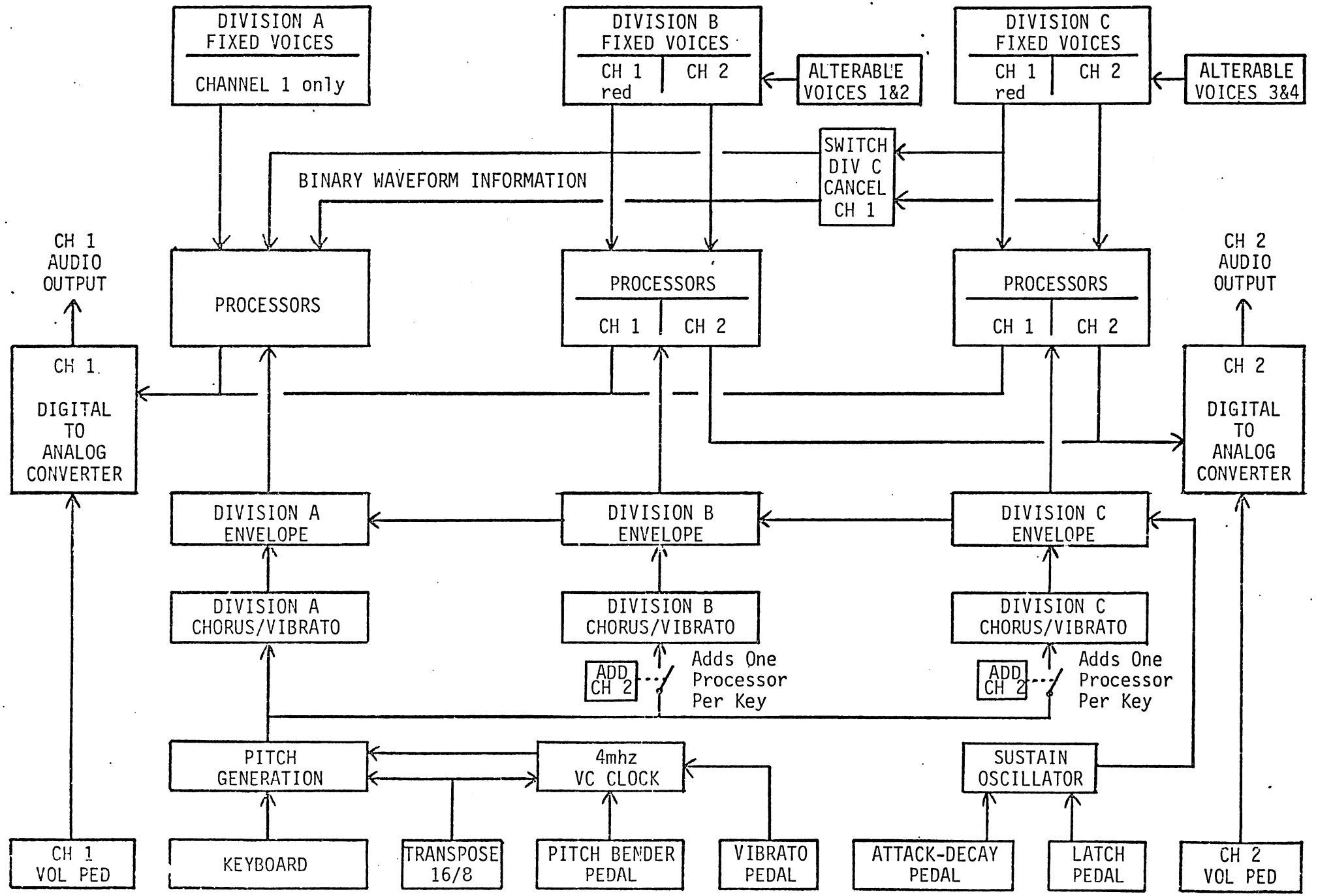
ENVELOPE CURVES - LONG ATTACK/NORMAL DECAY



ENVELOPE CURVES - SHORT ATTACK/NORMAL DECAY



ENVELOPE CURVES - PERCUSSION DECAY



CHANNEL ASSIGNMENT - VOICE, PROCESSOR, & ENVELOPE BLOCK DIAGRAM (not for service work)

CHANNEL ASSIGNMENT - VOICES, PROCESSORS, & ENVELOPES

Perhaps one of the most confusing areas of operation of the Keyboard Computer is its system of Voice, Processor, and Envelope channel assignment. Model KC-II was designed to simplify channel assignment by making the functions more graphic. If you refer to the Block Diagram on page 50 while reading this section on channel assignment, you will obtain a good understanding of the concepts. For sake of musical understanding, the Block Diagram has been greatly simplified and does not necessarily represent logic flow in the Computer - do not use this Block Diagram as a service tool.

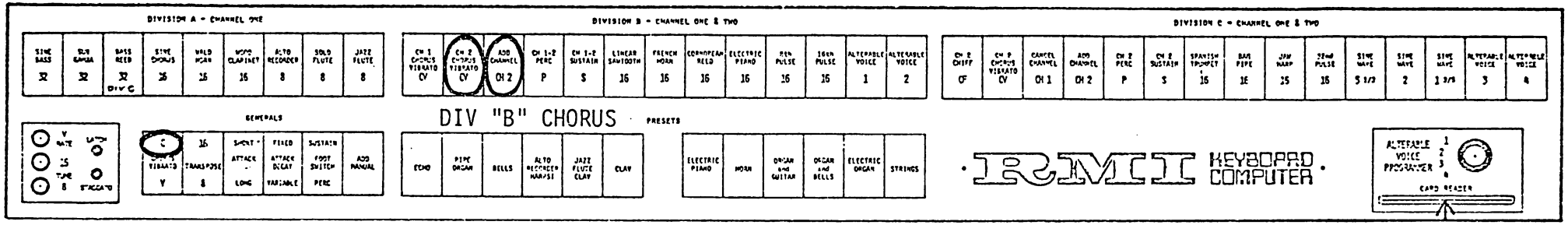
1. PITCH GENERATION: The keyboard controls pitch generation. Pitch generation can be further modified by the Transpose 16/8 control tab for octave shifts. Additional pitch modification can be achieved through the Pitch Bender Pedal or the Vibrato Pedal by frequency modulation of a voltage-controlled four million cycle clock.

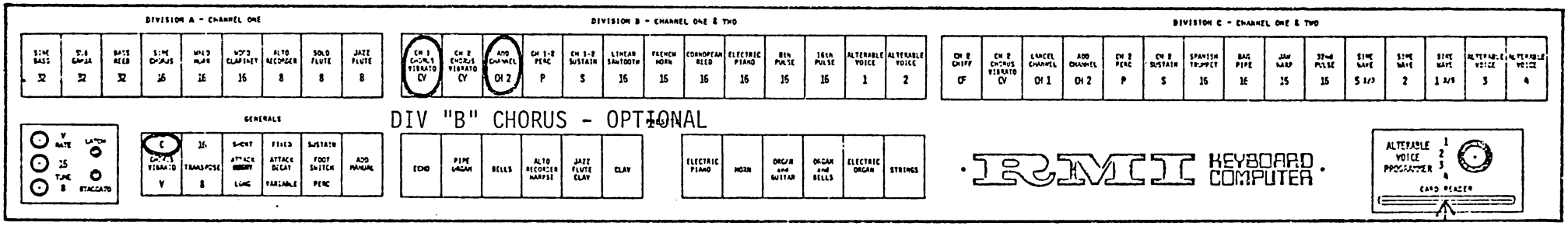
2. ADD CHANNEL TWO: The keyboard is always connected to DIVISION "A," therefore, those CHORUS/VIBRATO and envelope controls associated with DIVISION "A" will always be in effect (CH 1 CV and the CHANNEL ONE portions of the DIV "B" PERC & SUSTAIN controls). Referring to the Channel Assignment Block Diagram, you will notice that the DIV "B" ADD CH 2 control must be activated before any of the effects of that division can be realized (CH 2 CV and the CHANNEL TWO portions of the PERC & SUSTAIN controls). It should also be noted that similarly the DIV "C" ADD CH 2 control must be activated before any of that division's effects can be realized (CH 2 CV and CH 2 PERC & SUSTAIN).

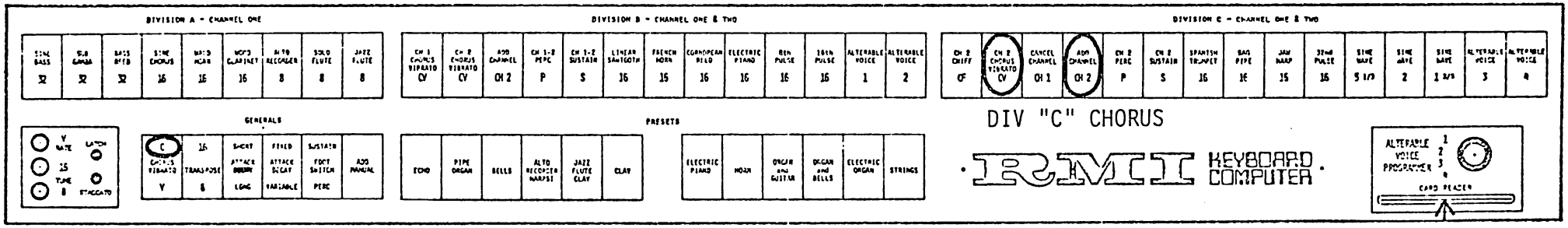
   The "Add Channel Two" tabs located in Divisions "B" and "C" add one additional Processor per key, allowing multiple pitch, voice, or envelope effects on each key. If DIV "B" ADD CH 2 is activated, there will be two Processors assigned to each key played. Playing six keys would activate all twelve available Processors. Activating DIV "C" ADD CH 2 will bring about the same effect. However, activating both DIV "B" and "C" ADD CH 2 tabs will assign a total of three Processors to each key causing the first four keys played to activate all twelve Processors. Any additional keys played will be "dead" until other keys are released. However, it should be noted that the most exciting and rich effects employ the most Processors per key.

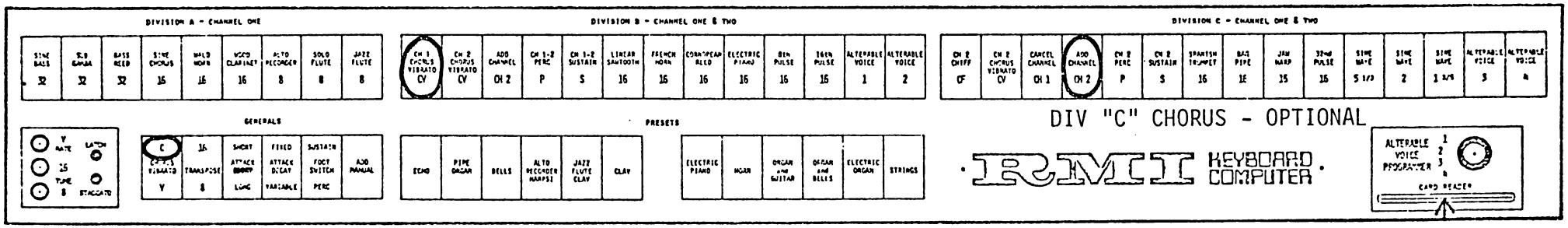
3. CHORUS/VIBRATO: Each division has a CHORUS/VIBRATO control. The DIVISION "A" CHORUS/VIBRATO control is included in the DIVISION "B" group of control tabs labeled "CH 1." A GENERAL CHORUS/VIBRATO control has been labeled "C" at the top and "V" at the bottom. This control affects the CHORUS/VIBRATO controls of all divisions, deciding whether they will be in the CHORUS or VIBRATO modes. VIBRATO is accomplished by adding then subtracting two counts to the frequency of a given note at a repetitive rate of about six cycles per second. CHORUS is a de-tuning phenomenon accomplished by adding two counts to the frequency of one division while the same voice is heard in another division at the normal frequency. "Beats" occur in the air as the close-but-different frequencies mix from opposite audio systems.

   The CHORUS effect requires that a voice be processed in two different divisions at the same time to obtain different "beat" frequencies. Voices in DIVISION "A" cannot be "chorused" since they can only be processed in their own division. Any voice in DIVISIONS "B" or "C" can be chorused since they are initially processed in DIVISION "A" (channel one). Voices in DIVISION "B" can be chorused by activating the ADD CHANNEL 2 tab and either the CH 1 or CH 2 CHORUS/VIBRATO tab. Do not add both CHORUS/VIBRATO tabs or there will no longer be a difference in frequency between the channels. DIVISION "C" can be chorused by adding CH 2 and the CV tab. DIVISION "C" chorus can also be created by adding the CH 1 CV tab instead, as long as there is a difference between the channels. Experiment with this concept, listening carefully as the phenomenon occurs in mid-air between the speakers. This is the effect that phasers are trying to achieve - that of independent frequency sources. The CHORUS effect is employed in almost all of the presets, but its effect is particularly important in the STRINGS - an inherently multi-pitched source. Selective VIBRATO is applied to one or two divisions when no VIBRATO is specifically required in another division at the same time - example: JAZZ FLUTE/CLAVINET preset (vibrato on the FLUTE but not on the CLAV). Another effect for using VIBRATO and Non-VIBRATO at the same time is that of the old Hammond VIBRATO/CHORUS where VIBRATO and Non-VIBRATO signals were mixed.

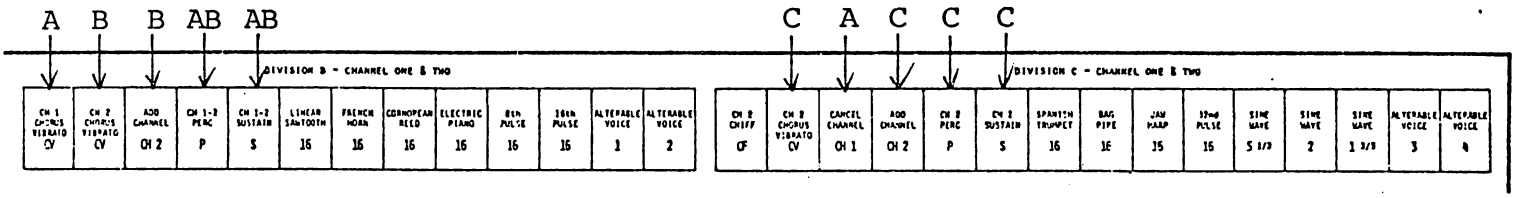








CHORUS EFFECT - DIVISIONS "B" & "C"



DIVISION ASSIGNMENT of CHORUS/VIBRATO & ENVELOPES

4. ENVELOPES: Each division has its own PERCUSSION and SUSTAIN envelopes. PERCUSSION modes of DIVISIONS "A" and "B" have been grouped together in DIVISION "B" reading "CH 1-2." SUSTAIN modes of "A" and "B" have been treated in the same manner (see drawing above). These controls have been grouped together because they are almost always used at the same time. This common usage is due to the CHORUS effect normally being employed in DIVISION "B," requiring the use of both channels. A group of control tabs labeled GENERALS is located in the lower left of the instrument. These controls affect all three divisions simultaneously.

5. FIXED & ALTERABLE VOICES: Refer to the Channel Assignment Block Diagram. Voices in each division have been given channel assignment. All voices in DIVISION "A" are assigned to CHANNEL 1. In DIVISIONS "B" and "C," only those voices engraved on the control tabs in RED are assigned to CHANNEL 1 - all other voices including the ALTERABLES are assigned to CHANNEL 2. However, before the Binary Waveform Information of the DIVISION "B" and "C" voices is sent to their Processors for "playing," it is also sent over to the DIVISION "A" Processors for "playing." For this reason, any voice turned on will initially play through CHANNEL 1 under the influence of the DIVISION "A" Processors. Those familiar with Allen Organ technology will recognize the device accomplishing this task is a Synthetic Coupler. Voices from DIVISION "B" are permanently wired to play initially through DIVISION "A" Processors, however, voices from DIVISION "C" can be disconnected from playing initially in DIVISION "A" by the DIV "C" CANCEL CH 1 switch.

6. PROCESSORS: There is a total of 12 Processors available for sharing between the three Divisions "A," "B," and "C." The Processors are called upon by the keyboard as needed and are available on a first-come, first-serve basis. If neither DIVISION "B" or "C" has been activated by the ADD CH 2 tabs, all 12 Processors will be available to DIVISION "A." As DIVISION "B" is activated by its ADD CH 2 tab one additional Processor will be assigned for every key played. The first 6 keys played will activate all 12 Processors. DIVISION "C" operates in the same manner. If both "B" and "C" are activated two additional Processors will be assigned to each key played for a total of three per key. In this mode, the first four keys played would activate all 12 Processors. Since the Processors operate on a first-come, first-serve basis, the fifth key depressed in this mode would not sound until one of the other keys was released. This factor should not be a problem to the musician since the mere effort of a four-note chord will render the tonal results of 12 independent sounds. It should also be kept in mind that a given Processor or group of Processors is assigned to a given key until the complete end of a given envelope. In the case of long envelopes such as SUSTAIN, the lower end of the keyboard on FIXED ATTACK/DECAY, or any portion of the keyboard on VARIABLE ATTACK/DECAY, Processors will still be actively assigned to keys after the fingers have been removed. More particularly, as fingers are moved from one key to another, there will still be Processors assigned to the previous key until its complete decay. A good example of this effect would be the STRINGS preset with the ATTACK/DECAY Pedal set "long." If you play a three-note chord you will activate 6 Processors at once, since both DIVISIONS "B" and "A" are required for CHORUS. When the second three-note chord (using three different notes) is played, the 6 Processors from the first chord will be heard decaying while the 6 Processors of the second chord will be heard attacking. During the moment of transition while both attack and decay are occurring there is a total of 12 Processors assigned to keys. If the performer were to play two six-note chords in succession on the STRING preset or similar CHORUS set-ups, the second chord would be delayed until all of the Processors from the first chord had decayed. It is only on the longer envelope settings that a lag is noticeable with large chords.

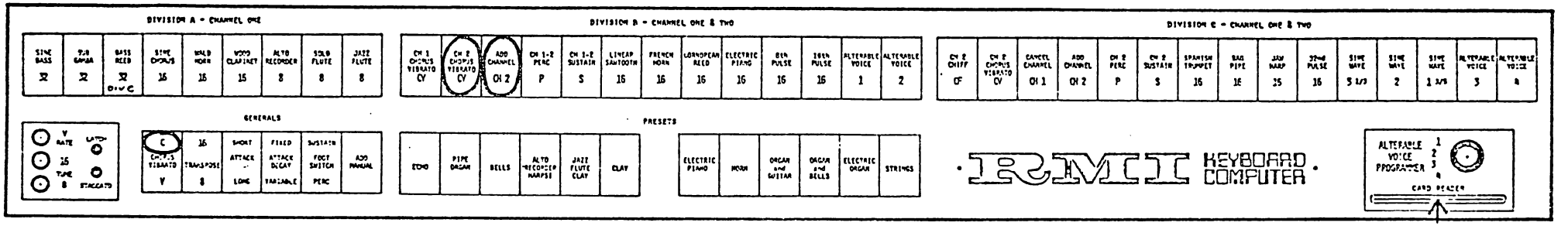
PROCESSOR AND ENVELOPE ASSIGNMENT COMBINATIONS

The most musically interesting combinations of Processor and Envelope assignment involve more than one event occurring at the same time - the more the better. In an orchestra or a large pipe organ, or even a large choir or band, there is a plurality of individual sound producing devices - instruments in the orchestra and band, pipes in the organ, and human voices in the choir. Each separate sound producing device has its own frequency, tone color, and attack/decay characteristics. Although a solo violin or human voice can have much beauty, there is a certain collective beauty that occurs when many play together.

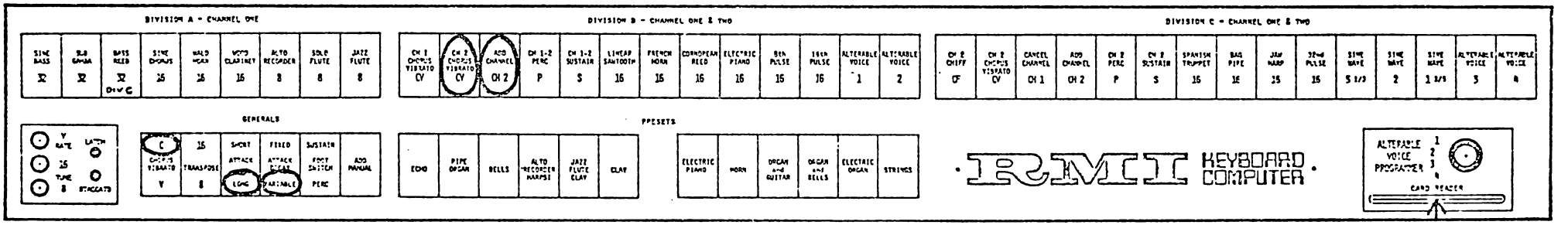
This same collective beauty can be created in the Keyboard Computer by assigning more than one Processor to a key. In this manner more than one musical event can occur at a time. Three of the presets employ one of the more musically complex set-ups: ELECTRIC ORGAN (B-3, ORGAN AND BELLS, and ORGAN AND GUITAR. Each involves CHORUS tuning in DIVISION "B" causing two Processors to be assigned to each key, and PERCUSSION in DIVISION "C" causing a third Processor to be assigned to each key. A less complex set-up is found in the ALTO RECORDER & HARPSICHORD and JAZZ FLUTE & CLAVINET presets - solo type flutes are used from DIVISION "A" and no CHORUS is employed since a single flute would not involve a CHORUS effect. Other set-ups such as the STRINGS and HORN use DIVISION "B" CHORUS and VARIABLE ATTACK/DECAY. DIVISION "B" CHORUS is used on almost all of the presets because it sounds good. The ELECTRIC PIANO preset uses DIVISION "B" CHORUS with PERCUSSION mode. The BELLS preset adds SUSTAIN mode. The PIPE ORGAN preset uses DIVISION "B" CHORUS to obtain its multi-rank effect. The CLAVINET preset also uses the DIVISION "B" CHORUS, but with the addition of the STACCATO mode (you will note that the STACCATO indicator light comes on when that preset is activated). The STACCATO mode can be very effective on a number of the narrower PULSE WAVES for funky playing.

In order to help you design your own Set-Ups, the following Processor and Envelope assignment combinations have been prepared with the voices or tone colors omitted - you add the voices either from the Fixed Voice Memory or from the Alterable Voice card reader. Keep in mind that voices to be percussed against other voices should have a high RMS value and/or be of brilliant nature - the BRILLIANT REEDS and the HARMONICS categories of the Tone Card Library are full of helpful possibilities. Cards from the MELLOW ENSEMBLE category are effective as a background against the percussed voices. It is suggested that the performer become so familiar with these combinations so as to memorize them.

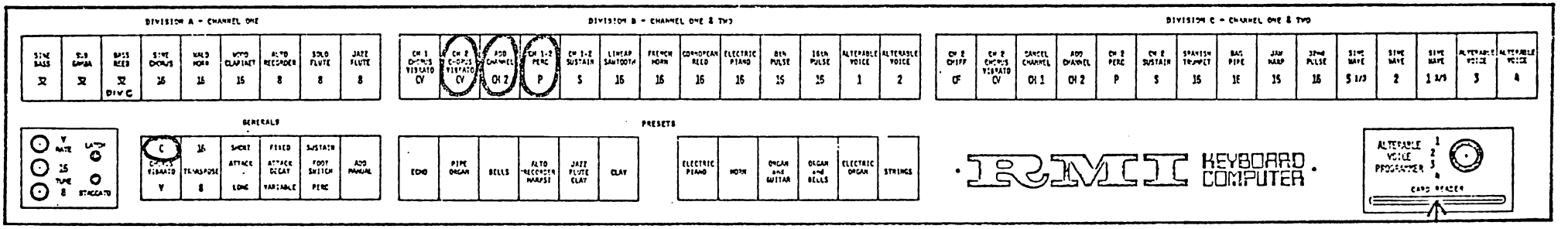
DIVISION "B" CHORUS



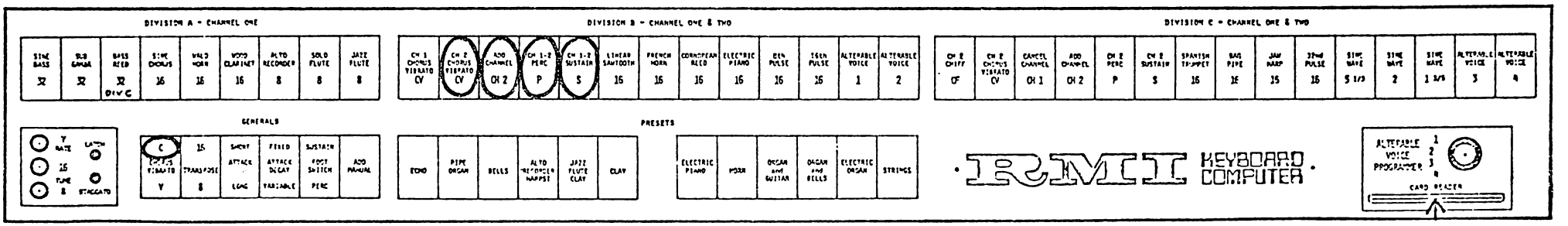
DIVISION "B" CHORUS with VARIABLE ATTACK/DECAY for STRINGS, HORNS, etc.



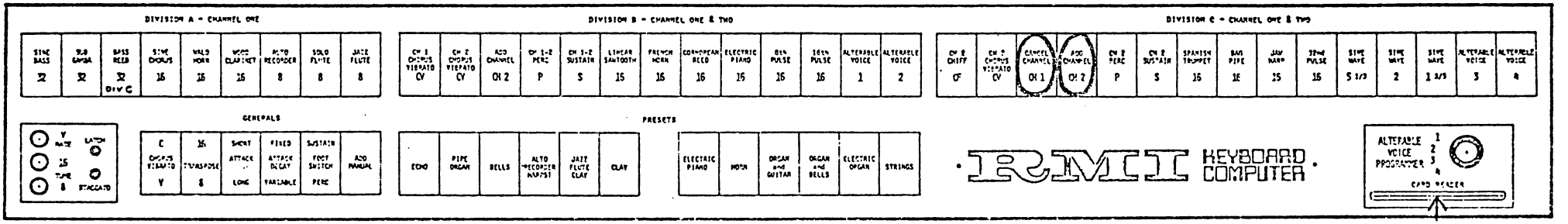
DIVISION "B" CHORUS & PERC for PIANO, HARPSICHORD, or CLAVINET/GUITAR EFFECTS



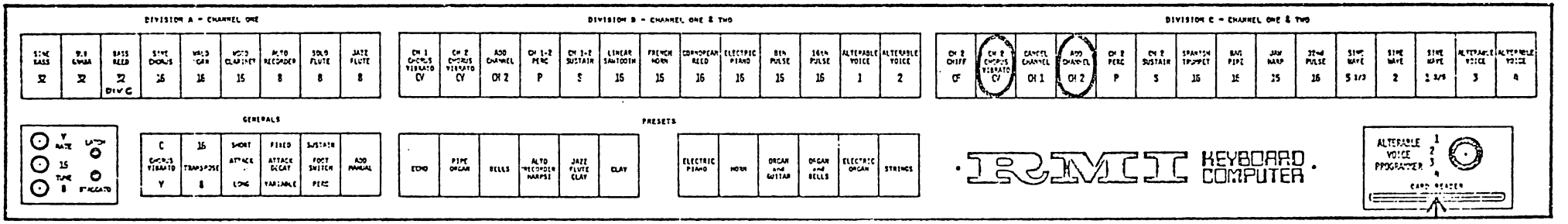
DIVISION "B" CHORUS, PERC & SUSTAIN for BELL EFFECTS



DIVISION "C" ALONE

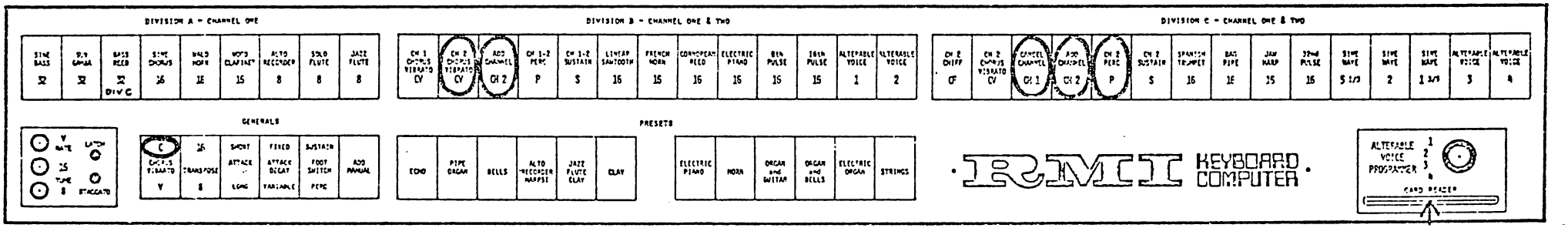


CHORUS DIVISION "C"



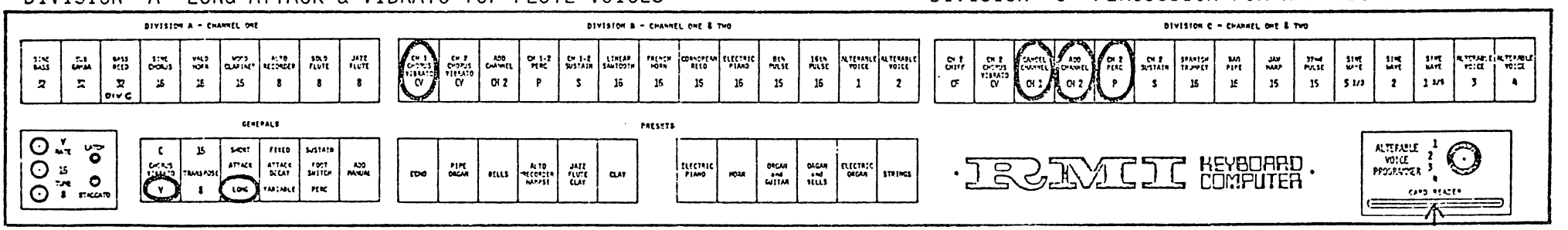
DIVISION "B" CHORUS

DIVISION "C" PERCUSSION



DIVISION "A" LONG ATTACK & VIBRATO for FLUTE VOICES

DIVISION "C" PERCUSSION FOR HARPSICHORD OR CLAV



One concept must always be remembered by the performer. That is, this instrument is not an organ or a piano, although it can be programmed to sound like either. Thinking of the Computer as an organ or piano will cause the performer to play it as one or the other, missing much of the potential available. The performer is best prepared by approaching the Keyboard Computer as a digital polyphonic synthesizer.

Unlike the piano or organ where there is some sort of tone-producing mechanism for each key, the Computer provides twelve tone-producing mechanisms of a much higher order of complexity to be shared by all 61 keys on a "first-come, first-serve"basis. With most people having only ten fingers, it would be assumed that the twelve Processors are more than enough to cover all possibilities, giving the "sensation" of a separate tone-producing mechanism for each of the 61 keys. However, there is more to the story . . . .

In the design of the RMI instrument, we assumed that most performers would not be attempting to play ten and twelve-note chords, but instead would average out somewhere in the area of four to six notes in a chord. If this were the case, then much of the processing ability of the Computer would be wasted. To allow the most use from the available Processors at one time, we provided for assigning more than one Processor to the same key. Assigning an additional Processor to each key played would allow the performer to play more than one "instrument" or effect simultaneously. Finally, a third Processor may be assigned to each key, allowing even further development of complex sounds in real time. The obvious conclusions may be drawn: when two Processors are assigned to each key, playing six keys will activate all twelve Processors, and when three processors are assigned to each key, playing four keys will activate all twelve Processors. Any additional keys pressed will not play until other keys held are released - earliest keys played have priority.

The previously mentioned "rules" to the game must be kept in mind at all times by the player. By now, it must be evident that merely applying piano or organ technique to the Computer will not be sufficient. A new technique must be developed - Keyboard Computer technique. It requires a little more thought as to how many keys you are playing. If you think about chord structure used in piano and organ, you will realize that notes are often added in the right hand to create "richness" of sound, and frequently bass lines in the left hand are

doubled in octaves. Let's analyze that. The basic sound of a piano never varies, so to gain added richness, you add more notes. Once the dynamic limitations of a single bass note on the piano have been reached, the only way to add more power is to play in octaves. These techniques have become second nature to many pianists and organists. Now that the Keyboard Computer is available, you have complete control of richness and bass content through harmonics. One can, of course, still play the Computer in the "one Processor to a key" mode, using as many keys as he can reach, however, the more exciting and unique sounds come from using more than one Processor per key. Four or six-part harmony can take on new excitement when there is more than one voice per key. If you have background in piano or organ, use it to your advantage, but do not let it hinder your approach to a new technique - that of the Computer.

INSTRUMENTAL REALISM STYLES

Once the proper controls have been set up on the Computer for creating a given sound, particularly a familiar instrument, the playing style should be plausible if the illusion of the instrument being created is to be achieved. As an example, if you were to set up the sound of an Alto Recorder and then play in a "chord and bass" organ style, the results would not at all be convincing.

There is a problem here. Most people who purchase a Keyboard Computer are keyboard players having familiarity with organ and piano. We might assume that, on the average, such performers have spent most of their musical time on the keyboard with little if no experience on other instruments. Now, however, appears the RMI Keyboard Computer with its ability to sound very convincingly like other instruments. The hitch is that it is hooked to a standard keyboard. When keyboard players see a standard keyboard, there is a great temptation to play in standard styles. This would be all right if the Computer were set up at the moment for piano, organ, clavinet, or harpsichord, but suppose it were set up for Jazz Flute, what then? Step one is to study the characteristics of the Jazz Flute or whatever instrument you are trying to recreate.

The first thing to do is listen to some recordings of the instrument to be imitated. Some things to note are: (1) Is the instrument Solo or Polyphonic? (2) If polyphonic, how many voices can play at once? (3) What pitch range do they cover? (4) Are there certain types of harmony that are typical to arranging for the instrument - open, close, etc.? (5) Are there any unusual character-

istic traits of the instrument such as bending notes, strumming, or sliding? (6) If a solo instrument is being created, how many "players" are there going to be? Example: If there were two flute players performing on stage, they could only produce two-part harmony. If you, as a keyboard player, are trying to create the same illusion, you will have to contain yourself to a predetermined number of voices. The fewer the parts, the better chance the listener has of hearing musical interplay between the parts. One good study source is the new RMI KC demo record - ask your dealer.

To start you out making good music on your Computer, we will describe the keyboard and arranging techniques required for the twelve presets, followed by some of the more popular Set-Ups.

1. STRINGS: Since the proliferation of "string units" and "violin machines" among keyboard players, almost everyone is playing strings - but not really!!! There is more to it than most performers realize. Of course, the biggest problem is that most of the string machines do not approach sounding like the real thing regardless of the playing technique, and this problem is compounded by the fact that very few performers are aware of the "string playing technique." Fortunately, the Keyboard Computer generates beautiful and highly-realistic strings, but the burden is on the performer to employ the correct playing and arranging technique that brings these sounds to life.

The first item to keep in mind about the STRING preset on KC-II is the fact that for every key depressed there are two distinct and independent sounds generated in stereo at different frequencies. In part writing, this would be considered "doubling" - placing two players on one line. For this reason alone it is not necessary to play a large number of notes in a chord (3 or 4 at the most). Now, look at your hand. How far can you reach - an octave? maybe a tenth? Two violinists sitting next to each other reading two independent lines or parts are in no way tied to each other as are the fingers of one human hand. They can play close to each other in pitch or as far apart as the extremes of their instruments will allow. Your single hand cannot cover the extremes of the keyboard simultaneously, or even half of the keyboard. So here is a major difference between, for example, four string players and your two hands on a keyboard. Both are capable of four-part harmony, but the string quartet will have more independence than your two hands. To erase this apparent difference, the key-

board player must make a specific effort. So, how is this accomplished? Avoid close harmony and employ open harmony. Spread your harmony widely over the keyboard - keep all intervals as wide as possible. For example, in the right hand, never play triads in root position. A "C-E-G" chord in the 4th octave should be played in one of three ways depending upon the note desired on top in the melody:

"G" in the melody - E3-C4-G4
"E" in the melody - C3-G3-E4
"C" in the melody - G3-E4-C5

This same "open harmony" concept should be applied to all chords. The bass line should be kept as low and far away as possible from the voices in the right hand. Three-part harmony can also be very effective since it allows wide spaces between the voices. Place the bass line in the lower part of the keyboard in the left hand and assign the upper two voices to the right hand in parallel sixths motion. Ascending or descending parallel sixths are exceptionally melodic, beautiful and string-like. At all times, however, try to limit your harmony to three or four voices so each can be heard clearly as an independent voice.

To further the illusion of independence of voices, rhythmic contrasts can be created between the voices. For example, while a long melody note is held in the top voice in the right hand, other voices can move around below in the same hand. Other rhythmic contrasts can involve legato in one voice while the other three or two are staccato, or conversely, a legato left hand while the melody dances around staccato style in the right hand.

Both volume pedals should be set equally in order to maintain a good balance between the two channels being chorused. Placing one foot equally in the middle between the two volume pedals will allow a good means of controlling the expression of both channels together. However, the most important pedal functions when playing the STRINGS are the VIBRATO and ATTACK/DECAY time. Place your left foot on the VIBRATO Pedal and your right foot on the ATTACK/DECAY Pedal. Proper use of these two pedals can make or break your string performance! Phrasing is the most important element in string playing. All music can be broken into musical phrases - complete musical thoughts. Faster and more articulate phrases will require a faster envelope speed, so you close the ATTACK/DECAY Pedal slightly, but not all the way. The differences in pedal position are very subtle and you will need to spend some time developing the necessary coordination. The best

way to pick up a feeling for the pedal range is to repeat a short duration chord while varying the pedal - note the attack and decay edges. Use the longer settings for more legato phrases. For ethereal "dripping" strings even the extreme long position of the ATTACK/DECAY Pedal can be used, but there will be a long lag in the attack requiring very slow playing technique. It is also best to limit the number of keys played at a time to 3 when using the very slow envelopes to prevent pauses between chords while the Processors reassign themselves for the next attack.

The VIBRATO Pedal is equally as important as the ATTACK/DECAY Pedal. A string player spends much time learning how to impart a gradually building vibrato to a note as the musical phrase builds toward its climax. The vibrato is extinguished before the end of the phrase so that the tail end of the decay will have no vibrato. Practice repeating a chord with an average ATTACK/DECAY setting (not too fast, not too slow) while adding the Vibrato Pedal. The chord should attack without vibrato, then add vibrato as the chord reaches full amplitude. Just before or just as releasing the chord, remove the vibrato so the tail of the decay will have no vibrato. This technique will go a long way toward creating the effect of real strings. You will notice that a more heavy vibrato can be tolerated on the high notes than on the lower ones. Particularly, you might notice that for a given setting of the Vibrato Pedal there will be a heavier vibrato at the 16' position of the TRANSPOSE tab than at the 8' position. A single isolated or rapid chord or note between legato phrases would be played entirely without vibrato in order to single it out from the rest. During longer legato passages it is possible to leave the vibrato running, but at a light intensity to be increased as needed.

String pizzicato is a beautiful orchestral effect that has never been attempted by any "string machines." Certain passages written in a delicate articulate manner require this pizzicato effect to bring them to life. The string player uses his/her fingers to pluck the strings rather than bowing them. This style is most effective in the upper end of the keyboard in the TRANSPOSE 8' position. Place the FOOTSWITCH tab (in the GENERALS DIVISION) in the PERCUSSION position. Hold the SUSTAIN/PERC footswitch down for as long as the pizzicato effect is desired. Selected individual notes or chords can be sustained (held) while other notes are played in pizzicato style at the same time. The coordination involved

is similar to that required in using the third pedal of a grand piano to hold a given note or group of notes. Play and hold the note that is not to have pizzicato first, then hold the footswitch down and play the remaining notes - they will be percussed while the first notes held will continue to sound. Those watching will think you have a split keyboard.

For further input and study of string technique, spend some time listening to classical recordings of string quartets. The violin is a highly-complex synthesizer in reality, capable of subtleties and nuances of timbre that change rapidly during performance. You will find that it is impossible to recreate all of the realism of strings on the Computer, but with practice and careful listening you will come closer than any other imitative instrument.

2. ELECTRIC ORGAN: Telltale sound of that famous electro-mechanical organ with drawbars, third harmonic percussion and two speed revolving speakers. Of course, we are referring to the B-3 Hammond. This preset activates the FRENCH HORN voice in DIVISION "B" and applies CHORUS to it. The effect is similar to an 00 8760 000 setting on the drawbars. The CHORUS tuning simulates the Chorale Speed Leslie. In fact, this imitation is ironic since the slowly-turning speaker was originally conceived to imitate the sound of multiple pitch sources as found in a pipe organ - we are now taking the real thing (multiple pitch sources) and trying to imitate the imitation. Tremolo speed Leslie is initiated by opening the VIBRATO Pedal. Third harmonic percussion is acheived by percussing the SINE WAVE 5-1/3' in DIVISION "C." Unlike the B-3, however, the percussion will be activated on each key played regardless of other keys being held at the same time. The CHORUS effect requires the assignment of an additional Processor to each key played, as does the PERCUSSION mode in DIVISION "C." Therefore, for each key played there will be three Processors activated - a four note chord would activate all twelve Processors. Any additional keys depressed would not sound until one of the other keys is released. If this mode of operation is particularly inconvenient for you to handle, turn off the preset and set up the combination manually, eliminating the CHORUS (do not use the DIVISION "B" ADD CH 2). If you find that you are continually using the B-3 sound without CHORUS, then you might consider removing that particular diode from the Preset Matrix. For quick additions to this sound while playing, check out the ADD MANUAL section of SET-UPS in the Owner's Manual. Since the SINE WAVE 5-1/3' percussion voice is engraved in RED,

it will be heard only in CHANNEL ONE. As a result, the percussion can be added or removed by the CHANNEL ONE volume pedal. Further variations can be made by the ATTACK/DECAY Pedal: the percussion decay envelope is clocked by the Sustain Oscillator and its rate, in turn, is controlled by the pedal. Very short popping-like percussion can be created with the pedal in closed position (Sustain Oscillator running at maximum speed). In the TRANSPOSE 16' position the bottom end of the keyboard takes on a heavy funky sound - the TRANSPOSE 8' position has more punch in the upper end. Three-note chords in the right hand against single-note bass line in the left is the most effective arrangement.

3. ORGAN and BELLS: This preset is like the ELECTRIC ORGAN except for the percussion. Instead of the SINE WAVE 5-1/3' voice, the SINE WAVE 2' is activated (a much higher pitched and more piercing sound).

The SUSTAIN mode is activated in addition to the PERCUSSION mode, causing the SINE WAVE 2' voice to continue its decay time after the keys have been released. If the ATTACK/DECAY Pedal is pushed all the way open (minimum rate for Sustain Oscillator) the 2' will continue ringing substantially after the key release. A heavy use of the VIBRATO Pedal is very effective with the longer decay times, and conversely, a lack of vibrato is more effective with the shorter decay times. When employing longer decay times, remember that the Processors are still assigned to a given key until the very end of the decay time, even if the key in question is no longer depressed. The point is that longer decay times may require either chords of less notes or a slower tempo in order for the Processors to have time to reassign themselves to the new keys as they are depressed. A little practice with this concept will soon give you the feel of it. For particularly effective use of this preset, it is best to contrast very short decays (without vibrato) with very long decays (with vibrato) in different parts of your music. The short decays when played in a choppy manner take on a funky popping sound.

4. ORGAN and GUITAR: This preset is capable of rendering a highly convincing non-keyboard sound. The secret lies in the music, playing technique and use of the Pitch Bender Pedal. First of all, this preset contains contrasting stereo voices on the CHANNEL ONE and CHANNEL TWO pedals. The organ sound heard in CHANNEL ONE is exactly the same as the B-3 sound used on the ELECTRIC ORGAN preset. CHANNEL TWO contains the same chorus-tuned FRENCH HORN voice from the

B-3, but the percussed SPANISH TRUMPET and JAW HARP have been added to create the guitar sound. The best effects are obtained by leaving CHANNEL ONE open while adding or removing CHANNEL TWO in quick precise movements as called for in the music. Remember, the audio is completely attenuated when the pedal is fully closed (heel down). When you intend to remove the Guitar sound make sure the pedal is completely closed so the sound does not "leak" through. Similarly, when the Guitar is desired be sure to open the pedal fully to obtain full volume. Since both feet will be busy with the VIBRATO, CHANNEL TWO, and PITCH BENDER pedals, it is probably best to set the desired Guitar decay time with the ATTACK/DECAY Pedal initially and leave it. However, if you can find a point in time, some interesting effects can be had by slightly shortening the decay time on the Guitar for a funky picking sound - remember, the Organ Percussion will share the same decay time.

One of the best effects available on the ORGAN and GUITAR preset is the PITCH BENDER slide for stylized pedal steel and rock guitar. Under the section titled "Transposer Tuning and Pitch Bender Controls" on page 78 you will find instructions for tuning the PITCH BENDER Pedal to the interval of a Perfect Fourth. With the TRANSPOSER in the 16' position the PITCH BENDER Pedal will slide up a Perfect Fourth when depressed fully to the floor and held. Listen to some country pedal steel to get an idea of the smooth slides used. Of course, a real pedal steel guitar is much more complex in its control over individual strings, whereas the KC slides all notes at the same time and by the same amount - this factor will have to be ignored when listening. It will take a little practicing to develop a smooth ankle slide - read the section on PITCH BENDER Technique, page 76.

The music should be arranged to have a three-note close harmony triad in the right hand in the upper portion of the keyboard. Remember, when you are playing guitar to use guitar style, then change style when playing organ only (CHANNEL ONE only). Guitar style involves playing the right hand chord in a broken manner - one note after the other. If you think about what happens when a guitarist runs his pick across the strings, you will realize that the notes are activated in succession rather than simultaneously. You can contrast this style against the organ by playing all notes simultaneously in the right hand when using the organ sound alone. The bass line should be limited to one note at a time since it will become the fourth note of the harmony and this preset assigns

three Processors to a key - the first four keys activate all twelve Processors.

Pedal steel guitar style involves gradual smooth slides - in this case, the slide of a Perfect Fourth. You will find that only two notes a sixth apart will sound best in the right hand (example: "E" and the "C" above). During the slide, a sixth should be held in the right hand while the bass line (left hand) takes a brief rest. It is not realistic to have the bass slide along with the upper voices. For some examples, refer to the section of this manual containing written music.

Rock guitar style can be contrasted with the pedal steel. Rock guitar slides are usually faster and involve more notes - use the three-note chord in the right hand giving the bass a rest during the slide. For the best realism in the rock slide start the PITCH BENDER Pedal moving on the slide before playing the right hand chord - hit all three right hand notes in rapid broken succession as the pedal nears 1/2 travel. The effect will be a slide of less than a Perfect Fourth, ending on the desired chord a Perfect Fourth above the notes played. This style contrasts with the pedal steel gradual slide heard over the entire range of the Perfect Fourth.

For another effective style, the left hand can drop the bass line and instead play three-note chords in the upper end of the keyboard against a single line running melody above in the right hand. Right hand runs that terminate in a held note can have that note bent a half step sharp then returned with vibrato during its duration. The left hand chord is given a rest during the bend so as to create the illusion that only the solo instrument is bending.

A good jazz style would involve a left hand single note bass pattern with right hand runs over the remaining portion of the keyboard. Single notes or fourths can be bent at the end of runs in the same style noted in the previous paragraph, giving the bass line a rest for the same reason as before. When adding vibrato at the end of a bend, do not hesitate to really dig into the VIBRATO Pedal giving a shake to the pitch. This is a style employed by Chick Corea.

5. HORN: The HORN preset was not intended to be totally imitative. Real horns involve changes in timbre (harmonic content) upon attack and decay. For such effects the output of the KC would have to be passed through a voltage-controlled

filter such as found in an analog synthesizer (of course gate and envelope would have to be generated). Resourceful performers with synthesizers will be able to try these effects. However, this preset was intended as a warm and simple sound for background use - there are no percussions or development of upper harmonics to stand out. Two Processors are assigned to each key for chorus effect - six keys will activate all twelve Processors. Close harmony and jazz keyboard styles are very effective on this preset. Use faster ATTACK/DECAY Pedal settings - between closed and half travel.

6. ELECTRIC PIANO: A Steinway this isn't. In fact, it is not even the same sound as the RMI Electra-Piano as some have expected, nor did we try to copy any brand. Notice the preset is engraved ELECTRIC PIANO, not just piano - the sound is mellow. Apply regular piano style here. In the TRANSPOSE 16' position the bottom end of the keyboard takes on a heavy bass - excellent for bass lines. A more realistic piano effect is heard, however, in the TRANSPOSE 8' position. The ATTACK/DECAY Pedal should be set in the maximum "long" position (open). In the GENERALS division the FOOTSWITCH control tab should be in the SUSTAIN position so that the chrome PERC-SUSTAIN footswitch on the far right will add sustain to the piano when held with the foot. This sustain pedal does not operate in exactly the same manner as does a sustain pedal on a real piano or even any other electric piano - notes played with the sustain pedal held will continue to the end of their natural decay even after the pedal has been released. Since this is the nature of the beast, it is up to the creative performer to use this effect to advantage. An arpeggio running from middle to the top of the keyboard with the sustain pedal held will continue to ring out until the end of its natural decay after the pedal is released. During the brief period of time while the remainder of the arpeggio is decaying, the rest of the keyboard is playable without sustain - get in some quick staccato-like chops in the middle of the keyboard while the arpeggio still rings. Even add a heavy VIBRATO Pedal to the arpeggio decay.

For variety, try a manual set-up of the ELECTRIC PIANO preset (see Set-Up Sheets) omitting the PERC control tab. Set the FOOTSWITCH control tab in the PERC position and activate the percussion mode by holding the footswitch down. When the footswitch is released the envelope will revert to an organ mode for contrast to the piano. Heavy use of the VIBRATO Pedal is very effective in the organ mode.

7. CLAV: With proper playing style, this preset can take on much of the sound of a Clavinet. The STACCATO mode is activated by this preset to assure a rapid decay particularly in the lower part of the keyboard, allowing a funky style. However, in the STACCATO mode notes held will sound indefinitely, whereas a Clavinet would eventually decay. Because of this effect it is possible to employ two styles at the same time - Clavinet in one hand and synthesizer in the other. The Clavinet style involves almost slapping the keys a la Stevie Wonder. Pretend the keyboard is a hot griddle - you would not hold your fingers down very long! Staccato chords alternate between hands. When you want to bring out a solo line, play a legato melody in the right hand using PITCH BENDER and VIBRATO techniques - remember to rest the left hand on bends.

8. JAZZ FLUTE & CLAV: This preset contains contrasting stereo voices between CHANNEL ONE and CHANNEL TWO. The CLAV is created differently than on the straight CLAV preset - the percussion mode is employed eliminating the necessity of the "hot griddle" technique to evoke the Clavinet effect. Only two Processors are assigned to a given key - the first six keys depressed will activate all twelve Processors. Since the Jazz Flute is a higher pitched instrument, you may find the TRANSPOSE 8' position useful. Remember however, that the TRANSPOSE 8' position will allow only flat pitch bends - the music written in this manual for Jazz Flute specifies a sharp pitch bend.

When attempting to imitate the sounds and characteristics of a natural instrument, it is important to consider the physical operation of that instrument. A single flute can produce only one pitch at a time - its effective length is varied by opening holes in the side of the barrel. The pitches change from one note to the next, but at no time will the previous note be sounding while the new note is heard (except in cases of extreme natural or artificial reverberation). The keyboard performer when playing a single solo line melody may unconsciously employ a legato style connecting the release of a previous note with the attack of the following note. In other words, adjacent notes in the melody line will sound together briefly - a flute cannot create this phenomenon. Much care must be exercised when playing a keyboard flute line to keep the fingering clean and void of legato technique, particularly in the melody line.

Along the same line of single-note-per-instrument, consideration must be given to harmony when played on the keyboard. Imagine seeing two flute players stand-

ing on stage - between them it is only possible to play a total of two notes simultaneously. Two voices can be heard by the listener very distinctly - more attention can be focused on the harmonic content of each note (realism). If you are to recreate this image, then much care must be taken to insure that only two voices are played at a time. Should a third flute player walk onto the stage and join the other two, only then would it be possible for three notes to be played.

One hand can easily play multiple notes simultaneously on a keyboard. Music written specifically for keyboard can take advantage of heavy vertical harmonies (chords). Individual instruments, however, have much more independence. For example, five individual instruments can play simultaneously over a wider pitch range than is possible to cover with one hand on a keyboard (note the section on string playing technique. The rhythmic and tonal counterpoint possibilities among five individual solo musicians is overwhelmingly greater than the abilities one possesses in a single five-fingered hand on a keyboard. It is necessary, therefore, to establish a technique on the keyboard that will create the illusion of the independence possessed by a group of solo musicians.

It is probably wise to limit the number of simultaneous voices to two or three. Since the tone color is the same up and down the KC-II keyboard, the only differentiation between voices is pitch and rhythm. The melody line should take on a more staccato technique so as to draw attention to its line. The phrasing should be grouped and fingered so as to lead up to important notes in the melody. A half-step sharp and return pitch bend can aid in drawing additional attention to these notes. The accompaniment voices will be lower in pitch, of course, but they will require further differentiation to isolate them from the melody. Use a contrasting rhythm such as one note in the accompaniment to every two in the melody. This two-to-one rhythmic contrast will isolate the voices in the ear of the listener. Do not forget to give a brief rest to the accompaniment during pitch bends of the melodic line - further separation. Trills and other ornaments added to the melody line will further isolate it from the accompanying voices.

The Clavinet technique will be similar to the CLAV preset technique discussed earlier, except a "hot griddle" release is not necessary to obtain decay. When changing from one "instrument" to another, it is necessary to change playing technique and style along with the CHANNEL ONE and CHANNEL TWO volume pedals.

When playing flutes one should not hear the Clavinet leaking through at low levels - close the pedal fully and rapidly (this change is not a fade, but a switch). Practice making fast changes on alternate measures - make a clean switch with the pedals.

9. ALTO RECORDER & HARPSICHORD: This preset is more delicate and articulate than the JAZZ FLUTE & CLAVINET preset, however, the playing style and technique (eliminating the PITCH BENDER) is the same. Remember, both "instruments" can be played at the same time if the style and technique is plausible for each. Usually the flutes will not sound effective on the harpsichord technique (standard keyboard technique), however, the harpsichord will appear convincing when added to the flutes. Use flute technique when playing both together. Once again, music is contained in the manual. Two-part Bach Inventions will sound terrific on keyboard flutes - try them.

10. BELLS: Many techniques are acceptable on the BELLS preset. Keep in mind that CHORUS tuning is employed, assigning two Processors to each key played. Additionally, those Processors remain assigned to their given key until the absolute end of the decay time. Processors are still assigned to keys after your fingers have been released. For this reason, it is wise on longer envelopes not to play large chords. Three-part harmony is most effective, particularly when played open - more than an octave between any three voices. Arpeggios and broken chords are most effective since they create multiple percussive attacks for a given chord harmony. Using the TRANSPOSE 8' position gives more brilliance to the BELLS. For contrast, it is good to add some vibrato on occasion. Vary decay time to short for special effects.

11. PIPE ORGAN: The sound of an Allen Digital Computer Organ. A Diapason Chorus at 16', 8', and 4' pitches is "doubled" for chorus tuning. A four rank mixture is included complete with proper "breaks" to add sparkle and clarity in the upper end. Two Processors are assigned to each key played - the first six keys played will activate all twelve Processors. Hymns sound great on this preset. Heavy chords involving four voices in the right hand and octaves in the left hand bass are most effective. When reading hymns or other four-part harmony, place the Soprano, Alto, and Tenor in the right hand and double the

Bass in octaves in the left hand. This arrangement will render a total of only five voices (ten Processors), but will allow more freedom of movement in the Bass line without waiting for the decay of Processors programmed with slower envelopes in the lower end of the keyboard (scaled attack/decay). The right hand chords should be located around the area of the 3rd and 4th octaves - the left hand bass should be played as low as possible on the keyboard, using the bottom octave most of the time.

An excellent ADD MANUAL option to this preset is the SPANISH TRUMPET chorus with the BASS REED 32' (see ADD MANUAL Set-Ups).

12. ECHO: This highly unique effect was discovered by Steve Cooper, one of our earlier KC customers in Denver, Colorado. The operation of the echo is based on the principle that the CHIFF and the BASS REED 32' of DIVISION "C" both share the same attack circuit. Original design in the Allen Organ utilizes the chiff as an attack transient characteristic of flute pipes. Of course reeds do not have such an attack characteristic, therefore, there was no intention of CHIFF being used with a reed voice. When the two are combined, the CHIFF is substituted for the slow attack of the reed. When the CHIFF abruptly decays, the reed abruptly attacks with a percussive rise time. If VARIABLE attack/decay is selected, then the CHIFF time can be extended with the ATTACK/DECAY Pedal, delaying the percussive attack of the BASS REED.

The BASS REED 32' (div c) is the only voice that can be delayed by the CHIFF. In order to obtain an echo, there must be an initial event preceding the delayed event. Adding PERC and any voice in DIVISION "B" will create an initial event, the BASS REED 32' will become the echo. If two or three notes are played in rapid succession, it will be noted that the delayed events (echoes) will maintain the same time spacing or rhythm value. It is absolutely important to remember that every note played will be played again by the KC as an echo. The crux of the issue for the musician/arranger (you) is to be playing another note (not the same note) that will fall in harmony or interesting counterpoint with the note you played earlier that is now echoing. Since everything played will repeat, a minimum of notes should be played so as not to confuse the ear and/or get ahead of the Computer. One note in each hand is strongly recommended - no more. From just two notes played the performer will render the effect of 4-part

harmony. To get the feel of playing in this style, try repeating a single note very slowly - vary the ATTACK/DECAY Pedal while repeating the notes. Notice the delay time range. When playing running music, the decay time is highly critical since it becomes in a sense a metronome. If you play too fast the effect will not work, same if too slow. Experiment setting the ATTACK/DECAY Pedal about half-way. Now, play a descending major scale and fine-tune adjust the pedal so that the echo falls about a musical third behind. Practice playing up and down scales in tempo with the decay time to create running parallel thirds. The left hand, when it joins the right, should have less rhythmic activity. For contrast, switch the rhythmic activity to the left hand, slowing the right. Notice that these styles and techniques are employed in the written music titled "ECHO" in the Owner's Manual.

THE PEDALS

Right off, you cannot help but notice what appears to be a myriad of pedals. Don't worry - it is easier than it appears. Here are a few guidelines toward simplification and best use in performance.

The two most important functions are VIBRATO and ATTACK/DECAY. They make the most musical difference. Of course, there are some presets or manual set-ups that may not take advantage of these functions, but if you begin by placing your left foot and right foot on the VIBRATO and ATTACK/DECAY Pedals you will cover a majority of effects. Use these places as "home base" for your feet and be familiar with what lies to either side of your feet as far as functions are concerned. Reach for other functions as you need them. Try not to accidentally activate neighboring pedals, and hope you don't wear size "EE."

If you are playing HARPSICHORD, for example, be absolutely sure that the VIBRATO Pedal is fully closed (heel down) so that no vibrato leaks in. There is a switch at the "closed" end of the travel to assure complete cut-off. A spring stop near the end of "full open" travel is intended to signal the performer that the level of "non-realistic" vibrato is about to be reached. Up to this point of travel, natural instruments such as strings will sound effective, beyond this point, the synthesizer effects begin. You must give a little extra push like going into the "passing gear" on an automatic transmission. High solo notes are very effective on this heavy vibrato. An excellent technique that should be mastered by the jazz-rock player is the coordination of PITCH BENDER and VIBRATO Pedals. Try an ascending run. While holding the last note quickly bend one-half step sharp then return to normal and immediately add a heavy vibrato. Practice this with your licks.

ATTACK/DECAY PEDAL

Some very interesting effects can be created by gradually diminishing the decay time with the ATTACK/DECAY Pedal while reiterating a broken chord - experiment with the available range. Try these effects with the ELECTRIC PIANO preset. Vibrato can be added to longer decay times on presets and set-ups employing SUSTAIN mode - try BELLS preset and VIBES set-up. Vary the VIBRATO and ATTACK/DECAY Pedals together as one. Some very articulate phrasing can be accomplished with quick bursts of short decay time in the middle of long.

VOLUME PEDALS

Resist the temptation to "ride gain" on the volume pedals - it is not only disturbing to hear, but it prevents the full dynamic range of the envelopes. Leave the volume pedals wide open (all the way to the floor). Set your amp levels for this full pedal setting.

When time does come to use the volume pedals, do so in a positive manner with some meaning to your actions. Changes between the stereo effects found on some of the presets are best accomplished by fast switching - fully open one, fully close the other in one fast movement. Practice changing rapidly from JAZZ FLUTE to CLAV and back. Experiment with the other stereo presets. Make a clean break so that the last note of one instrument is heard fully and the first note of the other instrument is also heard fully. The CLAV, PIPE ORGAN, or BELLS presets can give interesting results with a slow cross-fade between channels. Another effective technique is "terraced dynamics." This concept involves fast changes from one contrasting volume level to another. One phrase or section is played at one level, then a clean break is made to another level (usually contrasting loud with soft) like an echo. Bach made much use of this technique between the keyboards of the organ.

FOOT SWITCHES

Three foot switches allow some fast changes between effects. The LATCH footswitch can create several effects. When used in conjunction with the SUSTAIN footswitch or any presets or set-ups involving SUSTAIN mode, the notes played will become latched indefinitely until the LATCH footswitch is turned off. If only a few notes are latched, the remaining Processors can be played without latching when the SUSTAIN mode is released. It would be necessary to use a preset or set-up not employing SUSTAIN mode, then activate by footswitch for quick control. The LATCH mode can create an organ type of envelope from any PERCUSSION mode voices, such as the ELECTRIC PIANO preset. The LATCH mode will cause the PERCUSSION mode in the ELECTRIC ORGAN preset to remain at full amplitude and not decay - an interesting variation on the B-3 sound.

The STACCATO footswitch can accomplish several effects. It will "kill" any voices under influence of the PERCUSSION mode, so don't use it with the ELECTRIC

PIANO preset. The PERCUSSION effect in the ELECTRIC ORGAN preset can be turned off and on by using the STACCATO footswitch. Any chords or notes latched by the LATCH mode can be "dumped" or erased by the STACCATO mode.

The SUSTAIN-PERCUSSION footswitch can have its functions selected by the control tab in the GENERALS division. The SUSTAIN mode position will allow the footswitch to momentarily (as long as the pedal is held) activate SUSTAIN mode in DIVISIONS "A," "B," and "C." The PERCUSSION mode position operates in the same manner. The PERC is mainly for pizzicato effects on the STRINGS preset. The SUSTAIN position will allow some sustain effects with the ELECTRIC PIANO preset, although it will not operate exactly like a real piano - the notes played under influence of SUSTAIN mode will continue to the end of their natural decay regardless of when the footswitch is released. Experiment with other presets and set-ups - remember, if the SUSTAIN or PERC modes are already activated by the preset or set-up, the footswitch will not be able to add anything. With the inter-relations between envelope effects, it would be a good idea at this point to review the section in the OWNER'S MANUAL on ENVELOPE GENERATION (pages 43 through 49.

PITCH BENDER TECHNIQUE

Few keyboard players have had the chance to change their pitch on an "infinitely-variable" basis by means of a pedal. On first approach, the device seems like the ultimate gimmick - there is a great temptation to fiddle with it. However, if it is to become a musically-useful tool, it must be used with great care. Eventually, it will become second-nature to you just as the pedalboard is to an organist.

The first thing you will notice about the Pitch Bender Pedal is the fact that it is spring-loaded. The purpose is to assure return of the pitch to the "A" 440 standard when the Bender is not in use. Next, you will probably notice that the "curve" in pitch response is not linear. There are two reasons for this: (1) It is desirable to have less sensitivity at the beginning of the travel so that any imperfections in the return "stop" of the pedal (dirt, pieces of debris from the floor and feet) will not critically affect the tuning of the instrument; (2) It is also desirable to have less sensitivity at the beginning of the travel in order to give a wider spread to the first semi-tone or whole-step. Common

usage of the Bender, particularly in jazz and rock, is the half-step or whole-step bend sharp and return, frequently followed by a heavy vibrato (a typical guitar lick). By having a wider spread in the first portion of the travel, the performer maintains greater accuracy in controlling smaller intervals. With a little practice, you will soon have an "educated ankle."

Most of the Pitch Bender Pedal uses will fall into two categories: "bends" or "slides." The type of instrument you are imitating or creating will determine the category. Generally, solo instruments are effective with "bends" and accompaniment instruments are effective with "slides." The guitar is a good example. Solo guitar makes much use of half-step and whole-step bends (not to mention between steps). Rhythm or accompaniment guitar often slides into or up to chords. Of course, these examples are only guidelines, not rigid rules. There will be many exceptions that are musically effective.

When applying these concepts to the Pitch Bender, the performer must be constantly aware of the idioms, limitations, and peculiarities of the instrument he is trying to imitate. For example, if two or three flutes are playing together in harmony, it is very unlikely that all three of them could bend the same amount at exactly the same time. Of course, if the Pitch Bender Pedal is moved, all three will move together by the same amount. To avoid this unrealistic effect, two of the voices should take a brief rest while the remaining voice bends. Another important example is the case of the Pedal Steel Guitar slide. Turn on the "ORGAN and GUITAR" preset. The most effective "voicing" will be a three-note chord of "open" harmony in the right hand played in a "broken" manner in the fourth and fifth octave range (example: G4, E5, & C6). The bass line should be restricted to one note at a time, alternating octaves and fifth. Leave Channel One and Two Pedals fully open to gain the Chorus effect. As with the case of the three flutes, the bass line would lose some realism if it were to slide along with the other three voices. The effective technique is to give the bass line a brief rest during the slide. At the same time, this brief rest in the bass line will draw more attention to the slide effect in the right hand.

Aside from the Pedal Steel technique is the Rock Guitar technique. The guitar player sets his fingers to form the chord, placing them on the neck several steps below the desired chord. The other hand strikes the strings, immediately

after which the fingers slide up to the proper chord. The critical thing to keep in mind here is the transposition that occurs. You hit the keys of a "C" chord then push the pedal all the way to the floor to slide up a fourth - now you are in "F." You may play several measures before you desire to slide back, so during that time you must think in the transposed key while playing in another. There is, of course, another option: Slide up a fourth to the desired chord, then between that chord and the next, return the pedal to the "up" position and simultaneously transpose the chord up a fourth by hand. The pitch will not change, but it will be easier to play. You will have to develop some coordination by practice. After you get the hang of it, experiment with other techniques - you will probably discover effects that never occurred to us.

TRANSPOSER TUNING AND PITCH BENDER CONTROLS

The Pitch Bender Pedal is tied in with the Transposer control. When the Transposer is in the 16' position the Pitch Bender will bend sharp. The 8' position of the Transposer will allow flat bending on the Pitch Bender. Both types of bends have their place in different musical styles.

The 16' and 8' Tuning controls are also tied in with the Transposer and Pitch Bender (see the schematic, page 80). There are two options for tuning settings, the first being the more popular or useful: 1. Octave Tuning - with the Pitch Bender Pedal in the "up" position (your foot removed) and the Transposer in the 16' position, set the 16' Tune control for zero beat with a known pitch source - piano, organ, etc. The best sound to employ for tuning is the String preset with the Channel Two Pedal closed (off) so as not to hear any Chorus tuning beats that might be confusing. Also be absolutely sure that the Vibrato Pedal is fully closed (off) so that it does not have an effect on the pitch. After locking in the 16' tuning, change the Transposer to the 8' position and adjust the 8' Tune control in the same manner. After this procedure has been completed, switching the Transposer tab from the 16' position to the 8' position should cause a change of exactly one octave. If not, try again. Now, if you try the range of the Pitch Bender Pedal it will probably be slightly less than a Perfect Fourth ("C" up to "F," for example). If you are planning on playing some country Pedal Steel effects, you might want the range tuned for a Perfect Fourth, so try next method; 2. Perfect Fourth Tuning - the 16' Tune control will remain in

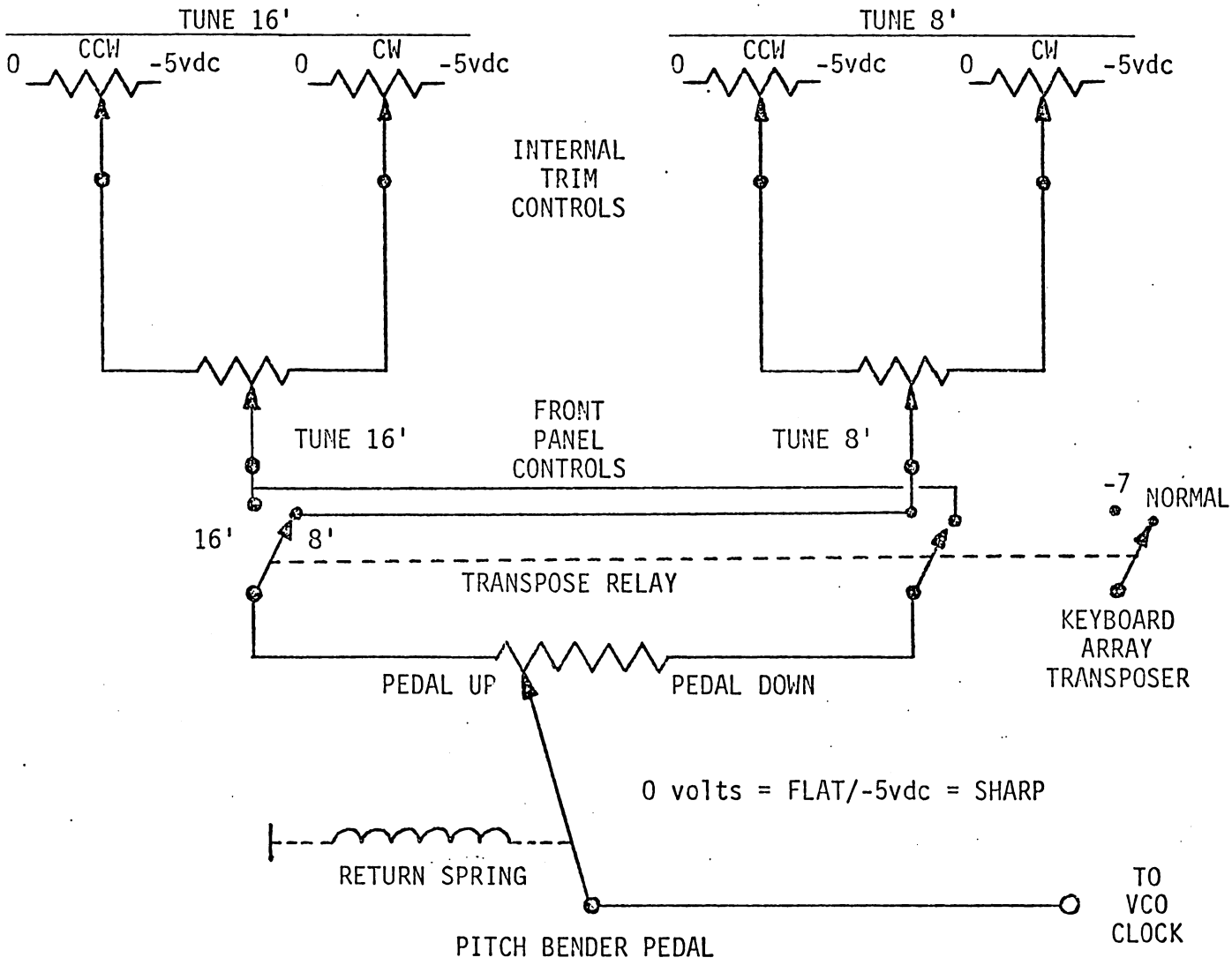
the same position as used in the #1 Octave Tuning method, but the 8' Tune control will change. Play "F4" with the Pitch Bender in the "up" position (foot removed) then change to "C4" (below "F4") while pushing the Pitch Bender Pedal all the way down to the floor hard and holding it there. Adjust the 8' Tune control until both notes are exactly the same pitch to your ear. The concept is that you are moving exactly a Perfect Fourth down the keyboard while you are moving the Pitch Bender up by supposedly the same amount - they should cancel out and the pitch should remain the same if the 8' Tune is adjusted for the Perfect Fourth. Due to inherent mechanical travel of the pot and pedal mechanism, it is not possible for the Transposer Octaves and the Pitch Bender Perfect Fourth to be in tune at the same time. You will probably use the Transposer Octave tune more frequently than the 4th bend.

The trim controls are located on a small board inside the instrument. Intervals less than a Perfect Fourth are safe; however, intervals greater than a fourth may cause the clock speed to run faster than the M.O.S. logic can follow. In this mode the computer will temporarily cease to produce musical results. No harm will come to the computer itself. However, if your amplifier has sufficient power, the noises may cause damage to your speakers. The range achievable by the M.O.S. board (the largest board) will vary somewhat from unit to unit. All units are tested to achieve an Augmented Fourth (Diminished Fifth) sharp, which allows a half-step safety margin above the Perfect Fourth.

If you are in doubt as how to check the limitations of your unit, turn on the "ORGAN and GUITAR" preset, open Channel 1 & 2 Pedals, and play four-part harmony near the top end of the keyboard with the Pitch Bender Pedal fully depressed and heavy vibrato added. Under this condition all twelve Processors will be working simultaneously, causing all sections of the computer to operate at full capacity. Any errors in operation will show up in the audio as distortion or "break-up." The highest tuning should be one half-step below the "break-up" point to allow a safety margin.

MODEL KC-II PITCH BENDER CONTROLS

This schematic applies only to the model KC-II RMI Keyboard Computer. Internal trim controls set the counter-clockwise and clockwise (CCW & CW) pitch limitations for the 16' and 8' Tuning Controls on the front panel. The Transpose tab activates a relay reversing the connections to the pedal pot, thus raising or lowering the pitch by a Perfect Fourth. Additionally, the Computer transposer mechanism on the Keyboard Array is switched up or down a Perfect Fifth. It is the combination of these two intervals that results in an octave transpose without loosing notes at the top or bottom end. Pitch Bender bends sharp in 16' Transpose position and flat in 8'.

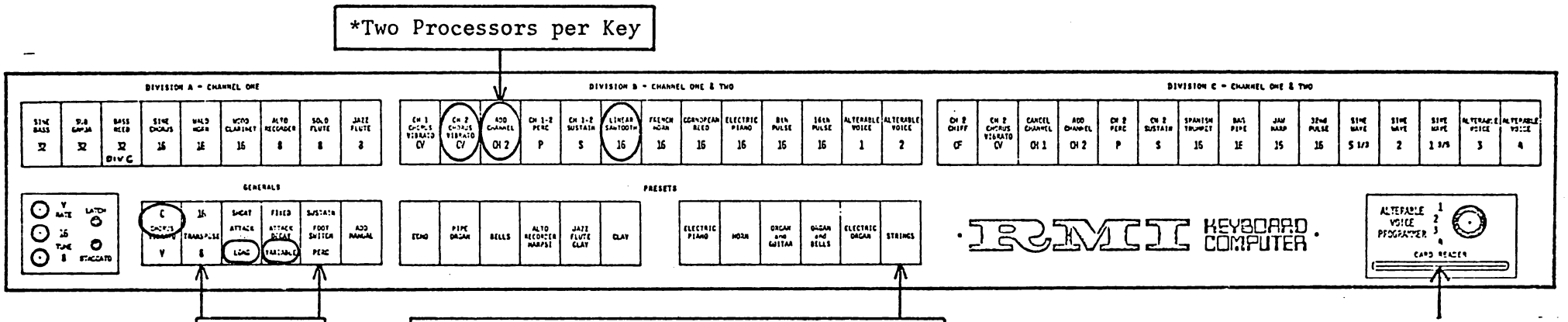


PREFACE PAGE TO PRESET SET-UPS EXPLAINING HOW PRESETS WERE CREATED:

Only Preset Tabs need to be activated - circled tabs indicate functions activated by Preset Tabs. If you want to create your own "Add Manual" addition to the presets, you want to know which tabs are already activated to eliminate redundancy.

Preset Tabs have a right-hand priority: If more than one Preset Tab is activated at a time, the one farthest to the right will operate. When the farthest right tab is turned off, the next farthest right tab will operate, etc. You can turn all Preset Tabs on at the same time, then turn them off one at a time from right to left, causing all the presets to be activated one at a time. Take advantage of this feature for quick changes. When there are no presets on, the manually activated tabs are in effect. When the presets are activated, manually-activated tabs are cancelled.

KEYBOARD TECHNIQUE: Two or, at the most, three Voices in Right Hand in Upper Octaves. Single-Line Bass in Left Hand in the Lower Octaves. Six keys activate all Twelve Processors.* Parallel Sixths are most effective in Right Hand ascending or descending. Employ "Open Harmony" in Right Hand when using three Voices - distance of a Fifth or more between adjacent Voices. Ability to reach Tenths in Right Hand is helpful. Otherwise, use First or Second Inversion Chords, but not Root Position - Listen to Violins, think Violin!



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2._____
3._____
4._____

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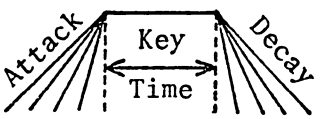

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN (PERC)
For holding Chord.	For quick change to Electric Sound.	Increase as each Musical Phrase builds. Off during rapid passages. Plant Left Foot	EQUAL (Usually	VOLUME Open Full)	Adjust "Long" for Slower Phrases, "Short" for Faster Phrases. Plant Right Foot	Not used unless for "Slide" Effect of Country Fiddle or Violin Solo Line.	For Pizzicato Effect.

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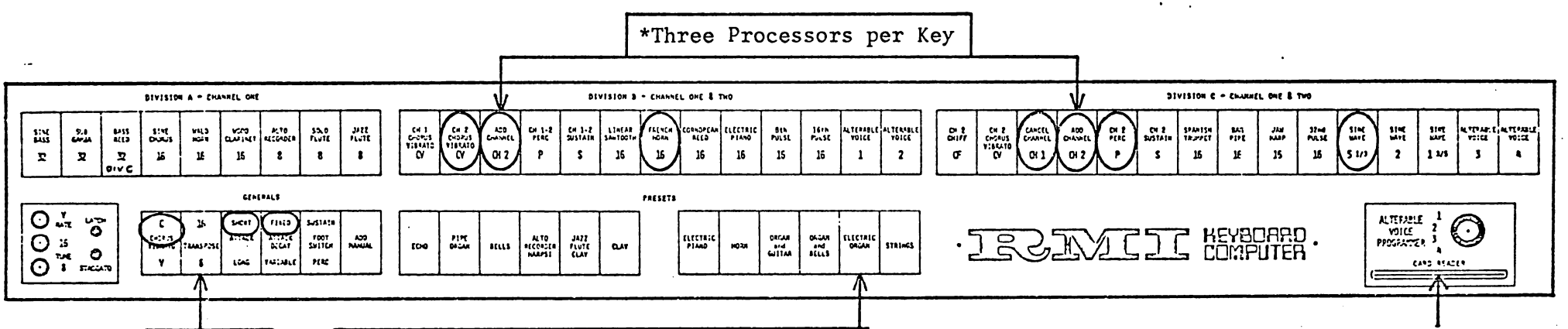
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

SET-UP SHEET: STRINGS PRESET

KEYBOARD TECHNIQUE: Pretend you're playing a B-3! Best Effect with 3-Voice Right Hand and Single Line Left Hand. Four keys activate all Twelve Processors.* Octave Transpose up to 8' Pitch is optional.



INSERT CARDS: 1._____
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PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	(SUSTAIN) PERC
Latch with Sustain Pedal -or- stop Perc Decay.	Use to kill Perc.	Use as "Leslie" Effect.	3rd HARM PERC EQUAL (Usually	VOLUME Open Full)	Use to vary Percussion Length - Div "C"	Use on Solo Line Runs at end of Phrase.	For Sustain Effects.

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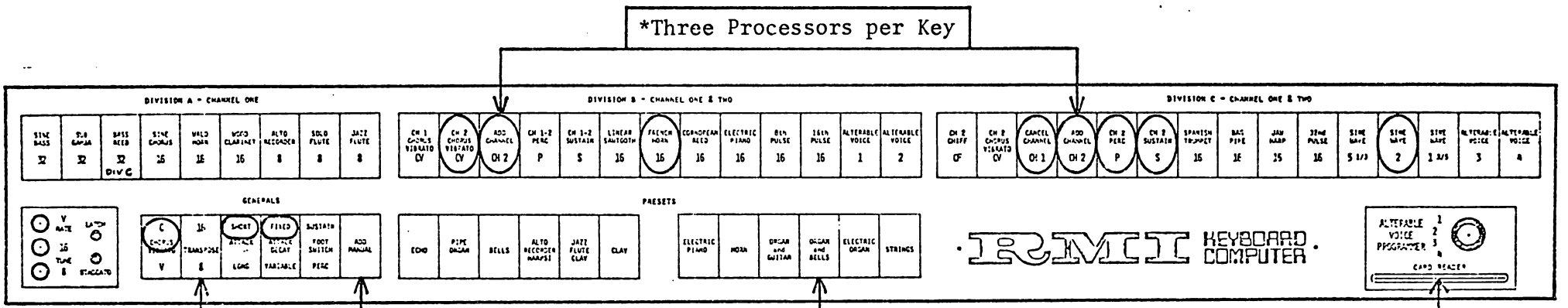
SET-UP SHEET: ELECTRIC ORGAN PRESET

KEYBOARD TECHNIQUE: Two distinct and contrasting styles are possible. With Attack/Decay Pedal in the "Long" Position Bells ring long. Using Heavy Vibrato Pedal is effective with Long Bells. Short Attack/Decay lends to Funky Sound - Kill Vibrato Pedal for a"Tight" Sound. Semi-Tone Bends Sharp are effective with the "Funk" Sound. Explore the effects of the Latch, Staccato, and Sustain/Percussion Footswitches. Four keys activate all Twelve Processors.*



Optional

See Set-Up for "Add Manual" Option for Organ and Bells Preset.

Circled Tabs are automatically activated by "Organ and Bells" Preset Tab.

INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Latch with Sustain Pedal -or- stop Perc Decay.	Will kill Bells.	Full Vibrato effective with Long Bell Decay.	EQUAL (Usually	VOLUME Open Full)	Vary Bell Decay: Long-Bell-Like ——— Short - Funky	More effective with Short Funky Attack/Decay.	

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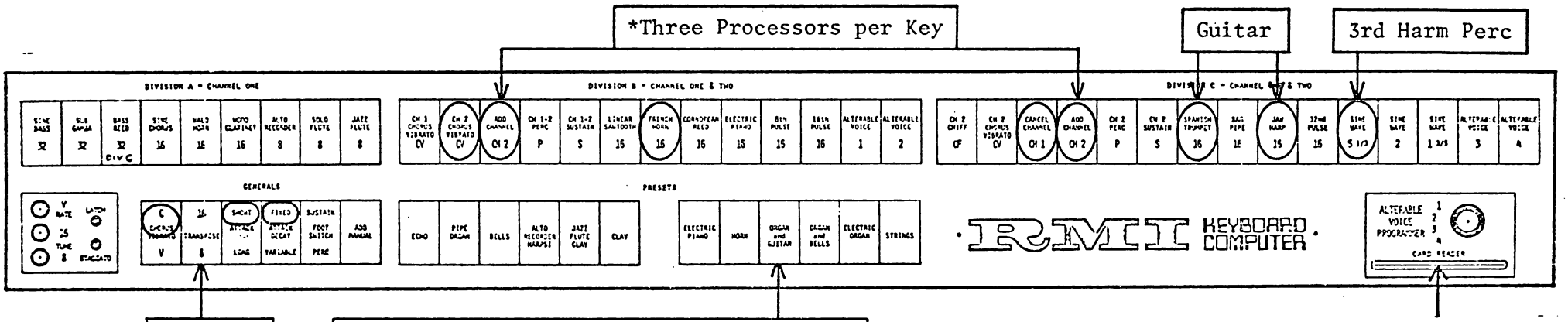
SET-UP SHEET: ORGAN AND BELLS PRESET

KEYBOARD TECHNIQUE: This Set-Up is identical to the "Electric Organ" B-3 Set-Up only with the addition of the Guitar Sound in Channel Two. Effective contrasts created by leaving Channel One Pedal Full Volume while alternating Channel Two Pedal Off/On. Sliding "Pedal Steel" Guitar is created by tuning Pitch Bender for perfect Fourth Slide Sharp - Read Owner's Manual sections on Pitch Bender and Playing Technique and Arranging. Four keys activate all Twelve Processors.*



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PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Latch with Sustain Pedal -or- stop Perc Decay.	Use to kill Perc and Guitar.	Hit Full just as Bender returns from Semi-Tone Sharp (Chick Corea Effect)	ORGAN and PERCUSSION (3rd Harm)	ORGAN and GUITAR	Vary Perc and Guitar Decay ——— Experiment	Use Semi-Tone Bend Sharp at end of Runs.	For Sustain Effects.

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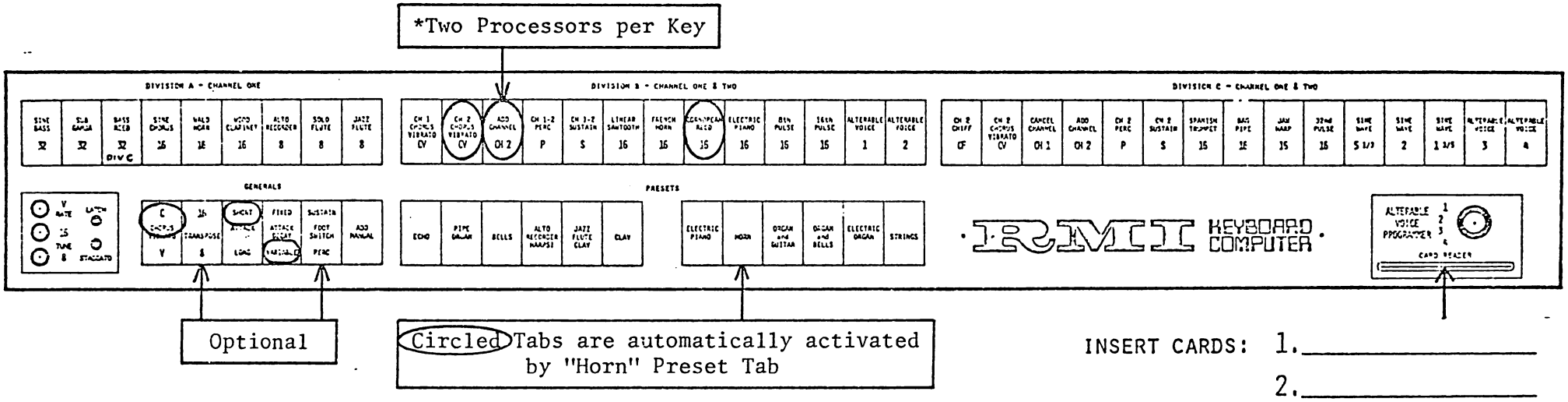
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

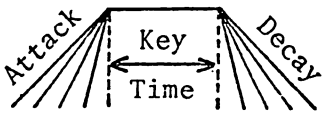
SET-UP SHEET: ORGAN AND GUITAR PRESET

KEYBOARD TECHNIQUE: A mellow and rich non-imitative sound good for Jazz work - blends well. Attack/Decay Pedal in extreme "Short" Position is best with only occasional "Long" or "Melting" Effects. Moderate-to-full use of Vibrato Pedal adds further warmth. Experiment with Latch, Staccato, and Percussion Foot Switches. Practice effective use of Pitch Bender on Jazz Solo Runs. Six keys activate all Twelve Processors.*



INSERT CARDS: 1._____
2._____
3._____
4._____

Varies Envelope:



PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN (PERC)
For holding Chord.	Use for Funk.	Use to "Accent" Chords at end of Phrases.	EQUAL (Usually	VOLUME Open Full)	Adjust "Long" for "Melting" Chords, "Short" for most playing.	Effective at end of Solo Runs.	For Perc Effects.

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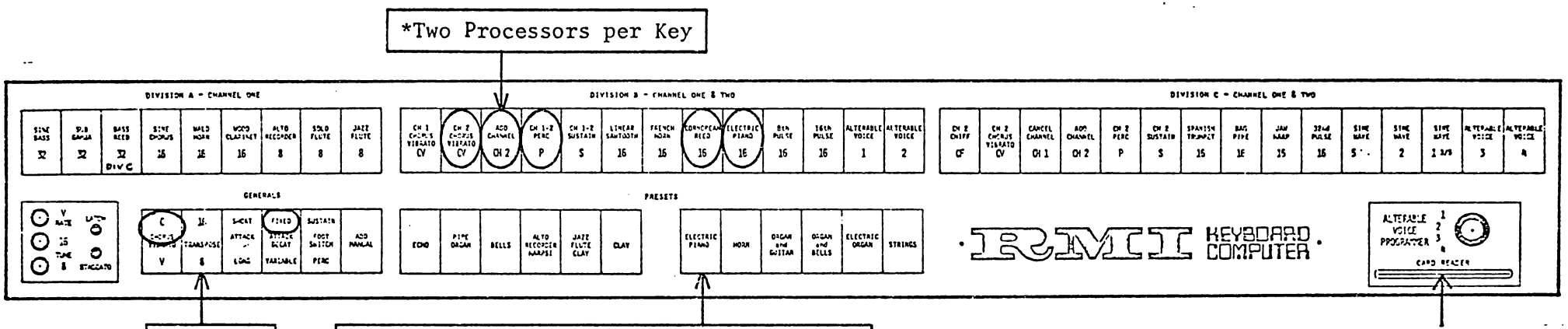
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT ROCKY MOUNT, N.C. 27801

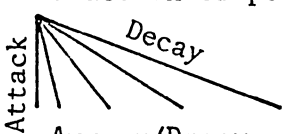
SET-UP SHEET: HORN PRESET

KEYBOARD TECHNIQUE: Highly-effective Piano Sound. Large Right Hand Chords sound good in repeated style. Lower end of keyboard provides Electric Bass-Like Sound in the 16' Transpose Position. More brilliance is achieved in the 8' Transpose Position. Unlike a real Piano Sustain Pedal, notes being sustained do not release with the Pedal, but at the end of their Natural Decay - variable by Attack/Decay Pedal. Six keys activate all Twelve Processors.*



INSERT CARDS: 1._____
2._____
3._____
4._____

Varies Envelope:



PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Latch with Sustain Pedal -or- stop Perc Decay.	Do not use.	Seldom used.	EQUAL VOLUME (Usually Open Full)		Affects Perc and Sustain Decay Time- Adjust to suit.	Seldom used.	Use on arpeggios etc.

Note: This Set-Up was originally created by KC Performer Ray Cobb of Denver, Colorado.

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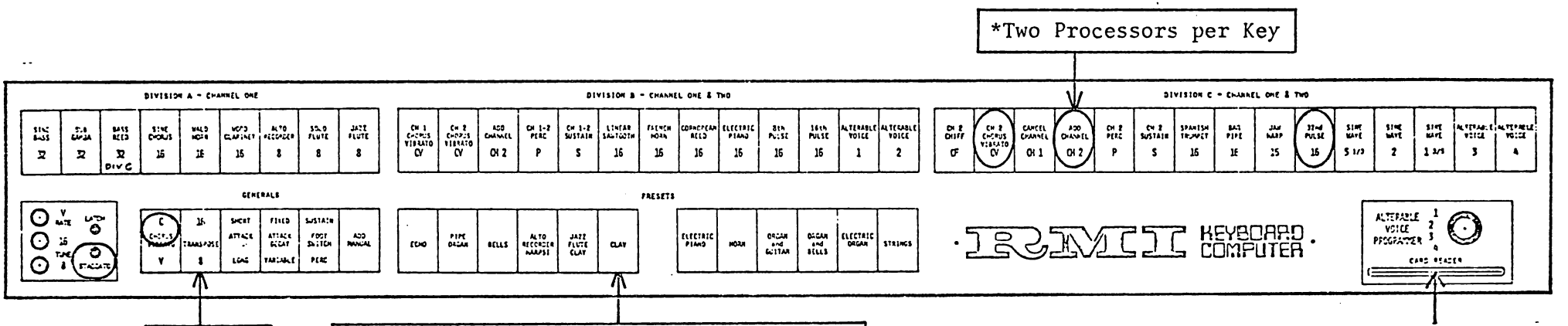
SET-UP SHEET: ELECTRIC PIANO PRESET

KEYBOARD TECHNIQUE: The Clavinet is a stringed instrument whose sound cannot sustain indefinitely - it is always decaying. However, popular usage in Funk Style is hitting the keys quickly as though playing on a hot griddle! In this manner, the Decay is seldom noticed. This Preset employs the Staccato Mode Envelope allowing two techniques at once: Left Hand can play Funky Clav while Right Hand Sustains Synthesizer-Like Solo lines using Pitch Bender and Vibrato. Six keys activate all Twelve Processors.*



INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	(STACC)	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Do not use.	Already "On"	Use only on Solo Lines Sustained.	EQUAL	VOLUME	Do not use.	Use on Sustained Solo Lines or a Single Fast Note.	Do not use.
		Plant Left Foot	(Usually	Open Full)		Plant Right Foot	

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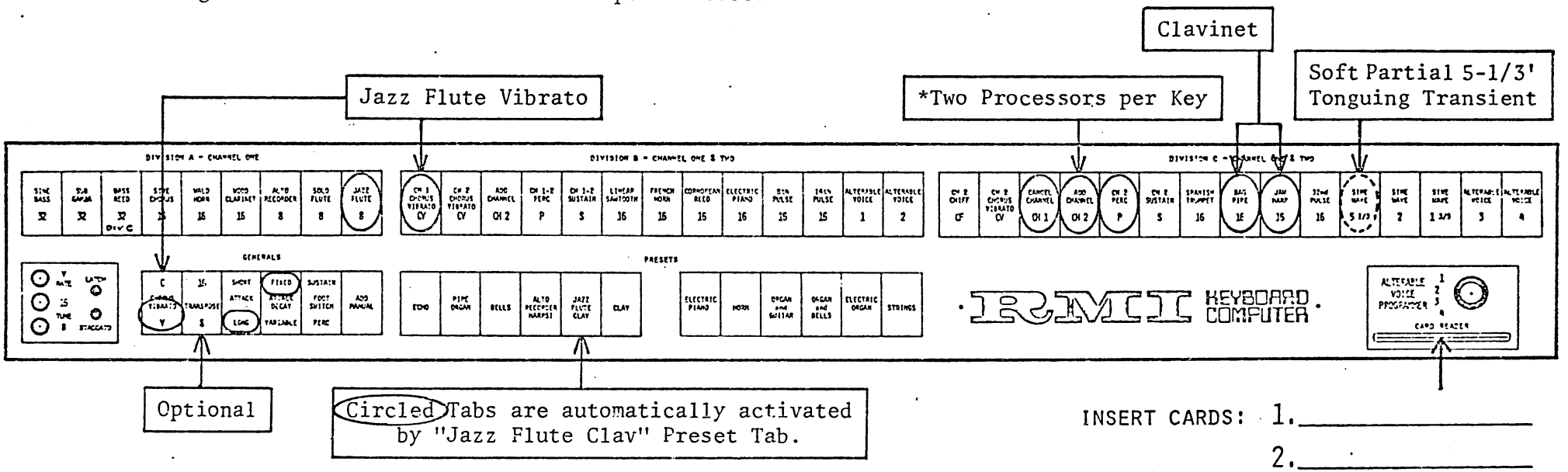
SET-UP SHEET: CLAVINET PRESET

KEYBOARD TECHNIQUE: This Clav Set-Up employs Percussion Mode, therefore, notes will automatically Decay without using "hot griddle" playing technique (see other Clav Set-Ups). Consider the realistic playing styles required by these two contrasting instruments (read sections on "Instrumental Realism, Playing Techniques & Arranging"). An interesting Effect is heard together as the Flute holds while the Clav Decays. Six keys activate all Twelve Processors.* Processor assignment same as "Alto Recorder Harpsi" Preset.

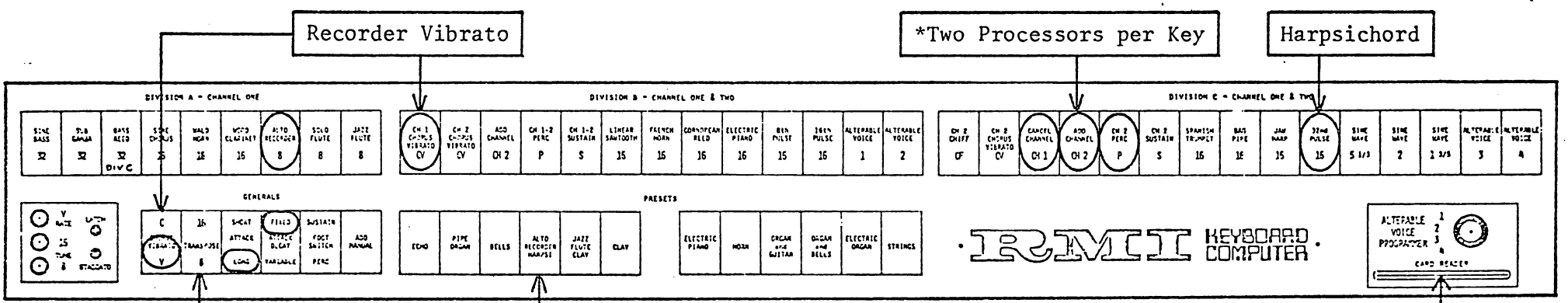


INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Latch with Sustain Pedal -or- stop Perc Decay.	Not used.	Not required.	JAZZ FLUTE ALTERNATE (Move Off & On Fast - Do Not Fade)	CLAVINET or MIX	Vary Clav Decay Time and Tonguing - Transient Decay	Semi-Tone # is very typical of Jazz Flute	Sustain can be added to Clavinet.

KEYBOARD TECHNIQUE: Processor assignment same as "Jazz Flute Clav" Preset. Read "Keyboard Technique" text for "Jazz Flute and Clavinet" Preset and read "Keyboard Technique" text for "Alto Recorder Solo." In general, keyboard technique for "Alto Recorder Harpsi" is more delicate, articulate, and staccato-like than that of the "Jazz Flute Clav" Preset. Six keys activate all Twelve Processors.*



INSERT CARDS: 1._____
2._____
3._____
4._____

NOTE: Although an option is available to add Sustain to the Harpsichord for Special Effects, keep in mind that real harpsichords cannot sustain except when keys are held.

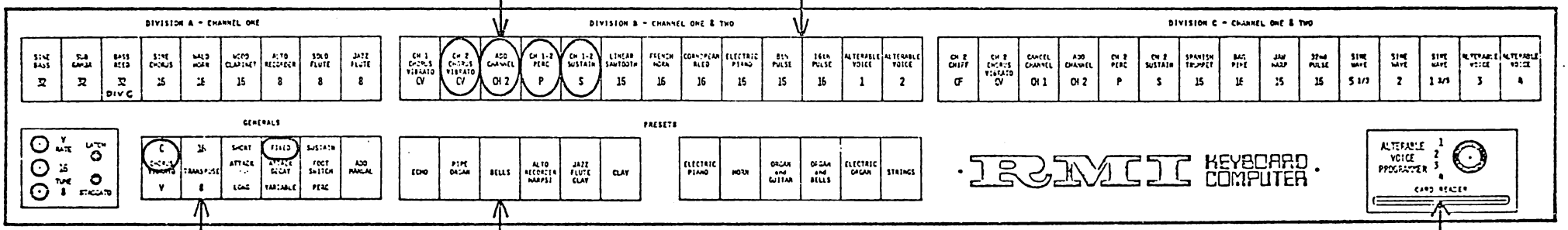
PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Latch with Sustain Pedal -or- stop Perc Decay	Not used.	Not required.	ALTO RECORDER ALTERNATE (Move Off & On Fast - Do Not Fade)	HARPSICHORD or MIX	Varies Decay of Harpsichord.	Not used.	Sustain can be added to Harpsi-chord.

KEYBOARD TECHNIQUE: When playing Chords, use "Rolled," "Broken" or "Arpeggio" Styles. Listen to some Music Boxes for stylizing ideas. Two-Part Bach Invention-Like Style is effective. When in Transpose 16' Position, it is best to keep Right Hand in the upper more brilliant octaves. Trills, Faster Passages, and Runs can become more articulate with shorter settings of the Attack/Decay Pedal. Six keys activate all Twelve Processors,* but remember each Processor is still active until complete end of Decay.

*Two Processors per Key

Chrysoglott Sound (Theatre Organ Bells) is drawn from Permanent Memory but not available manually on rocker tab.



Optional

Circled Tabs are automatically activated by "Bells" Preset Tab

INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
For holding Chord.	Do not use.	Bells sound best without Vibrato, but can be added for Special Effects.	EQUAL VOLUME (Usually Open Full)		Best Effect in the Extreme "Long" Position. Vary for Special Effects.	Not used.	Not used.

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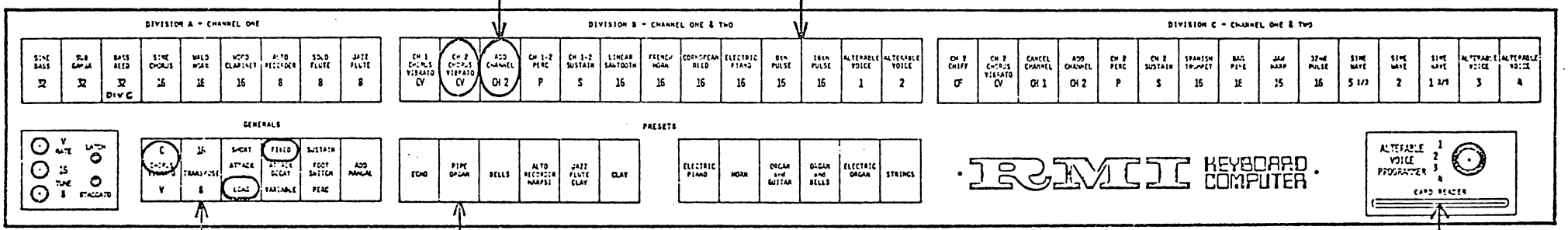
SET-UP SHEET: BELLS PRESET

KEYBOARD TECHNIQUE: Six keys activate all Twelve Processors.* Best Full Organ Effect is obtained with Four-Note Chords in Right Hand in the 4th Octave area and Doubling Bass in octaves in Left Hand in 1st and 2nd Octaves. Play legato. The Effect of a Multiple-Keyboard Organ can be created by Off, On, or Half-Volume alternating or mixing of Channel 1 and Channel 2 Pedals. Echo Antiphonal Effects can be created on Repeating Phrases. Listen to some recordings of large organs.

*Two Processors per Key

Pipe Organ Ensemble (Diapason Chorus 16', 8', 4') Four-Rank Mixtur, and 32' Reed Div "A" Sounds are drawn from Permanent Memory but are not available manually on Rocker Tabs.



Optional, but best in 16' Position for depth of 32' Reed.

Circled Tabs are automatically activated by "Pipe Organ" Preset Tab.

INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Use with Sustain Pedal to hold Chord.	Not used.	Not used.	PIPE ORGAN ← Usually both Full and Mixtur can be Cross-Faded for po	PIPE ORGAN with MIXTUR IV → werful Effects.	Set in Extreme "Long" Position for possible use with Sustain Pedal.	Not used.	Use to add Reverb or Latch Chord.

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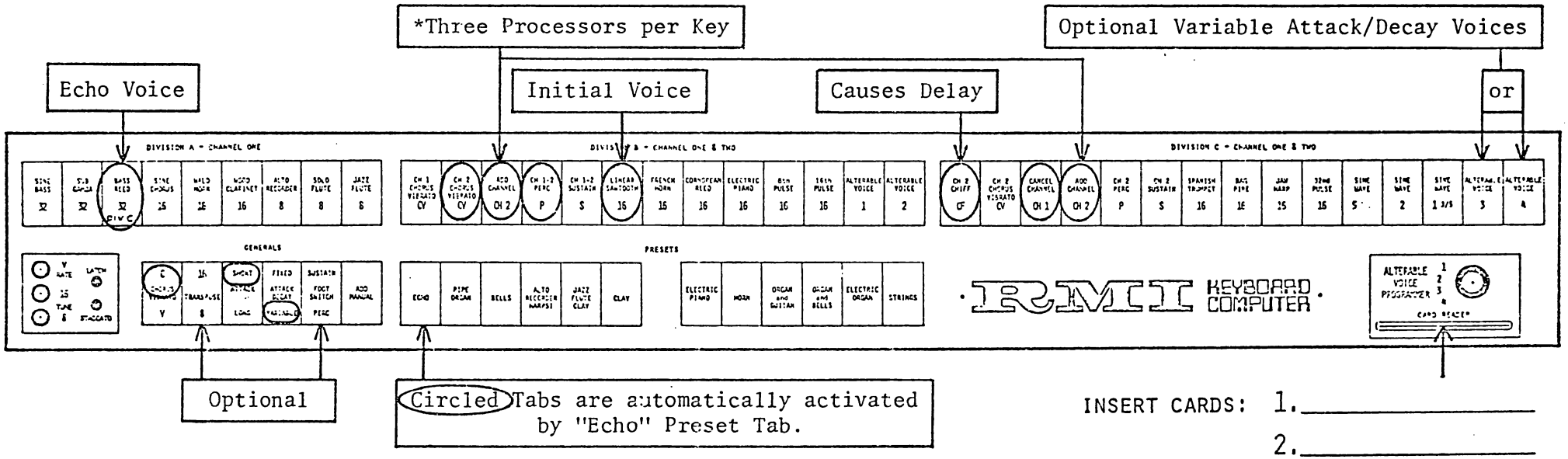
SET-UP SHEET: PIPE ORGAN PRESET

KEYBOARD TECHNIQUE: This is the most unique Set-Up of any keyboard instrument. It is similar to a Tape Echo Effect except the Echo Voice is one octave lower and in a different tone color. Consideration must be given to the notes played so that they fall in harmony or interesting counterpoint with their immediate echo. Scales and arpeggios are a good starting point. Keep it simple and allow only one note in each hand. Setting of Attack-Decay Pedal will determine Delay Time and, therefore, setting tempo.



INSERT CARDS: 1. _____
2. _____
3. PICC 2 - A or FIFE 1
4. FL 4 - B or PICC 2 - A

NOTE: Do not use Perc Pedal when Staccato Mode is on.

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN (PERC)
Chord Segues with Long Attack/ Decay.	Kills Div "B" and stops Echo.	Effective with Alterables added and/or with Long Attack/Decay.	INITIAL VOICE and ECHO VOICE	INITIAL VOICE and ALTERABLES 3 - 4	Sets Delay Time for Echo and sets Tempo of Music.	Use on Runs when Staccato Mode is on.	Adds Perc to Div "C" and stops Echo.
			Usually both Full Volume, but can be alternated or Cross-Faded for very interesting Effects.				

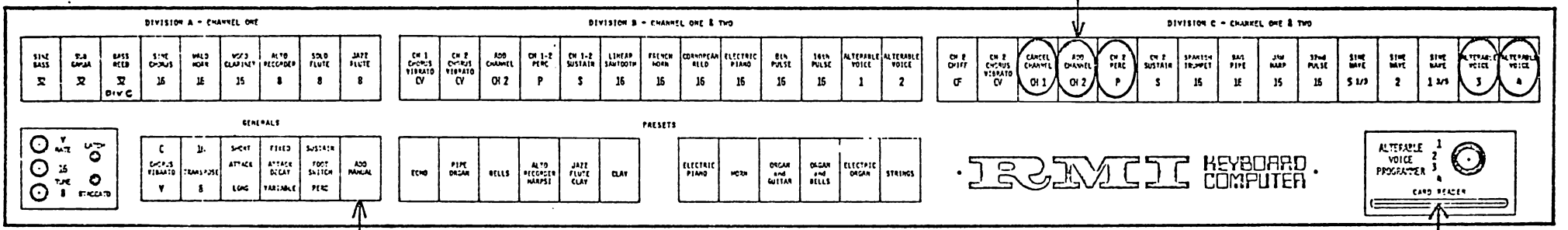
Note: This Set-Up was originally created by KC Performer Steve Cooper of Denver, Colorado.

PREFACE PAGE TO "ADD MANUAL" OPTIONS FOR PRESETS

Presets can be used alone or have manually-activated Set-Ups added to them by turning on the "ADD MANUAL" tab. The "Add Manual" tab overrides the Preset "Cancel" of manual Set-Ups. Leave tabs indicated for "Add Manual" Options in "ON" position and activate them by turning on the "Add Manual" tab. In most cases, information on Preset Set-Up Sheets also applies to the "Add Manual" Options. The necessary additional information is included on the "Add Manual" Set-Up Sheets. The following "Add Manual" Options are intended to be used with the Presets at the same time.

KEYBOARD TECHNIQUE: Slower 4 or 5-note arpeggio technique is best due to pizzicato effect of Percussion Mode. Four keys activate all Twelve Processors,* making response sluggish at slower Attack-Decay Pedal settings. Do not fight it, but arrange to take full advantage of this unique effect. This particular Set-Up can be used alone for a Harpsichord Effect by turning off the Preset.

*Adds Third Processor per Key



Activate for "Add Manual" Option

INSERT CARDS: 1. _____
2. _____
3. LINEAR SAWTOOTH H
4. LINEAR SAWTOOTH H

Doubled to Increase Percussive Transients

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
				Pizzicato Effect heard in this Ch. when "Add Manual" tab is activated.	Also controls pizzicato decay time.		

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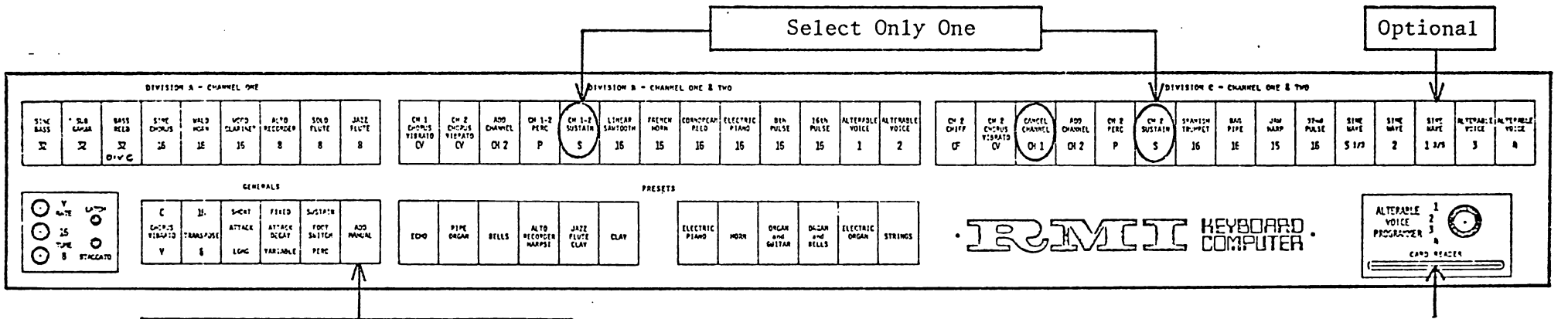
SET-UP SHEET: STRINGS PRESET
"Add Manual" Option

KEYBOARD TECHNIQUE: Electric Organ Preset allows use of Sustain-Perc Pedal to sustain both Divisions "B" and "C". This "Add Manual" Option allows selective Sustaining of either Division "B" or Division "C" alone. In this manner, either the fundamental or the Perc Voices can be sustained independently. Bell Effects are created by Sustaining Division "C" with the "Sine Wave 1-3/5" and opening the Attack-Decay for Long Decay time.



INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
		Medium to Heavy Vibrato is effective with Long Decay Times.	Adds Sustain to 3rd Harm Perc.		Longer Decay Times are good for Ringing Effect.		Can still be used to activate both Divisions.

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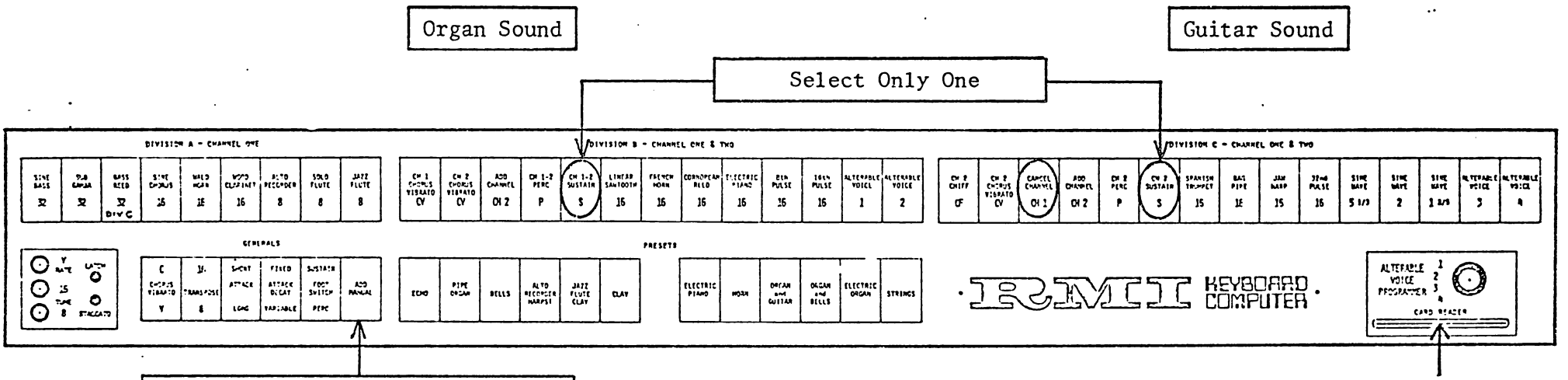
SET-UP SHEET: ELECTRIC ORGAN PRESET
"Add Manual" Option

KEYBOARD TECHNIQUE: Allows selective Sustaining of Organ or Guitar Sound. Sustain Pedal will still activate both at the same time.



INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN ~~PERC~~
Latch Div. under Sustain							

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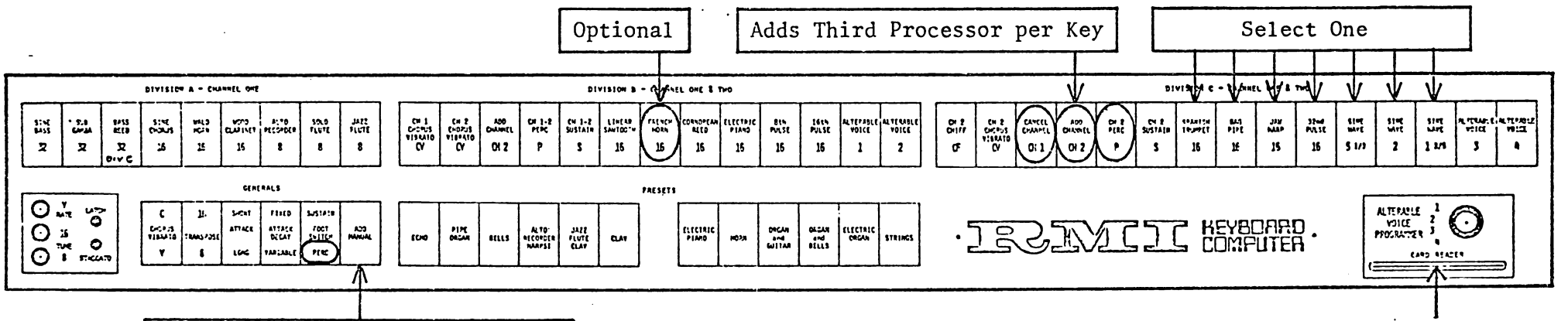
SET-UP SHEET: ORGAN AND GUITAR PRESET
"Add Manual" Option

KEYBOARD TECHNIQUE: Split keyboard effect can be created by careful use of Percussion Pedal. Left Hand can be held while Right Hand plays pizzicato runs. Set Attack/Decay Pedal "Short." Play Left Hand (two notes only - Sixths, Fifths, etc.) then immediately hold Percussion Pedal down, Left Hand will hold while remaining keys will have pizzicato effect. Repeat process to change chord. Coordination involved is similar to use of Piano Sustain Pedal during chord changes - release during change.



INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN (PERC)
	Kills Perc Voices.		Adds Percussion Sine Waves	Adds Perc Spanish, Bag, or Jaw	"Short" for Faster Music - "Long" for Slower Music.		See "KBD Tech." above.

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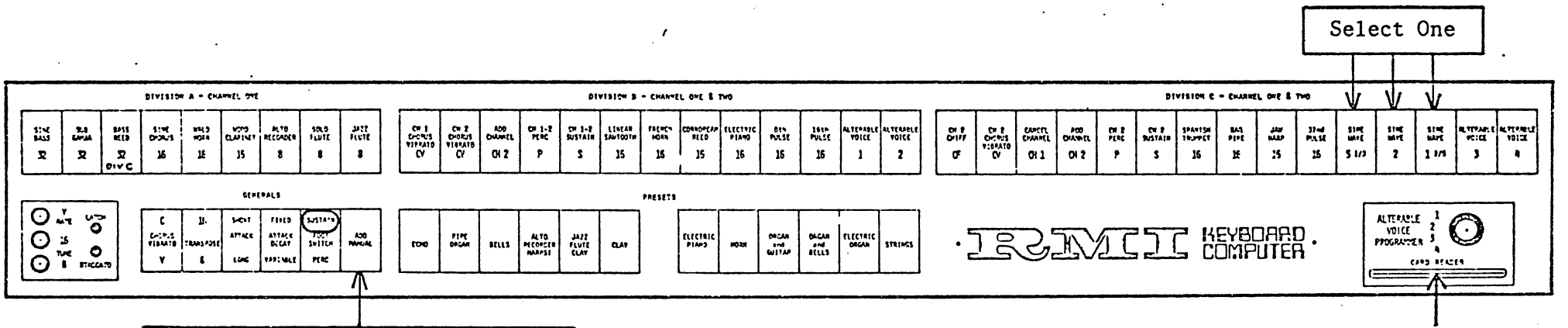
SET-UP SHEET: HORN PRESET
"Add Manual" Option

KEYBOARD TECHNIQUE: Long and Rapid Trills are effective with Attack/Decay Pedal in "Short" Position.



INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
	Do not use.	Effective with Sustain Pedal	Adds Sine Waves		Keep in "Long" Position except for Special Effect		Effective with Vibrato Pedal.

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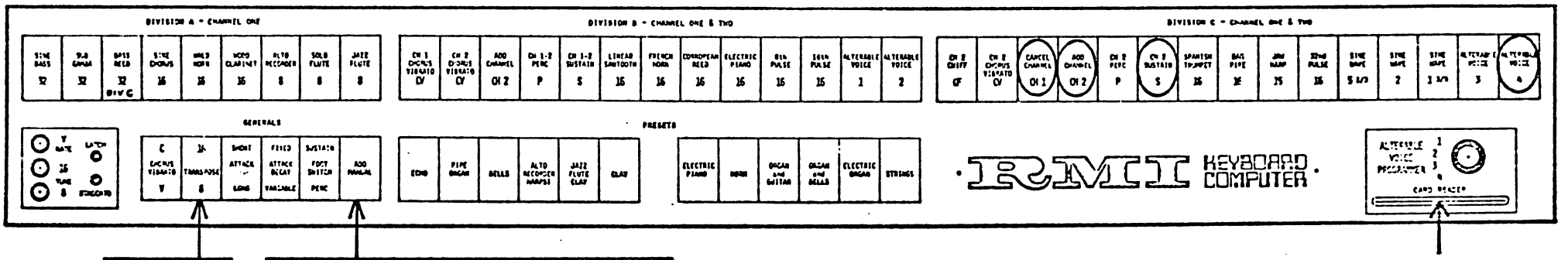
SET-UP SHEET: ELECTRIC PIANO PRESET
"Add Manual" Option

KEYBOARD TECHNIQUE: Arpeggios and Runs with counterpoint are effective in a Staccato-like technique. Piano sound will be heard initially with the Percussion Mode - when keys are released Sustain Mode sine waves will ring on. With longer decay times, it is effective to add fairly Heavy Vibrato with the Pedal. Pitch Bender can be used for a Fourth Slide during Sine Decay after keys are released.



Optional

Activate for ADD MANUAL Option

INSERT CARDS: 1. _____
2. _____
3. _____
4. SINE WAVE 8'

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Add some Vibrato to Long Decay. (Left Foot)	- FULL -	- FULL -	Vary for contrasts. (Right Foot)		Not used.

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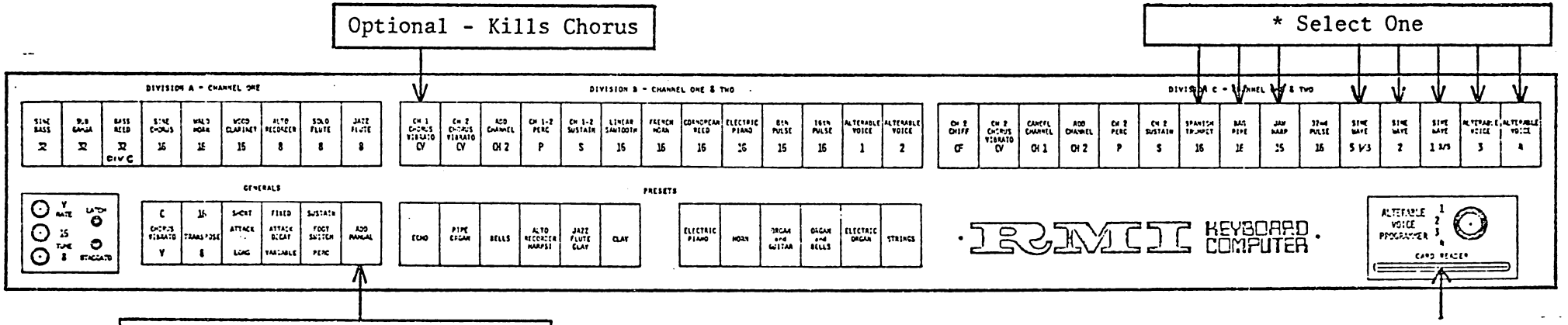
SET-UP SHEET: ELECTRIC PIANO PRESET
"Add Manual" Option #2

KEYBOARD TECHNIQUE: Same as Clavinet Preset.



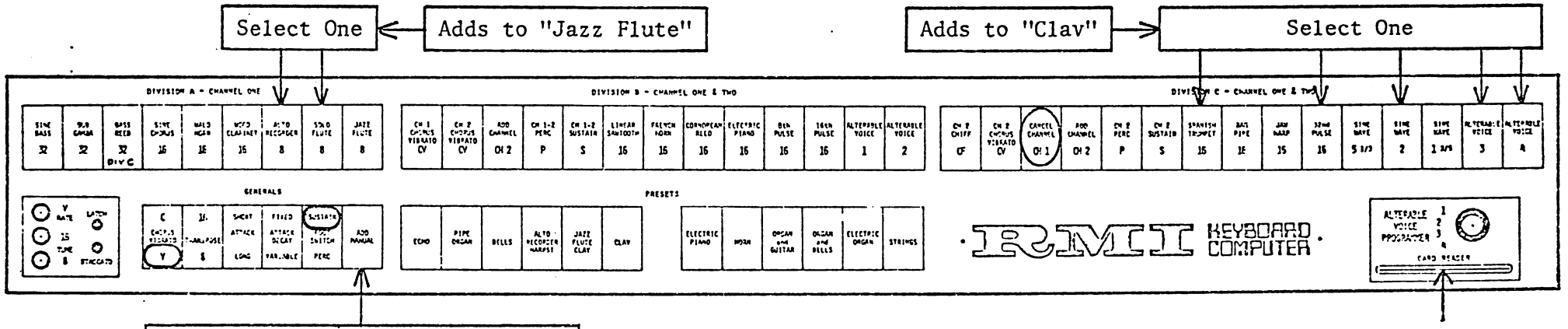
INSERT CARDS: 1. _____
2. _____
3. PULSE WIDTH 1/16
4. PULSE WIDTH 1/8

*Note: Bag Pipe and Jaw Harp can be combined and Alterables 3 & 4 can be combined.

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Already "ON"		Adds Sine Waves		Not used.		Not used.

KEYBOARD TECHNIQUE: Same as Jazz Flute and Clav Preset.



INSERT CARDS:
1. _____
2. _____
3. FLUTE 2-2/3' B
4. FLUTE 24th - 4/5'

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN ~~PERC~~
		Can be used with Sustain Pedal on "Clav"					Good with Sine Waves and Heavy Vibrato.

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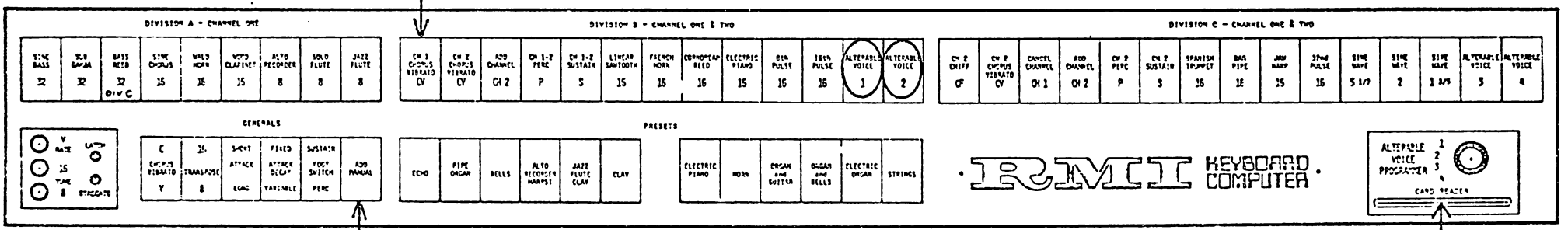
SET-UP SHEET: JAZZ FLUTE & CLAV PRESET
"Add Manual" Option

KEYBOARD TECHNIQUE: Same as Bells Preset.

1-1/7 adds dissonance like old cracked bells.
8/9, 4/5, or 1/2 add sparkle and clarity.
1' adds penetration.
2-2/3 B adds hollowness.

Optional - Kills Chorus



Activate for "Add Manual" Option

Try these cards "doubled" in Alterable Voices 1 & 2:

SEPTIEME 1-1/7' B
FLUTE 23rd 8/9'
FLUTE 24th 4/5'
FLUTE 29th 1/2'
SINE 1'
FLUTE 2-2/3' B

INSERT CARDS:
1. Same Card
2. Same Card
3. _____
4. _____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC

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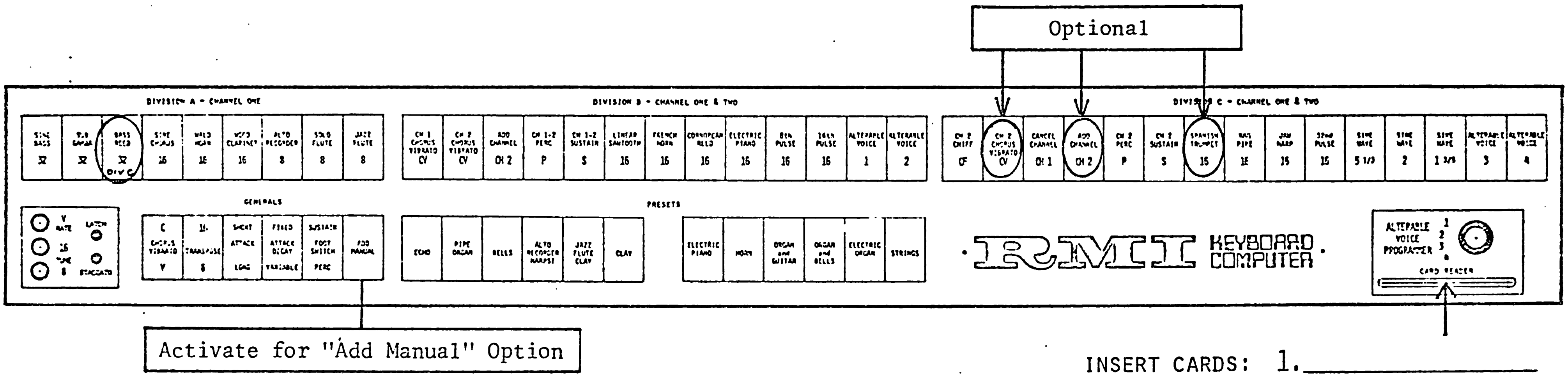
SET-UP SHEET: BELLS PRESET
"Add Manual" Option

KEYBOARD TECHNIQUE: When adding Optional Spanish Trumpet Chorus in Division "C" keep in mind that an additional processor is added to each key played causing the first four keys to activate all 12 processors. A better musical usage of this Set-Up is to use it as an "Alternate" rather than an "Add Manual" Set-Up. Merely turning off the Pipe Organ Preset will activate this Set-Up if the "Add Manual" tab is off. With the Preset off, six keys can be played.



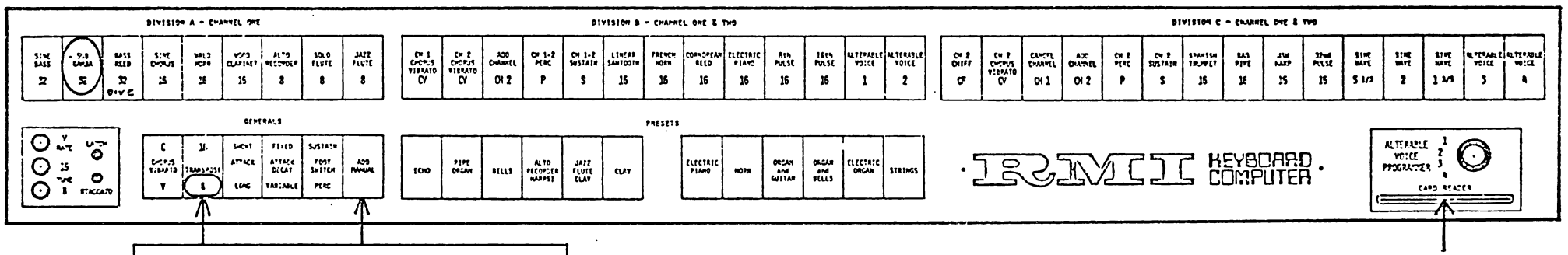
INSERT CARDS: 1.__________
2.__________
3.__________
4.__________

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC

SET-UP SHEET: PIPE ORGAN PRESET
"Add Manual" Option #1

KEYBOARD TECHNIQUE:



Activate for "Add Manual" Option

INSERT CARDS: 1._____

2._____

3._____

4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC

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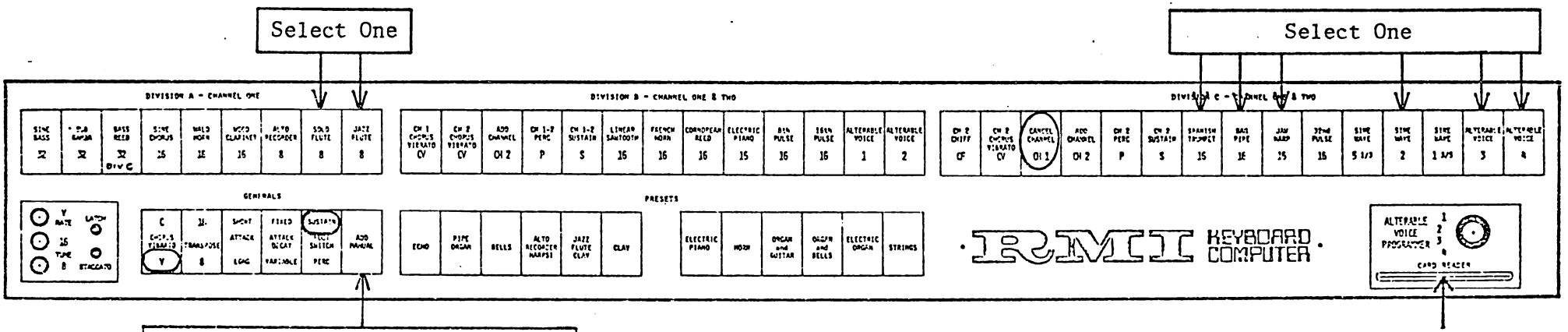
SET-UP SHEET: PIPE ORGAN PRESET
"Add Manual" Option #2

KEYBOARD TECHNIQUE: Same as Alto Recorder and Harpsi Preset.



INSERT CARDS:
1. _____
2. _____
3. FLUTE 2-2/3' B
4. FLUTE 24th - 4/5'

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
		Can be used with Sustain Pedal on "Harpsi"					Good with Sine Waves and Heavy Vibrato.

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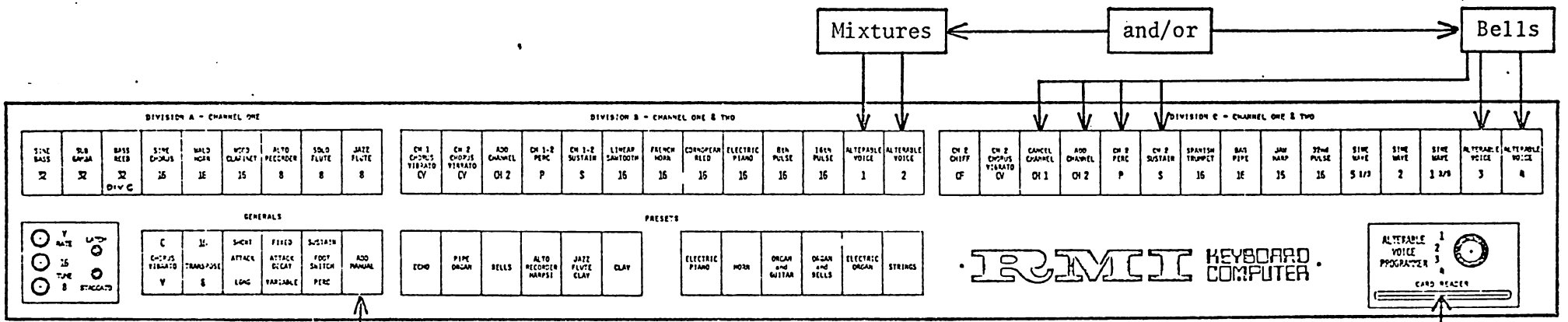
SET-UP SHEET: ALTO RECORDER & HARPSI PRESET
"Add Manual" Option

KEYBOARD TECHNIQUE: "Bells" option adds Third Processor per key - four keys activate all twelve processors. The following "Mixture" Cards add Upper Harmonic Brilliance that fits well with the existing Mixture and Diapason Chorus: Mixture III - A, G. H. or K, Carillon III Mixture, or Cornet V. Cornet III is rather harsh and reedy, and "Jeu de Clochette" sticks out screaming in the upper end, if you are looking for that Effect.



Activate for "Add Manual" Option

INSERT CARDS:

1. MIXTURE
2. MIXTURE
3. CHRYSOGLOTT
4. CHRYSOGLOTT

Note: Mixtures can be selected from Allen Organ Tone Card Library. "Double" or use separately or mix 1 & 2.

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC

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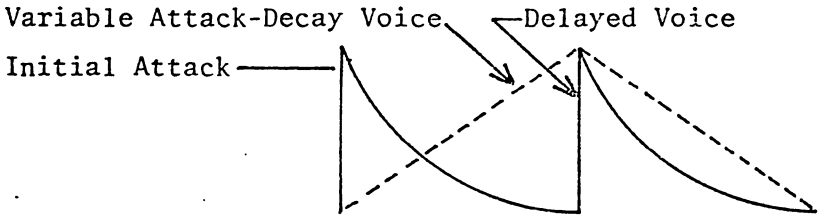
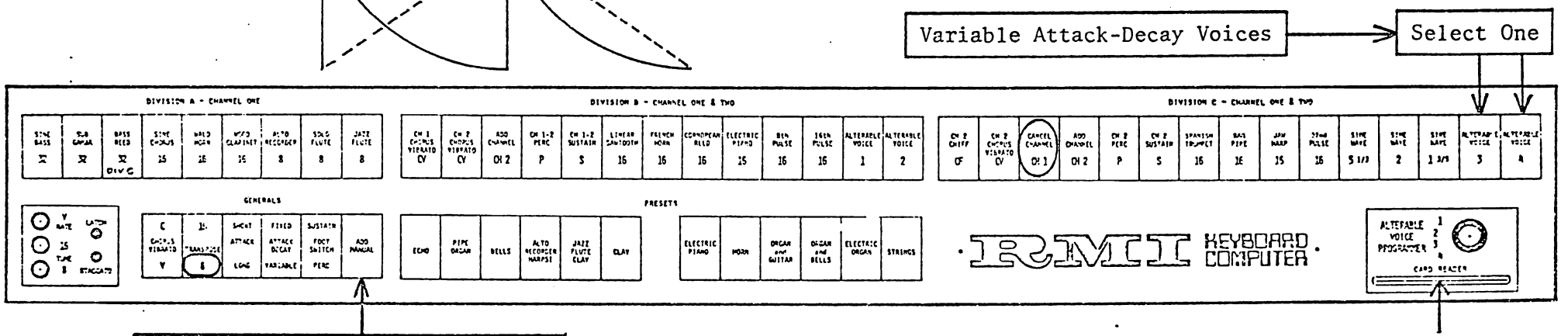
SET-UP SHEET: PIPE ORGAN PRESET
"Add Manual" Option #3

KEYBOARD TECHNIQUE: This "Add Manual" option adds even a Third Envelope for every key pressed, making for a very complex and exciting sound. Due to the Sustaining Envelope of this added voice, it is best to play runs or arpeggios that are in the same harmony to avoid clashing.





INSERT CARDS: 1. _____

2. _____

3. CATHEDRAL CHOIR or 3. PICCOLO 2' A or 3. FIFE 1'

4. LINEAR SAWTOOTH H or 4. FLUTE 4' B or 4. PICCOLO 2' A

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
		Vibrato is very effective with Sustained Voices.		Variable Attack-Decay Voices.			

SET-UP SHEETS:

Some are variations on the Presets, others are creations by RMI Performer, Clark Ferguson, and many were sent to us by creative KC Owners who dared to go beyond the owners manual for their sounds. Even with the advent of KC-II, all sounds have not yet been discovered. The following Set-Ups are to serve merely as a guide line to get you thinking in the right direction, but not to limit your exploration. However, it is recommended that you become familiar with all the Set-Ups in this manual before trying your own.

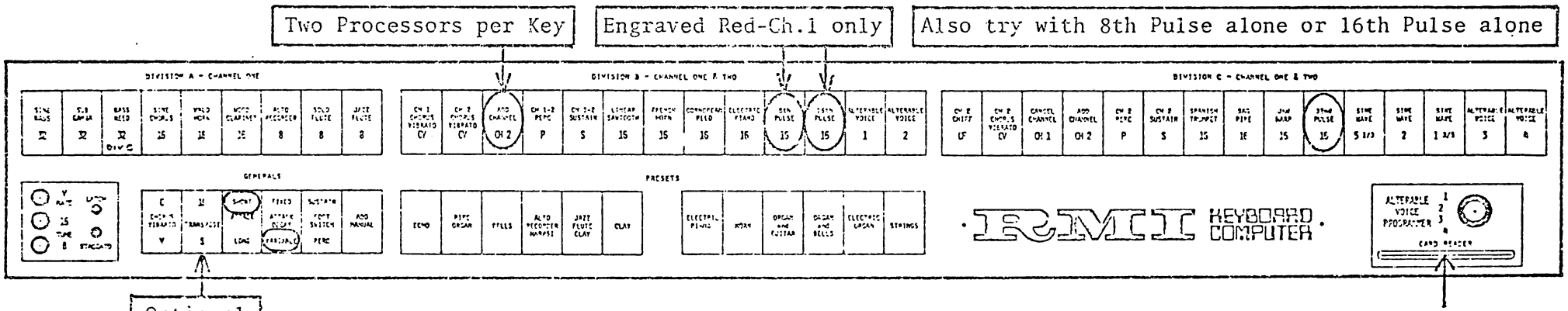
Included in this manual, you will find blank Set-Up Sheets for jotting down your own ideas. If you come up with one you think is exceptional, please send us a copy so we may share it with other owners like yourself by adding it to this manual. You can receive additional blank Set-Up Sheets and/or recent Set-Up Sheets for up-dating your manual by writing:

RMI
Macungie PA 18062

Please be sure to mention that you own the Model KC-II.

Remember, while playing on any of these manual Set-Ups you can instantly go to any Preset, cancelling out the manual Set-Up until the Preset is turned off. You can also add these Set-Ups to the Presets by activating the "Add Manual" tab.

KEYBOARD TECHNIQUE: Left Hand Bass Patterns with Single-Note Sax-Like Melody in Right Hand (articulate). Make effective use of Vibrato and Pitch Bender Pedals. Notice the waveforms selected (8th & 16th & 32nd Pulses) are engraved in red. These waveforms when initially selected will be heard from Channel One. However, activating the Add Channel Two tab will cause these waveforms to be additionally processed through Channel One. A red "2" has been engraved on the label for the Channel One Pedal as a reminder that any waveforms engraved in red will be processed through this channel rather than Channel Two as expected when activating the Add Channel Two tab. By not activating the Chorus/Vibrato tab, the frequencies of the additional group of processors will be exactly the same as the initial. However, as a key is depressed assigning two processors to that key, the phase relation of the waveform between the two processors will be random and remain in that precise relation until the key is released. Due to the nature of



the waveshape, out-of-phase relationships will cause phase cancellations and interesting changes in harmonic content - some sounds appear to jump an octave as heard when over-blowing a sax. Repeating a single key will cause many different phase relations which create changes in tone color. Synthesists will find this effect similar to random S/H modulating the VCF.

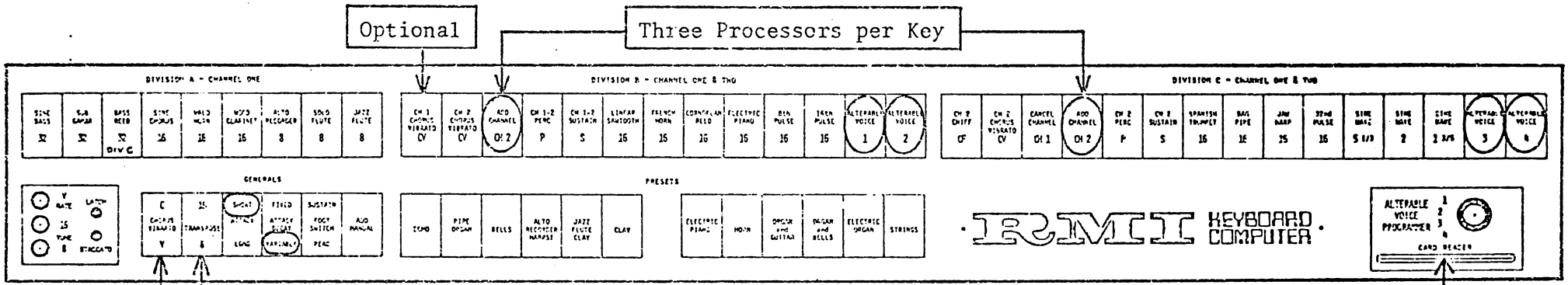
INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED) (Processed Twice)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Will hold notes.	Option	Use at end of Phrases after Bend and as needed.	FULL	Not used.	Extreme Short Position	Use at end of Phrases, then add Vibrato.	Not used.

SET-UP SHEET: SAX #1 (BEST)

KEYBOARD TECHNIQUE: Left Hand Bass Patterns with Single-Note Sax-Like Melody in Right Hand (articulate). Make effective use of Vibrato and Pitch Bender Pedals. Random Tone Color Change due to Phase Cancellation (same Effect as in "Sax #1" Set-Up Sheet, only occurring in Channel Two). Optional "Ch 1 CV" can create Chorus Tuning or Chorus Vibrato Effect when both channels are played at the same time. This Set-Up offers much room for experimentation - Try mixing or alternating the Alterables with the Permanent Memory Pulses. Try the optional Alterables. For further options, try only Odd-Numbered Alterables, then even. Invent your own combination of Pulses!



Try these optional Alterable Voices:

	Option "A"	Option "B"	Option "C"
1.	PULSE WIDTH 1/8	PULSE WIDTH 3/16	PULSE WIDTH 3/16
2.	PULSE WIDTH 5/32	PULSE WIDTH #1 Time Slot	PULSE WIDTH 1/16
3.	PULSE WIDTH 1/8	PULSE WIDTH 3/16	PULSE WIDTH 3/16
4.	PULSE WIDTH 5/32	PULSE WIDTH #1 Time Slot	PULSE WIDTH 1/16

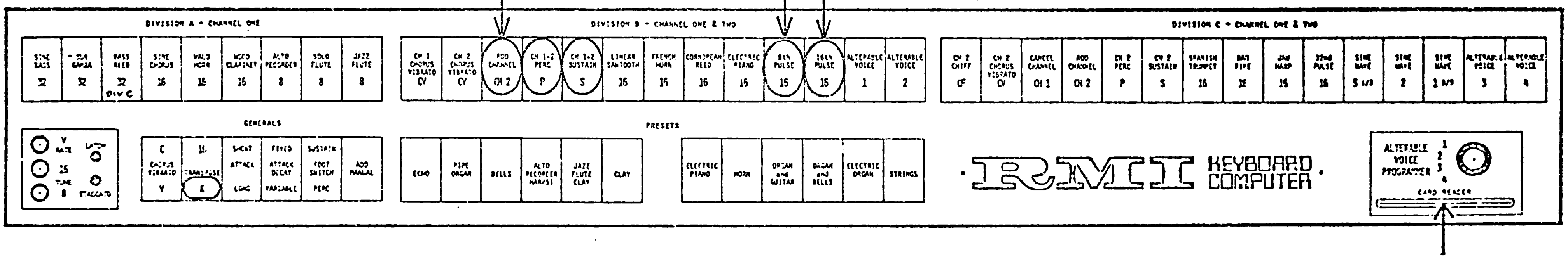
INSERT CARDS:
1. PULSE WIDTH 1/8
2. PULSE WIDTH 3/32
3. PULSE WIDTH 1/8
4. PULSE WIDTH 3/32

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Will hold notes.	Option	Use at end of Phrases after Bend and as needed.	Constant Tone Color - FULL -	Random Tone Color Effect (Best for Sax) - FULL -	Extreme Short Position	Use at end of Phrases, then add Vibrato.	Not used.

KEYBOARD TECHNIQUE: Difficult! Remain within 2nd and 3rd Octave Range. Do not play chords. Use Rapid Broken Chord Technique for Plucking Effect - use one note at a time in each hand. A Rhythmic Ratio of one to two between Left and Right Hands is very effective. Banjo Technique is generally fast and busy, so get your fingers moving! If you have any Banjo tapes or records, try playing them at a slower speed to pick out the parts.

Phase-Cancelling Effect similar to Sax Set-Ups



NOTICE: Tone Color will vary at random on different keys due to Phase Cancellation - Effect similar to Sax Set-Ups.

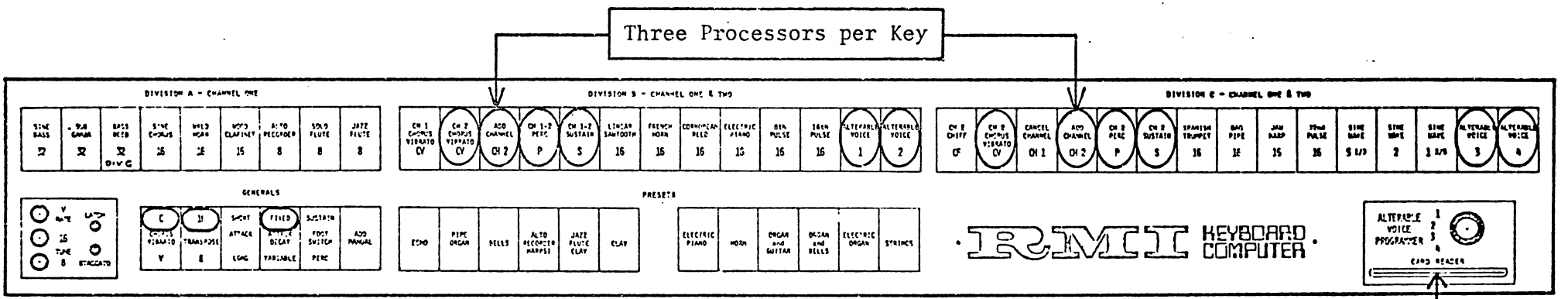
INSERT CARDS:

1. ________
2. ________
3. ________
4. ________

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not Used.	Not used.	FULL	Not used.	Critical for correct Banjo Decay - Set by ear and keep it short.	Not used.	Not used.

KEYBOARD TECHNIQUE: Play in 2nd, 3rd, & 4th Octaves - One note at a time in each hand in Latin Style. Remember, a Steel Drum is played by hitting "tuned" spots on a sheet of metal with each hand - chords would not be possible. Try to develop interesting Rhythms and Interplay between Right and Left Hands. For a quick variation from the Steel Drum Sound, push Vibrato and Attack-Decay Pedals wide open. Listen carefully when returning to Steel Drum Sound to get Decay correct.



INSERT CARDS:
1. TIERCE BELL
2. TIERCE BELL
3. FLUTE 2-2/3 B
4. FLUTE 2-2/3 B

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Not used except for Special Effect	EQUAL (Usually	VOLUME Open Full)	Decay time is very critical - adjust by ear until like Steel Drum. Longer for Special Effects.	Not used.	Not used.

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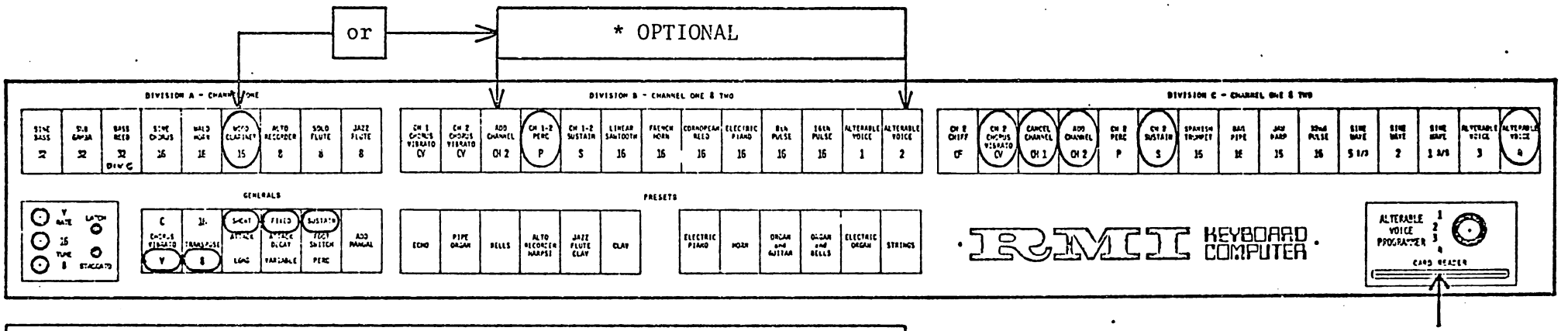
SET-UP SHEET: STEEL DRUMS

KEYBOARD TECHNIQUE: Percussed Clarinet for Strike Tone similar to Marimba, Sustained Sine Wave provides Decay Tone with Vibrato, similar to Vibes. Hit keys rapidly so Strike Tone does not linger. Pretend you are playing on a hot griddle! Think about what you could play with 2 or 3 mallets in each hand instead of five fingers. Use mostly Parallel Harmony in each hand since the mallets in each hand move basically as a unit. Try Reiterate and Roll Effects. 1st, 2nd, and 3rd Octaves are particularly effective and resonant.



NOTE: For quick change to another Mallet Instrument, pre-load cards for "Vibes" Set-Up. In changing, it will not be necessary to turn off all Division "C" Tabs - only "Add Ch 2".

INSERT CARDS:
1. _____
*Optional → 2. CLARINET-WOOD 8'
3. _____
4. SINE WAVE 8'

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Not used except for Special Effect to increase Sine Vibrato on a Long Decay.	EQUAL (Usually	VOLUME Open Full)	Adjust by ear until Decay is characteristic of Marimba. Vary for interest.	Can be tuned to a Fourth for some non-realistic Slide Effects during Sine Decay.	Adds Bells by Sustaining Strike Tone.

From Steve Cooper, Denver, Colorado

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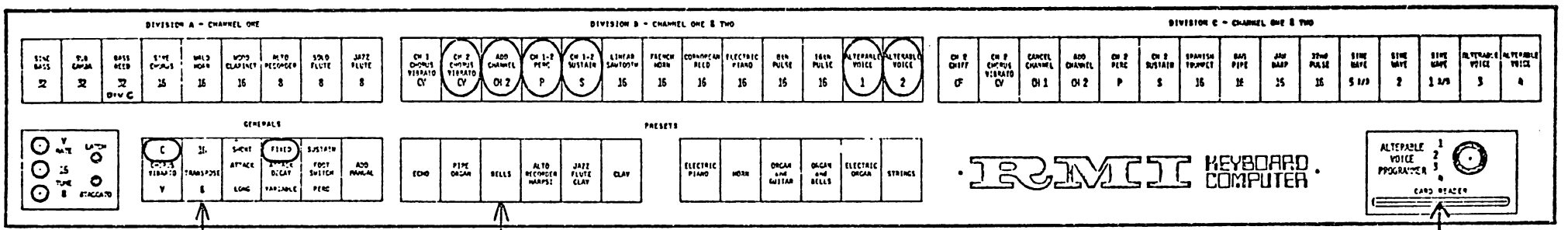
SET-UP SHEET: MARIMBA

KEYBOARD TECHNIQUE: A very clear sound due to great distance between Fundamental 8' Sine and 1/2' Upper Harmonic. Much of the Effect is in the Long Decay with Vibrato. Play a minimum number of notes - Parallel Sixths in Right Hand up high and Single Bass Low End - so each can be heard Decaying. Half-Foot Harmonic from Bass Line will be heard Soloing in space between Left and Right Hand and creating harmony with Fundamental of Right Hand. Hit keys quickly and release. The Decay is the secret - "Hot Griddle" Technique again.



Optional

Alternate with Preset for Contrast

INSERT CARDS:
1. SINE WAVE 8'
2. FLUTE 29th 1/2' B
3. _____
4. _____

Option: Try all All "Harmonics" Series Cards including JAZZ PICCOLOS A & B

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Use as needed. Very effective in medium amount.	EQUAL (Usually	VOLUME Open Full)	Set in Extreme Long Position or experiment.	Not used.	Not used.

From Steve Cooper, Denver, Colorado

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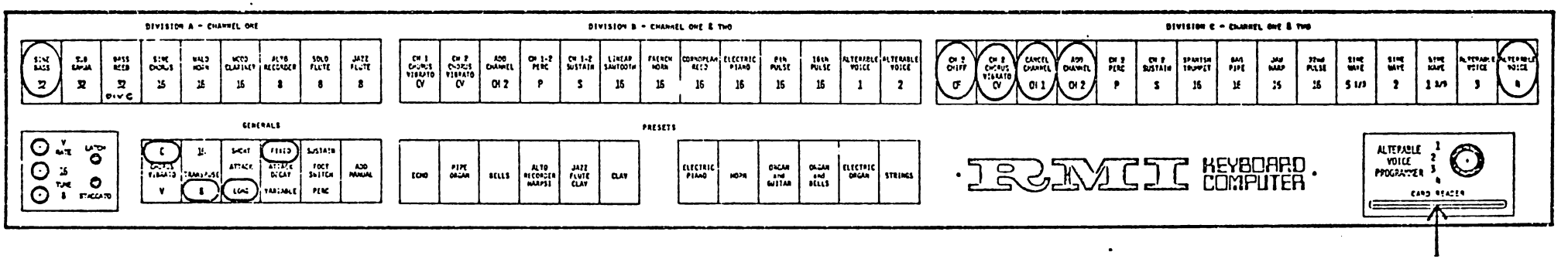
SET-UP SHEET: VIBES

KEYBOARD TECHNIQUE: Play mostly in Upper Octaves and very articulately so that Chiffing Attacks can be heard. 3/4 Um-Pah type music is typical of Calliopes. Cross-Fading, Alternating, or adding Channel 1 and 2 Pedals is effective. Chiff is more pronounced when Channel 1 is used alone, however a realism of warmth occurs when both are added.



INSERT CARDS: 1. _____
2. _____
3. _____
4. SINE WAVE 8'

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Can be used in small amounts, but not real for Calliope.	Calliope with Chiff	Sine Wave Flute adds Chorus	Not used.	Not used.	Not used.

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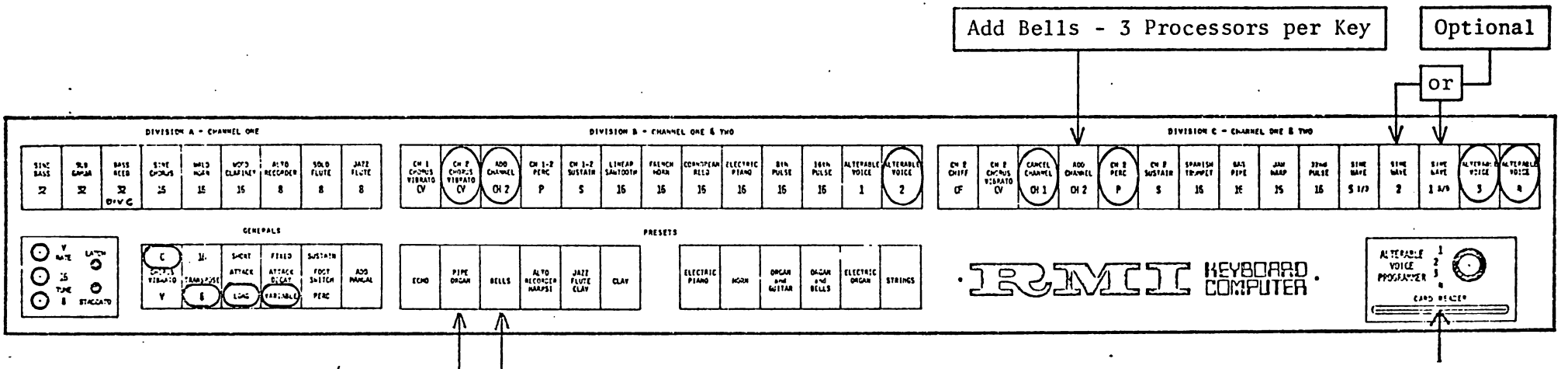
SET-UP SHEET: "STEAM PIANO" (CALLIOPE)

KEYBOARD TECHNIQUE: Use of Vibrato and Channel 2 Volume Pedals is critical for realistic introduction of First Solo Voice in Choir. Voices tend to sound very "Human" in the middle of the 3rd Octave, so concentrate Solos in that area. The effective range for "Human" Sounds is F3-A4 (Transpose in 8' Position). Keep Voices in 2 or 3-part Open Harmony using slow movement and suspensions. Add a 4th Voice with Bells to cause delayed attacks between Choir and Bells - play even slower waiting for all notes in chord to play both Choir and Bells. This Effect will be remembered.



INSERT CARDS:
1. _____
2. CATHEDRAL CHOIR
3. RING MODULATOR
4. RING MODULATOR

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Add with Attacks of Solo Voices - leave continuous with 2 or more Voices.	Open with addition of Second Voice to create an Antiphonal Effect. ←CHANGE BALANCE SLIGHTLY FOR INTEREST→	Open slowly with Attack of First Voice to Mask Digital Envelope.	Set in Extreme Long Position.	Not used.	Not used.

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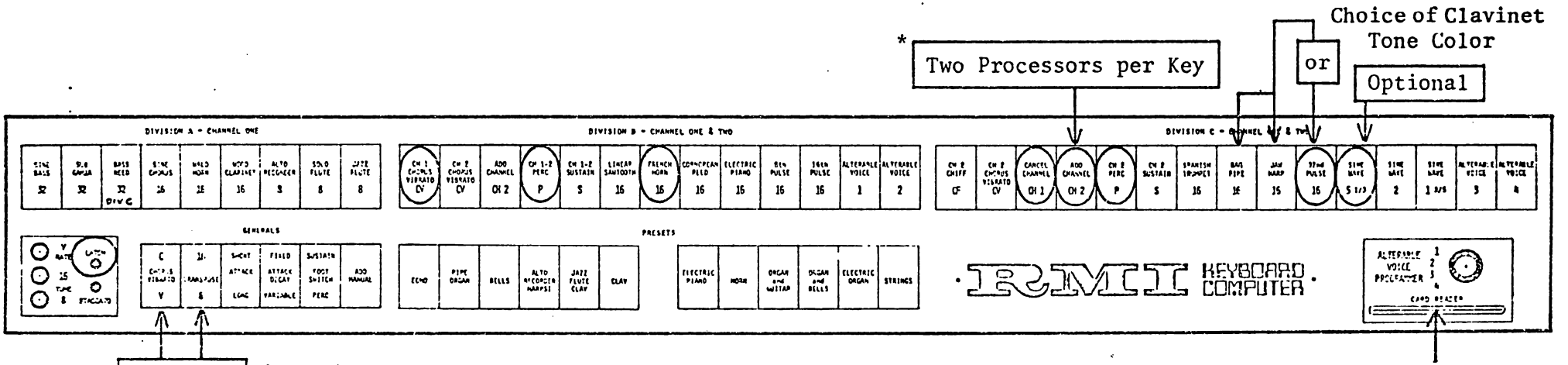
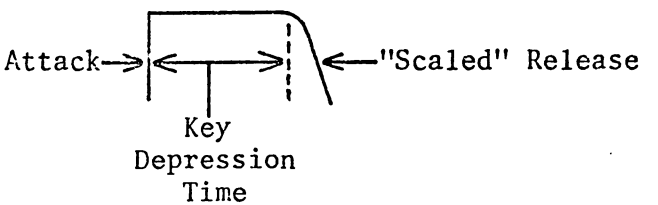
SET-UP SHEET: CATHEDRAL CHOIR AND BELLS

KEYBOARD TECHNIQUE: Make decisive switches from Channel 1 and (2Red) Pedal to Channel 2 Pedal. Change playing style to suit. Six keys activate all twelve Processors.* Since the Clavinet is a stringed instrument its sound could not sustain indefinitely, therefore, hit the keys quickly as though playing a hot griddle! If Sustained Solo Lines with Pitch Bender and Vibrato Technique are desired, hold Long Notes in Right Hand while keeping a Fast Left Hand.

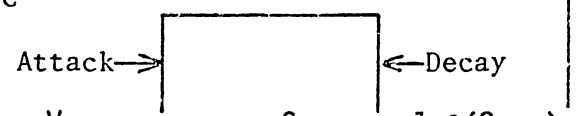


NOTE ENVELOPE: Using "Percussion Mode" with "Latch" creates an Envelope with Percussive Attack, but an Organ-Like "Scaled" Release.



INSERT CARDS: 1._____ 2._____ 3._____ 4._____

Envelope Option:
Activate Staccato Pedal and remove Perc Modes from Divisions "B" & "C"



PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
ON for Perc Attack	Option. Remove Perc tabs Divs B & C	Use for "Leslie" Effect with B-3 Sound	B-3 French Horn 16' -and- Sine Wave 5-1/3'	CLAVINET 32nd Pulse 16' -or- Jaw & Bag 16'	Not used.	Use as needed.	Not used.

Note: This Set-Up created by KC Performer Josh Pines of Manhattan, New York.

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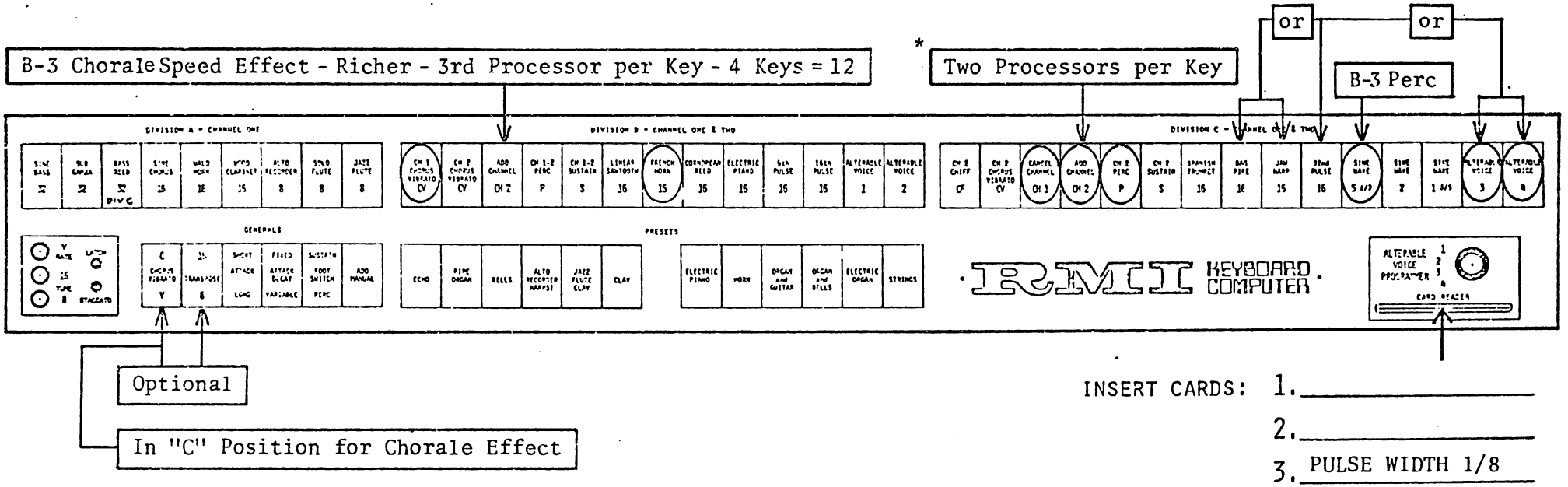
SET-UP SHEET: B-3 AND CLAVINET
(Option "A")

KEYBOARD TECHNIQUE: Make decisive switches from Channel 1 and (2Red) Pedal to Channel 2 Pedal. Change playing style to suit. Six keys activate all twelve Processors.* Although Fast and Funky Technique is recommended on the Clav, it will Decay at rate of Attack/Decay Pedal if held. This Effect is useful when both B-3 and Clav are played together - Clav Decays while B-3 holds.

Choice of Clavinet Tone Color



INSERT CARDS:
1. _____
2. _____
3. PULSE WIDTH 1/8
4. PULSE WIDTH 1/8

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Option Holds Decay.	Option Kills Div "C"	Use for "Leslie" Effect with B-3 Sound.	B-3 with 3rd Harmonic Percussion.	CLAVINET	Varies Decay Time of Clav and B-3 Perc.	Use as needed.	Adds Sustain to Div "C" Perc.

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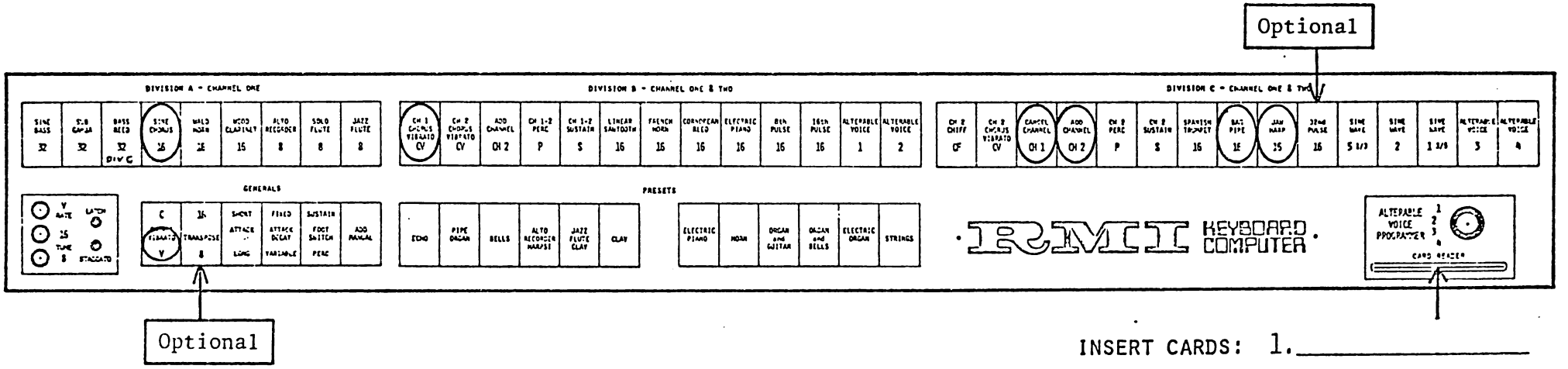
SET-UP SHEET: B-3 AND CLAVINET
(Option "B")

KEYBOARD TECHNIQUE: Organ typical of 60's Portable "Rock Organ" Sound. Play Right Hand Chords with Left Hand Bass Line. Use "Hot Griddle" technique on Clavinet, otherwise Right Hand Solo Notes can be held to take on a Synthesizer Sound with aid of Pitch Bender and Vibrato Pedals. Be sure to make a clean break when switching "instruments" with Channel 1 and 2 Pedals. And remember, the playing style must also change instantly. Both can be played together, but the technique must be fudged, however, you might try Staccato OFF and Division C Percussion ON, then adjust Decay Time.



INSERT CARDS: 1._____

2._____

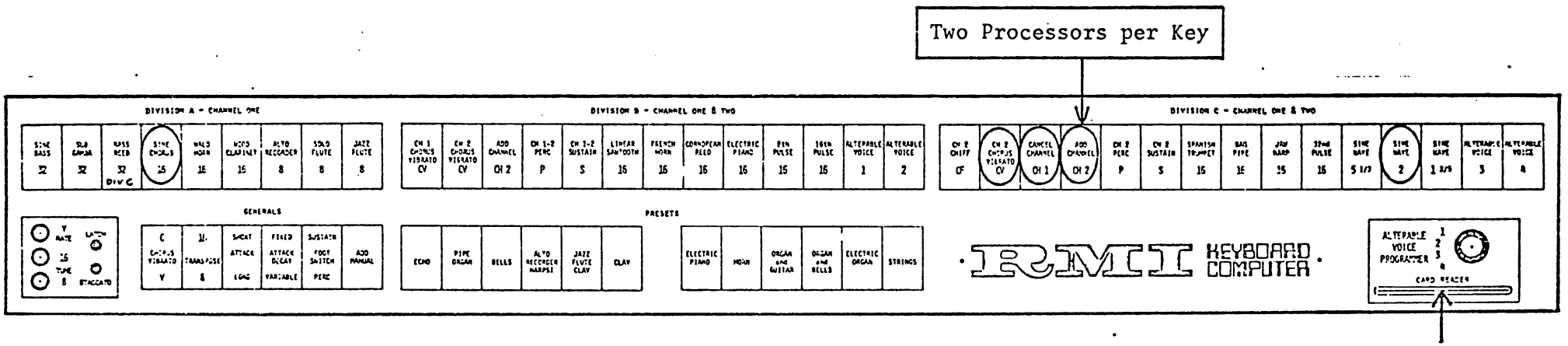
3._____

4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	ON	Use for Synthesizer Effects on Channel 2.	ELECTRONIC ORGAN ← Make clean switching	CLAVINET → changes when "Instruments"	Not used.	Use for Synthesizer Effects on Channel 2.	Not used.

KEYBOARD TECHNIQUE:



INSERT CARDS: 1._____

2._____

3._____

4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
	Option.	Optional	Sine Chorus	2' Sine Wave	Not used.	Not used.	Not used.
			EQUAL	VOLUME			

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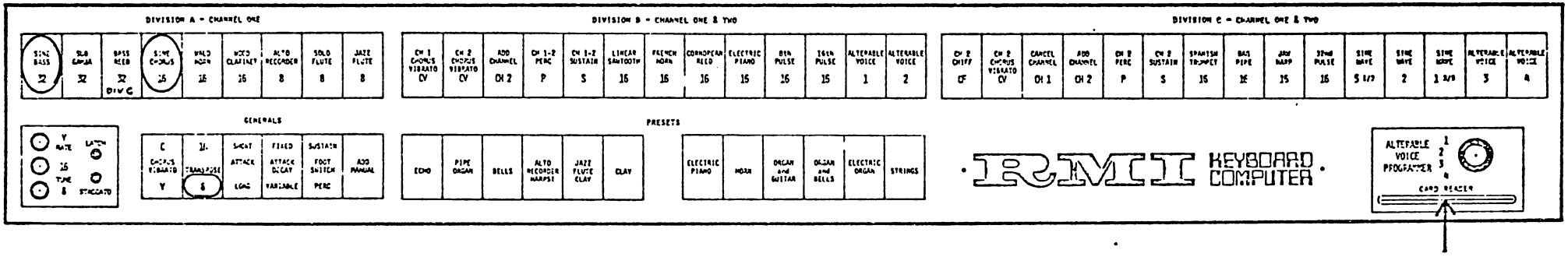
SET-UP SHEET: ELECTRIC ORGAN #2

KEYBOARD TECHNIQUE:



INSERT CARDS: 1._____

2._____

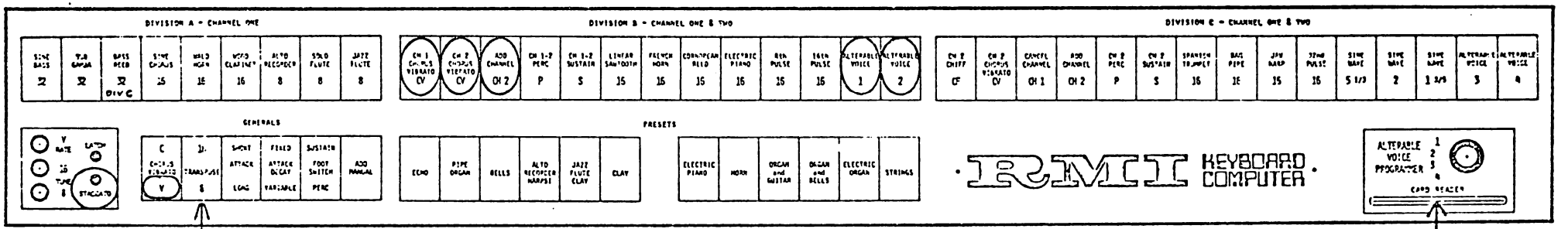
3._____

4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
		Use as needed.	Only				

KEYBOARD TECHNIQUE: Not intended to be a pleasing sound, but rather intended as an imitation of the inexpensive portable "Rock Organ" of the 60's. If you are looking for a "dated" sound, this is it! Try Full Chords in Right Hand and Bass Line in Left Hand.



Optional

INSERT CARDS:
1. SINE CHORUS C
2. FIFE 1'
3.
4.

Option: If you want it to really SCREAM try the Sine 1'

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
	ON	Not used unless more Vibrato is desired.	EQUAL VOLUME (Usually Open Full)		Not used.	Not used.	Not used.

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SET-UP SHEET: PORTABLE ELECTRONIC ORGAN

KEYBOARD TECHNIQUE: Same as Echo Preset. Use Perc or Staccato Pedals as quick change effect, but do not activate Perc Pedal while Staccato is on. Additional variation can be had by fading out Channel One Volume, since the Echo Voice is heard only in that channel.

Initial Voice

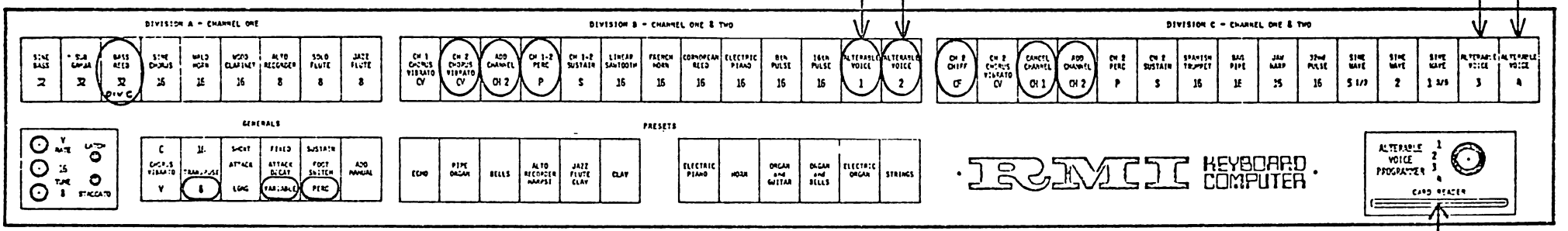
Variable Attack-Decay Voice

Alternate or Combine

Optional

or

Echo Voice



INSERT CARDS:
1. JAW HARP "B"
2. BAGPIPE
3. LINEAR SAWTOOTH "H"
4. FIFE 1'

DO NOT USE TOGETHER

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
	Stops Echo	About 1/2	FULL Initial Attack Echo Attack	FULL Initial Attack	Set Echo Time - Experiment		Stops Echo

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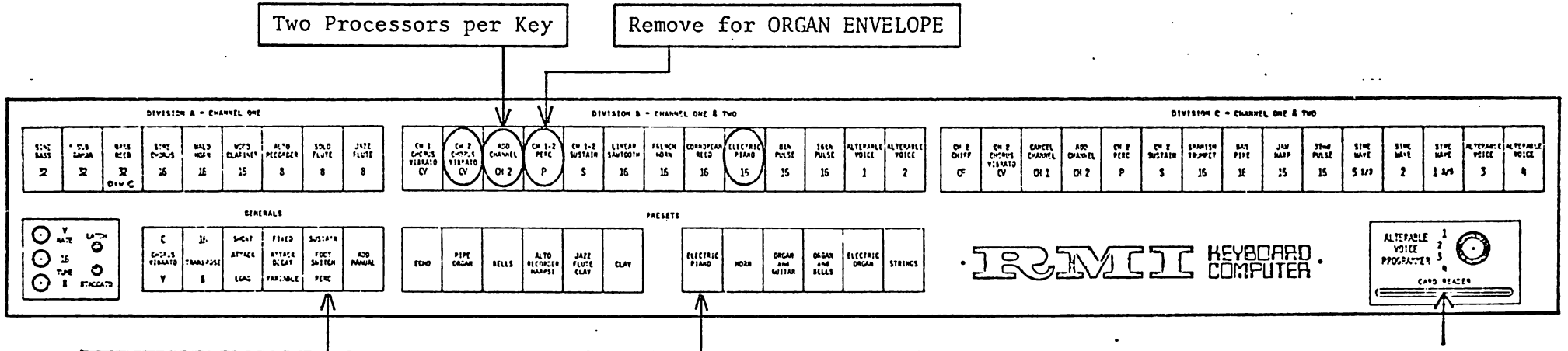
SET-UP SHEET: ECHO VARIATION #1

KEYBOARD TECHNIQUE: Single-Line Walking Left Hand Bass. Single-Line Right Hand Melody.



INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Can be very effective on Top Octave Notes.	← EQUAL	VOLUME →	Best Effect in extreme "Long" position - vary for Special Effects.	Effective on Upper End of Bass Solo Runs.	Add Sustain or Perc.

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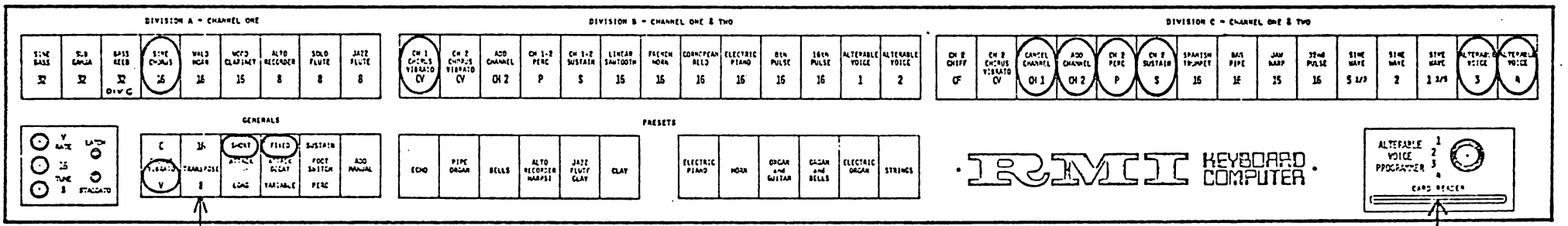
SET-UP SHEET: JAZZ BASS

KEYBOARD TECHNIQUE: 4 or 5-note Chords in Right Hand, Running Bass Line in Left Hand.



Optional

INSERT CARDS: 1. _____
2. _____
3. CHRYSOGLOTT
4. CHRYSOGLOTT

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Can be used to increase Organ Vibrato or add Vibrato to Bells.	ORGAN ← Sounds best at Full	CHRYSOGLOTT (Bells) → with both Volume	Set Long for Bells or adjust by ear.	Not used.	Not used.

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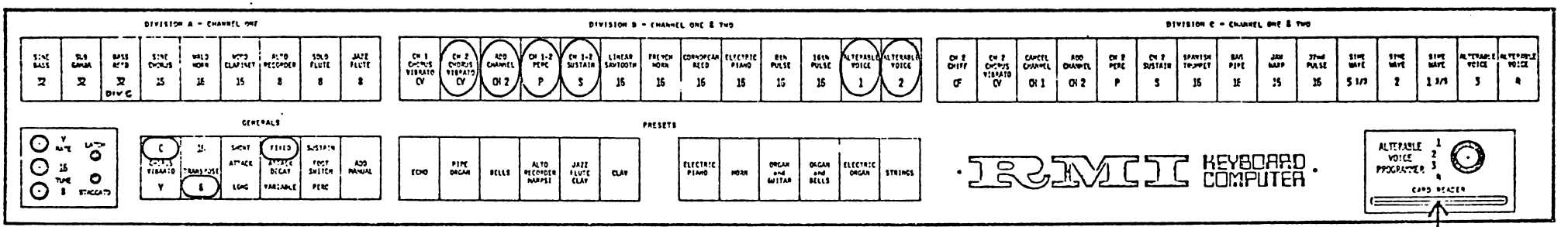
SET-UP SHEET: ORGAN AND CHRYSOGLOTT

KEYBOARD TECHNIQUE: Traditionally, Bells are not keyboard instruments. To have Bells hooked to an electric keyboard is to have them played with unrealistic ease - so play Bells "mechanically." Listen to music boxes and other mechanical musical instruments, carillons, etc. Parallel Sixths in Right Hand with a Running Single Line Left Hand is most effective. Be sure to experiment with mixing Upper Harmonics with different Bell Cards.



INSERT CARDS: 1. ✕ 2. ✕ 3. ____ 4. ____

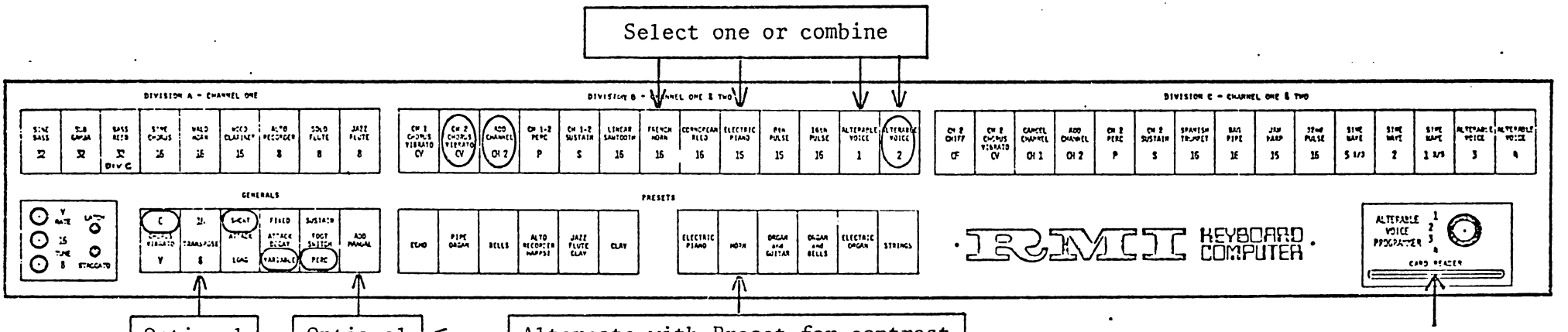
Try all Bell Cards Doubled in Alterables 1 and 2

Optional: Try any Bell Card in Alterable 1 mixed with any of the following in Alterable 2: Flute 2-2/3 B, 8/11 B, Flute 1-1/3 B, Septieme 1-1/7 C, Flute 23rd 8/9, Flute 24th 4/5, Flute 29th 1/2 B, or Sine 2.

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Not used except in small amounts for Special Effects with Long Decay.	EQUAL (Usually Cross-Fade for	VOLUME Open Full) Special Effects.	Set Long or vary to suit taste - experiment.	Not used.	Not used.

KEYBOARD TECHNIQUE: Good Set-Up for Contemporary Jazz Styles. Solo Lines "sing out." Left hand chording is best heard in Transpose 8' position. Left hand should take a brief rest during Pitch Bending of Right Hand Solo Lines . A heavier Vibrato can be tolerated on Solo Lines than on chords. Vibrato can be kept at low level, then increased when needed for Solo Lines. The Electric Piano Wave Form is mellow and sounds good in this Organ Mode.



Optional | Optional | Alternate with Preset for contrast

Optional: Diaphone, Orchestral Tuba, any Horn Card - French, Wald, etc.

Note: Cards can be mixed or alternated with Alterable 1

INSERT CARDS:
1. _____
2. VOWEL "OO"
3. _____
4. _____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN (PERC)
Hold chord.	for stacc env.	Use in Jazz Style.	EQUAL (Usually	VOLUME Open Full)	Set in extreme Short position.	Use in Jazz Style.	Use as needed -but- increase Attack-Decay.

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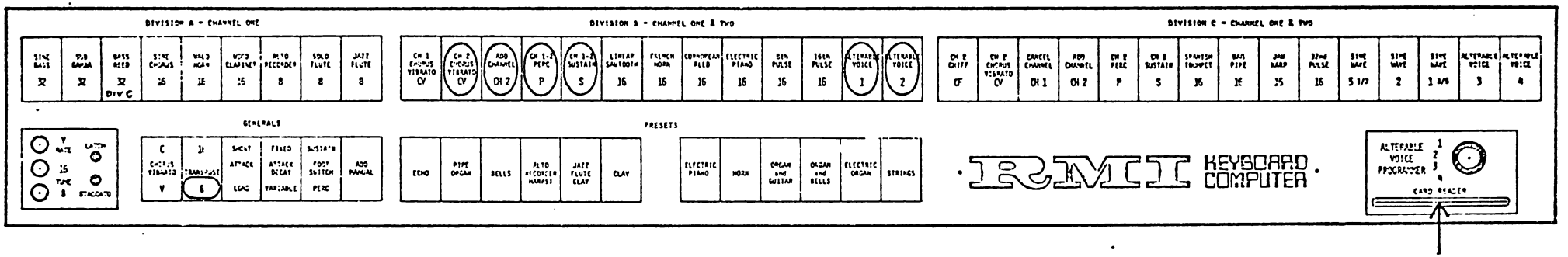
SET-UP SHEET: JAZZ VOICES - MELLOW

KEYBOARD TECHNIQUE:



INSERT CARDS: 1. SINE 8'
2. Any Mixture
3. _____
4. _____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
		Add Light Vibrato if desired.	FULL VOLUME ⟷ EQUAL		Long		

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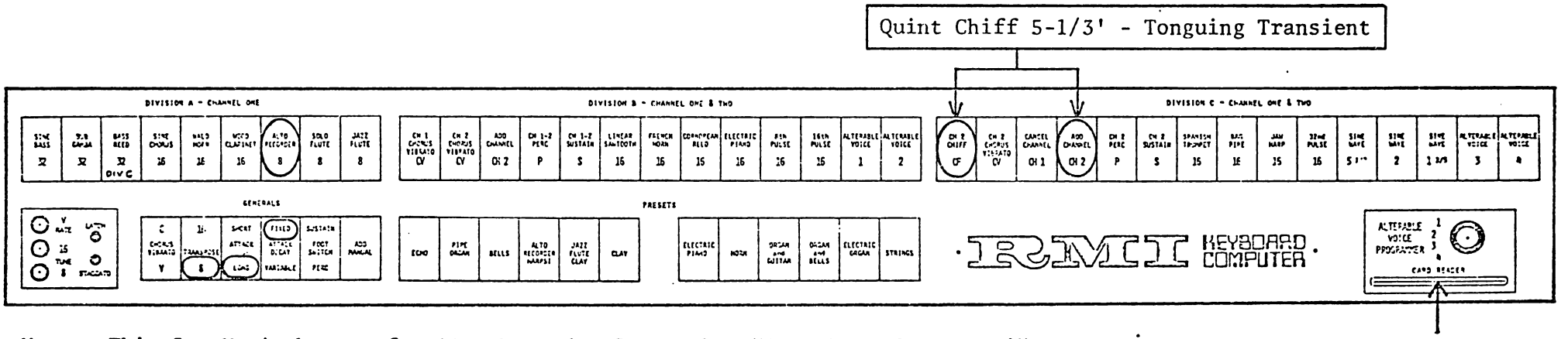
SET-UP SHEET: BELL EXPERIMENT

KEYBOARD TECHNIQUE: One, Two, or at the most, Three Voices at a time. Do not play notes in a range lower than physically possible for an Alto Recorder. Remember, flutes can play only one note at a time, therefore, play staccato-like, not legato. For Two Voices, play one in each hand, Three Voices - two in one hand, to maintain the illusion of individual players performing, contrast phrasing between Voices. Effective Three Voice Style: Almost-legato parallel Sixths in Left Hand against a staccato solo in Right Hand - Watch pitch range!



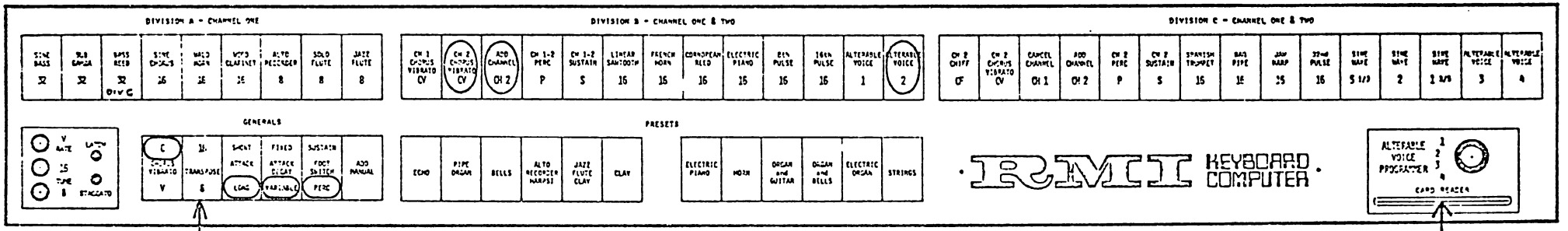
Note: This Set-Up is better for Alto Recorder Solos than "Alto Recorder Harpsi" Preset because using Percussion Mode in Division "C" for Harpsichord prevents "Chiff" Envelope from operating.

INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Use carefully in small amounts to accent Phrases.	ALTO RECORDER (Vary Expression)	Not used.	Not used.	Not used.	Not used.

KEYBOARD TECHNIQUE: See "Strings Preset" Set-Up Sheet for details.



Optional

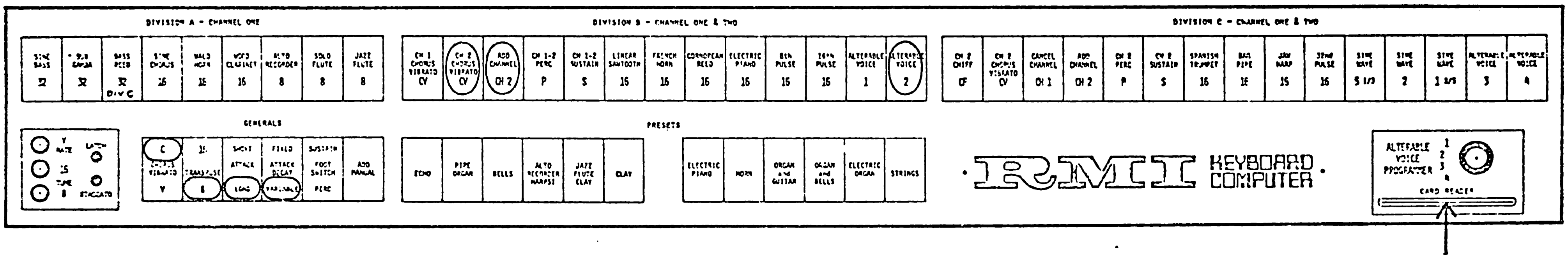
INSERT CARDS: 1. _____
2. X
3. _____
4. _____

Try "Non-Linear" Sawtooth Cards A through I and 4' A and B

PEDAL ASSEMBLY: See "Strings Preset" Set-Up Sheet for details

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC

KEYBOARD TECHNIQUE: Good for Lawrence Welk Music! Right hand mostly. Use close harmony with added 6ths or 7ths.



INSERT CARDS: 1. ____________
2. EDGE WHISTLE
3. ____________
4. ____________

Option: Try any Clarinet Card → (2.)

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Not used.	← EQUAL	VOLUME →	Critical for correct attack of Accordion - set by ear.	Not used.	Not used.

from Steve Cooper, Denver, Colorado

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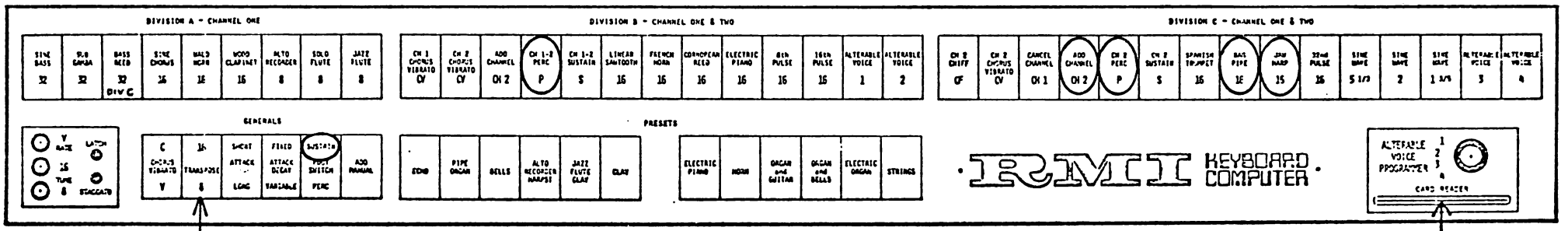
SET-UP SHEET: ACCORDION

KEYBOARD TECHNIQUE: Funky. Keep it moving and rhythmic. Break chords.



Optional

INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Organ Enve-lope.	Not used.	Not used.	- FULL -	- FULL -	Extreme Long Position or vary.	As needed.	For Sustain Effect.

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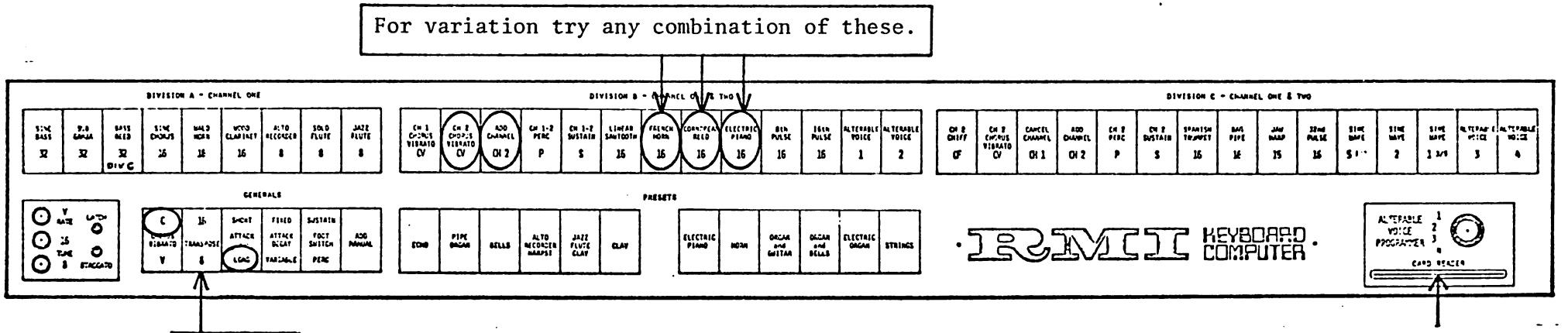
SET-UP SHEET: CLAVINET EFFECT

KEYBOARD TECHNIQUE: 3 or 4 Part Harmony - Triads in close harmony in right hand.



INSERT CARDS: 1._____
2._____
3._____
4._____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Use with trills or long notes.	- FULL -	- FULL -	Not used.	As needed.	Not used.

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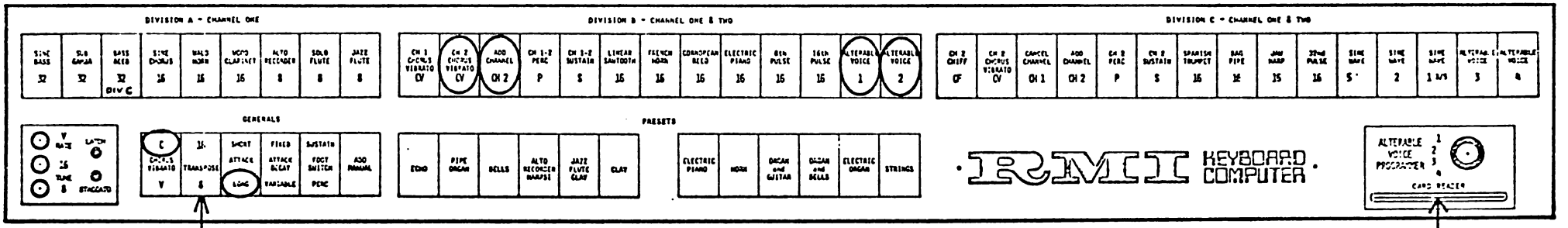
SET-UP SHEET: HORN #1 MELLOW

KEYBOARD TECHNIQUE: 3 or 4 Part Harmony - Triads in close harmony in Right Hand.



Optional

INSERT CARDS:
1. CORNOPEAN - C R1542
2. HORN - B R1543
3. _____
4. _____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Use with trills or long notes.	- FULL -	- FULL -	Not used.	As needed.	Not used.

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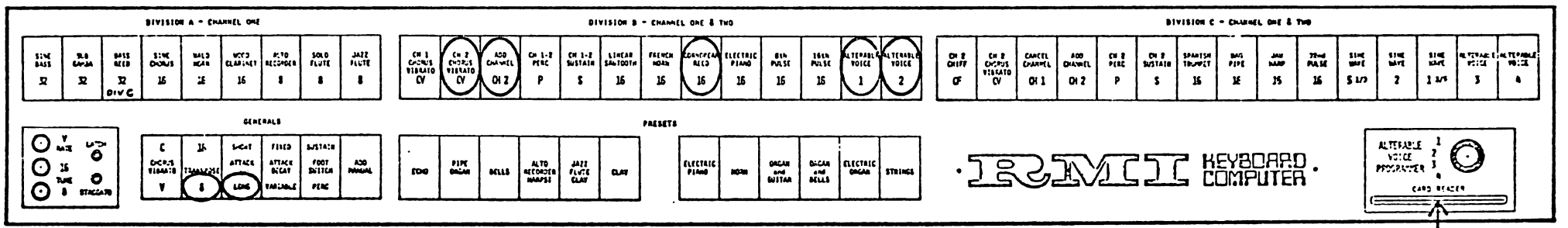
SET-UP SHEET: HORN #2 DARK

KEYBOARD TECHNIQUE: 3 Part harmony - Triads in close voicing. Trumpet style.



INSERT CARDS: 1. BRASS R1546
2. BRASS R1546
3. _____
4. _____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Use with trills or long notes.	- FULL -	- FULL -	Not used.	As needed.	Not used.

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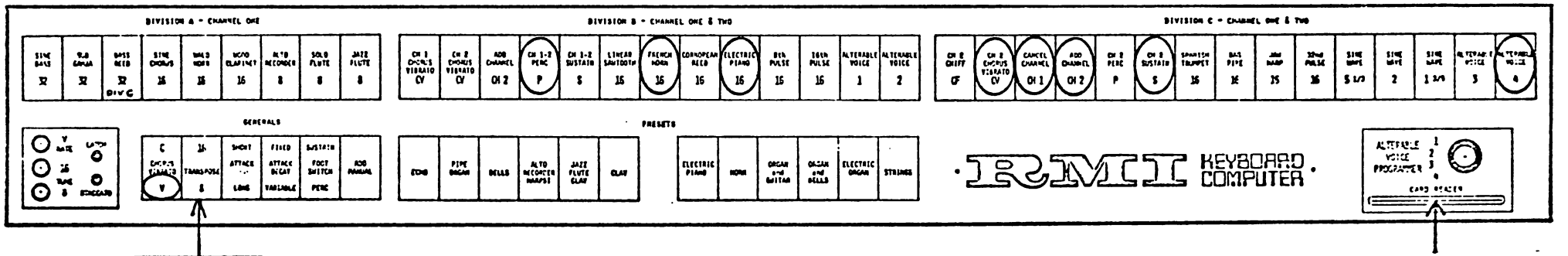
SET-UP SHEET: HORN #3 BRILLIANT

KEYBOARD TECHNIQUE: Arpeggios and Runs with counterpoint are effective in a Staccato-like technique. Slow-moving chords would be less effective since the essence of the effect is the contrast between Attack Timbre and Decay Timbre. Percussion Voice will be heard initially from Division "B" followed by Sustain Voice in Division "C" Sine Wave. Contrast Short and Long Decay times with Pedal. Add Heavy Vibrato Pedal to longer decay times. Smooth Fourth Slides can be created with Pitch Bender during the Sine Decay after keys are released.



Optional

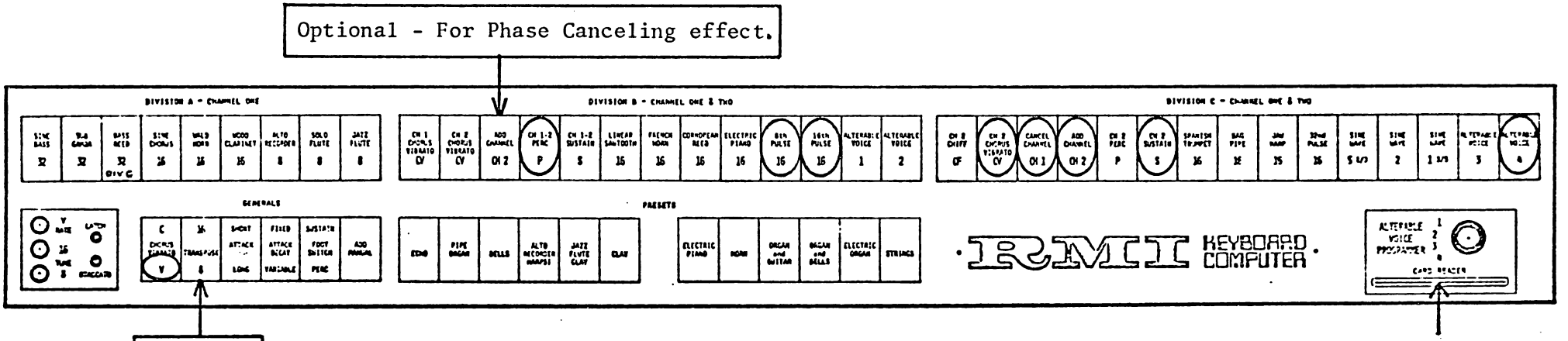
NOTE: These "ABSTRACT" Set-Ups are very pleasant timbres that are intentionally non-imitative. Some will remind you of the timbres created by Walter Carlos in "Switched-On Bach." The sky is the limit in creation of this type of Set-Up.

INSERT CARDS:
1. _____
2. _____
3. _____
4. SINE WAVE 8'

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Use with Long Decay settings.	- FULL - Percussion Sounds	- FULL - Sustain Sounds	Vary. Try extremes.		Not used.

KEYBOARD TECHNIQUE: Arpeggios and Runs with counterpoint are effective in a Staccato-like technique. Slow-moving chords would be less effective since the essence of the effect is the contrast between Attack Timbre and Decay Timbre. Percussion Voice will be heard initially from Division "B" followed by Sustain Voice in Division "C" Sine Wave. Contrast Short and Long Decay times with Pedal. Add Heavy Vibrato Pedal to longer decay times. Smooth Fourth Slides can be created with Pitch Bender during the Sine Decay after keys are released.



INSERT CARDS: 1. _____
2. _____
3. _____
4. SINE WAVE 8'

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Use with Long Decay settings.	- FULL - Percussion Sounds	- FULL - Sustain Sounds	Vary. Try extremes.		Not used.

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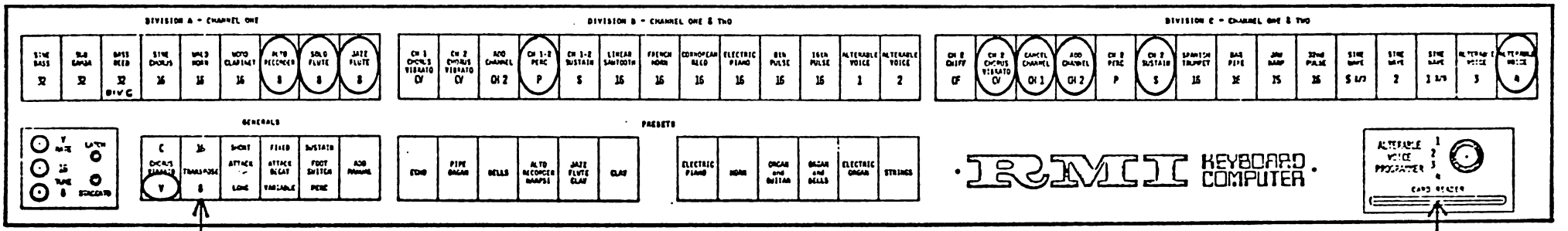
SET-UP SHEET: ABSTRACT #2

KEYBOARD TECHNIQUE: Arpeggios and Runs with counterpoint are effective in a Staccato-like technique. Slow-moving chords would be less effective since the essence of the effect is the contrast between Attack Timbre and Decay Timbre. Percussion Voice will be heard initially from Division "B" followed by Sustain Voice in Division "C" Sine Wave. Contrast Short and Long Decay times with Pedal. Add Heavy Vibrato Pedal to longer decay times. Smooth Fourth Slides can be created with Pitch Bender during the Sine Decay after keys are released.



Optional

INSERT CARDS: 1. _____
2. _____
3. _____
4. SINE WAVE 8'

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Use with Long Decay settings.	- FULL - Percussion Sounds	- FULL - Sustain Sounds	Vary. Try extremes.		Not used.

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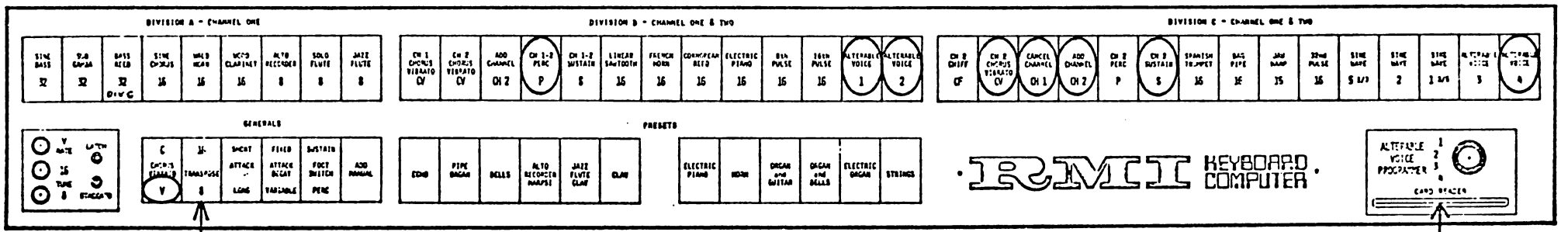
SET-UP SHEET: ABSTRACT #3

KEYBOARD TECHNIQUE: Arpeggios and Runs with counterpoint are effective in a Staccato-like technique. Slow-moving chords would be less effective since the essence of the effect is the contrast between Attack Timbre and Decay Timbre. Percussion Voice will be heard initially from Division "B" followed by Sustain Voice in Division "C" Sine Wave. Contrast Short and Long Decay times with Pedal. Add Heavy Vibrato Pedal to longer decay times. Smooth Fourth Slides can be created with Pitch Bender during the Sine Decay after keys are released.



Optional

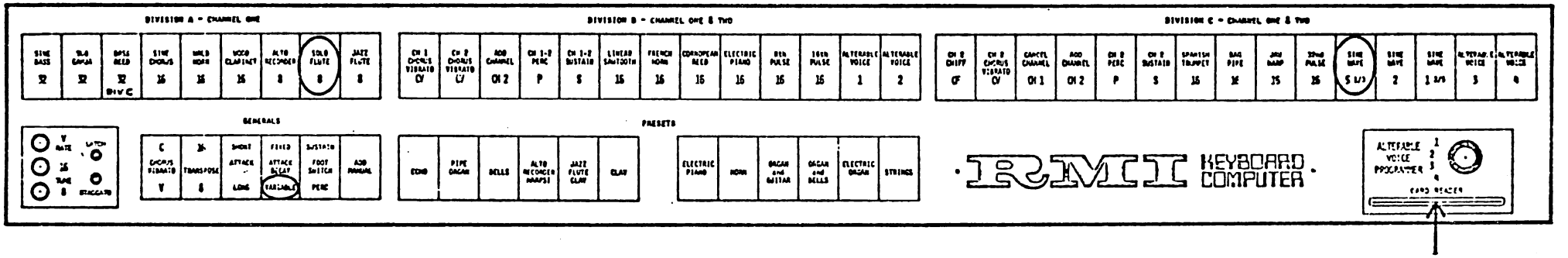
INSERT CARDS:
1. RANKETT 8' - B
2. RANKETT 8' - B
3.
4. SINE WAVE 8'

Try any card from the "Brilliant Reeds" category of the library doubled into Alterables 1 and 2.

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
Not used.	Not used.	Use with Long Decay settings.	- FULL - Percussion Sounds	- FULL - Sustain Sounds	Vary. Try extremes.		Not used.

KEYBOARD TECHNIQUE: Not intended for large chords. Single line in each hand is most effective. Each key plays Fifths, giving a fat and funky sound to Solo lines.



INSERT CARDS: 1._____
2._____
3._____
4._____

NOTE: Make sure Attack/Decay Pedal is in the "FAST" or "MINIMUM" Position (HEEL FULLY DOWN).

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC
	Option	As needed.	FULL	Not used.	MINIMUM (FAST)	As needed.	

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

SET-UP SHEET: QUINT ORGAN

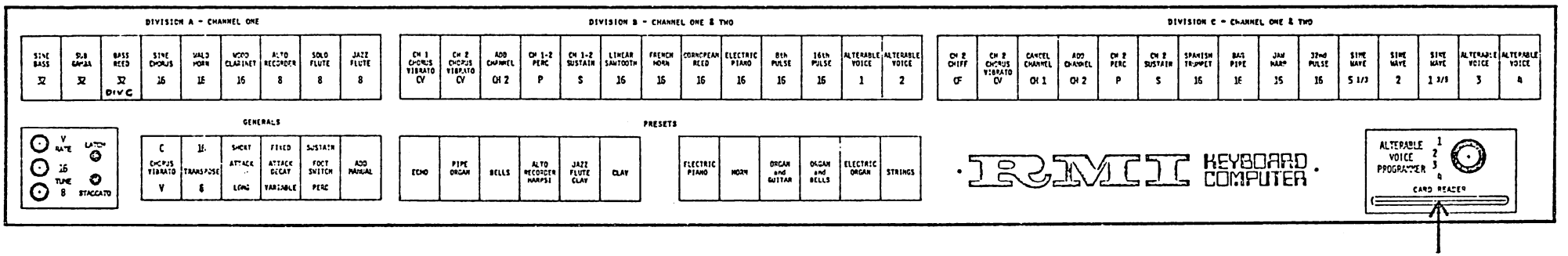
KEYBOARD TECHNIQUE: _____

_____

_____

_____

_____



INSERT CARDS: 1. _____

2. _____

3. _____

4. _____

PEDAL ASSEMBLY:

LATCH	STACC	VIBRATO	CHANNEL 1 &(2RED)	CHANNEL 2	ATTACK/DECAY	PITCH BENDER	SUSTAIN PERC

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT ROCKY MOUNT, N.C. 27801

SET-UP SHEET: _____

INSERT P. 1

tone cards - insert on RMS values (add to page 1)

The two digit number appearing to the left of the following card identification numbers is called an intensity index or R.M.S. value (Root Mean Square): 32 R1184. RMS values ~~range~~ currently range up to about 63 (1' SINE). Generally speaking, the higher the number, the louder the tone. A bright reed tone for example, indexed at 15, will sound "louder" than a simple fluTE TONE similiarly indexed at 15. This is a natural phenomenon, caused by the greater efficiency of the upper harmonics in the bright reed, as heard by the human ear.

Within a particular family of tone (brass, strings, reeds, etc.) the index numbers or RMS values should be both helpful and accurate. When using only one sound at a time, it is best to have the highest possible RMS value on the card in order to maintain a good "signal-to-noise ratio". One way of achieving a high RMS value is to "double up" the card, or insert it into two adjacent Alterable Voices such as I & II or III & IIII. When a card is "doubled up" its RMS value doubles. Most of the cards listed in the RMI library have high values (it is helpful to coordinate the understanding of this section with the section on "Registration Concepts").

A performer can use the RMS values to advantage when seeking a specific balance between two sounds, such as an organ sound with percussion like the "B-3 Hammond sound". The card used for the percussion tone is the 2 2/3' "B" having an RMS value of 44. Each tone color has an inherent limit on the amplitude that can be achieved while still maintaining the same tone color. The 2 2/3' "B" is at its fullest value. If a greater contrast is desired between the percussion and organ tone, merely lower the value of the organ tone (the French Horn card of which there are four values to choose) and turn up the amplifier gain, returning the organ tone to ~~where it was before~~ the previous level, but in addition raising the percussion tone.
Of course, you will notice that the percussion tone is already "doubled" in Alterable Voices III & IIII (see set-up sheet).

We may be in a position to provide, on request, certain other intensities not listed. Check the Allen library first to see that what you need is not already available. Then, send us a brief letter describing your need, the planned usage and set-up so that we may determine the feasibility of supplying such cards.

tone cards - insert on custom cards policy (second page of the insert to page 1)

From time to time, we receive requests for tone card sounds other that just RMS value variations of existing cards, such as real piano, trumpet, guitar, Fender Rhodes, etc. What must be realized about the above-listed instruments and similar sounds is that all have the unique characteristic of changing their tone color upon the attack and/or decay of the note. Of all the many unique, realistic, and phenomenal things that the RMI Keyboard Computer accomplishes, dynamic tone coloring is not one of them - it would seem amazing enough that it has high reliability in returning precisely to a specific sound when desired. All of this is not to say that dynamic tone coloring "effects" cannot be created. Example: A mellow tone can be programmed in Ensemble Channel Two while a brilliant tone is programmed in the Solo Division with a percussion envelope. As the key is played, both tones are heard in Channel Two, then the brilliant percussed tone slowly dies away leaving only the mellow tone from the Ensemble Division.

TONE CARDS:

Since a majority of the sounds stored in the Keyboard Computer as Fixed Voices are basically organ, the owner is provided at time of purchase with a carefully-selected set of cards that will create all the Computer sounds heard on the RMI demo record. This selection ~~is~~ provides a good starting point for ~~the~~ experimentation. As the performer becomes familiar with the card sounds and their use in the instrument, additional cards may be ordered directly from the factory. Two Tone Card Libraries are published periodically: ~~by the Allen Organ Company:~~ the RMI Library, containing the sounds frequently used by Keyboard Computer performers, and the Allen Organ Library, containing sounds usually associated with pipe organs ~~sound~~. There is, however, some duplication between the two. A copy of either library can be obtained by writing the factory in Macungie, Pennsylvania. The list also serves as an order blank: the owner places a check beside the desired cards and encloses payment for the total. A copy of the current library will be returned along with the cards.

Since cards, as opposed to Fixed Voices, are used almost exclusively in the RMI Keyboard Computer, it will be an important advantage to the performer to become greatly familiar with the ~~cards~~ Tone Card Library. Spend a lot of time listening to each card individually. Categorize the sounds - mellow and fat, brilliant and thin, nasal, flute-like, metallic, hollow, bell-like, etc. Close-spaced harmonics such as the Spanish Trumpet, or wide-spaced harmonics like the Jaw Harp. Close-spaced harmonics sound coherent, while wide-spaced harmonics can be picked out individually by the ear. Be absolutely sure that you are using a flat audio system to audition the cards, otherwise you will get a false idea of their sound.

INSERT P or RMS VALUE

An optional card storage box is available to maintain organization of your cards. Six dividers are provided for grouping categories. See your RMI Keyboard Computer dealer about obtaining and installing.

SOME COMMENTS ABOUT → RMI Current Tone Card Library categories (subject to change) - ~~use as example only~~)

Brass Ensemble: Warm, close-spaced harmonics, fat and mellow. Notice the French Horn variations "A" thru "D" - you may choose R.M.S. values from 23 to 30. There are slight changes in harmonic content, basically fundamental, first, and

CHANGE FORMAT

second harmonic. The elimination of higher harmonics causes the mellow tone color. The French Horn has a heavy fundamental with first and second harmonics in descending order.

Strings: Rich, close-spaced harmonics. Most cards have all 16 harmonics represented in a descending taper from the fundamental (see the Sawtooth Harmonic Content Chart). The Harpsichord is a combination of an 8' and 4' sawtooth. The Violin 8' B is the sound of string pipes used in the old Wurlitzer theatre pipe organ of silent film days - not real violins. The most effective (personal taste) string card is either Sawtooth 8' "A" or the Linear Sawtooth, found in the section titled "Geometric Waveforms".

Brilliant Reeds: Unusual, colorful tones of widely-varying harmonic content. "Rawk", "Razz", and "Buzz Horn" are comic names applied to non-imitative sounds for sake of identification. The Jaw Harp exhibits a unique "non-linear" characteristic due to its harmonic layout: there is a group of harmonics around the fundamental such as the French Horn, then, unlike the French Horn, there is a vacant space, and finally a cluster of harmonics around 16th harmonic. When the keyboard is run chromatically with the Jaw Harp, both the fundamental "cluster" and the upper "cluster" are heard throughout the lower and middle octaves, however, as the fundamental approaches the top octaves, the upper harmonic "cluster" begins to run out of the range of human hearing, leaving only the fundamental "cluster" to be heard. In essence, the card appears to change tone color over the range of the keyboard. The effect is very pleasing when playing bass line in the lower octaves and right-hand configurations in the upper octaves.

Flutes: The Alto Recorder and Jazz Flute 4' are highly effective solo voices when played with the proper technique in the upper octaves. The Edge Whistle is just a name for identification purposes - there really is no such instrument, but you can have fun fooling your friends (hope we don't get a letter from someone holding a degree in Edge Whistle performance). Flute 4' "B" is a sine wave of

high intensity. It could also be considered part of the"Harmonics" group, representing the first overtone above the fundamental. Flute 4' "B" is also very effective as a percussion voice.

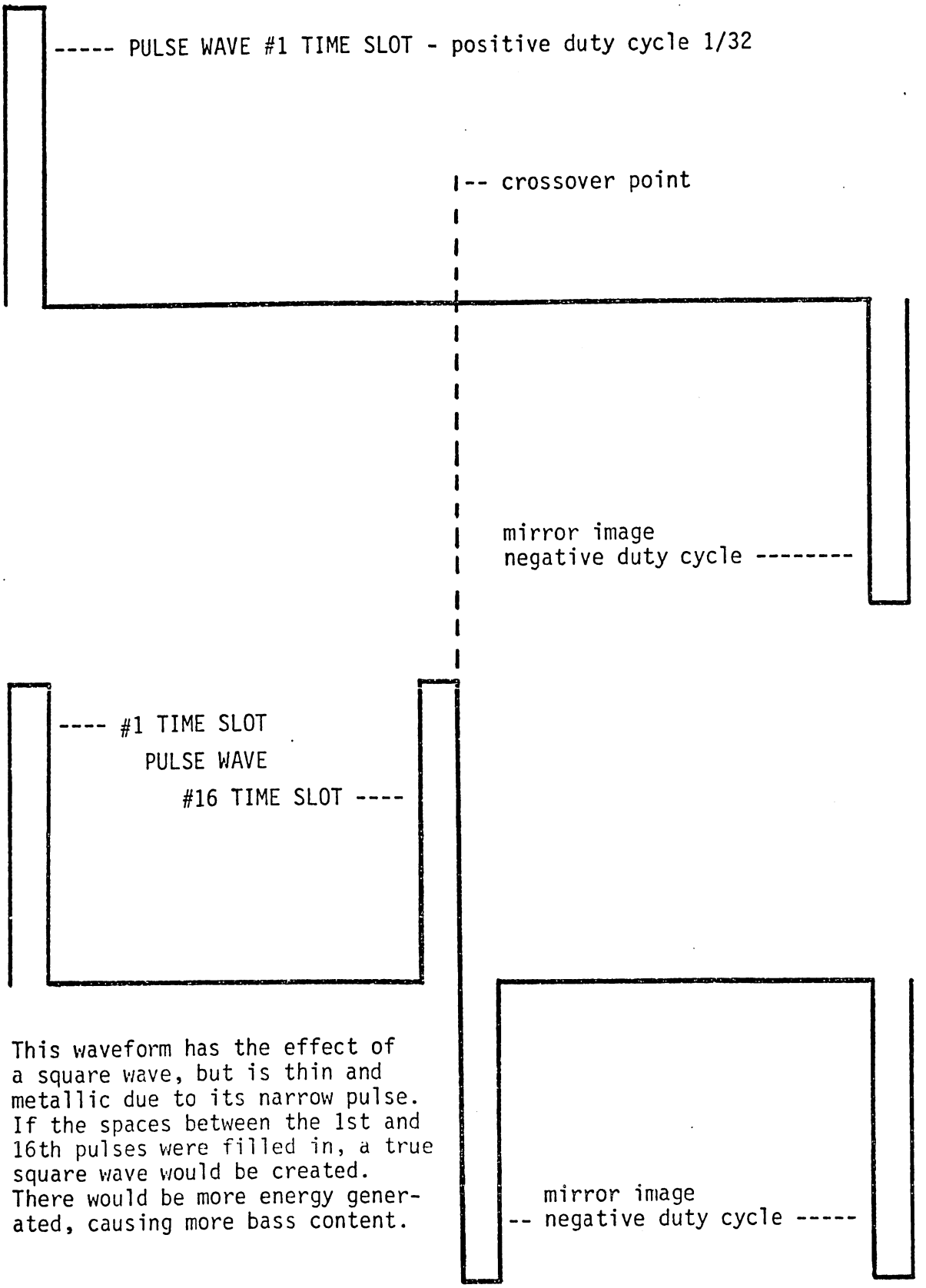
Vowel: Probably the most unique characteristic of the human voice as a musical instrument is its ability to gradually change tone color during a note or phrase. Of course, the Keyboard Computer waveforms do not make gradual changes, however, the performer may cross-fade between different tone colors programmed into opposite audio channels. Even the use of the same tone in both channels is effective when the Chorus button is used to cause a frequency change between channels. For some ideas on the subject, try the set-up sheet for "Voices" and listen to the "Voices" cut on the RMI HS & KC demo record.

Harmonics: These cards are basically sine tones representing various harmonics or overtones above the fundamental. Each of these cards is greatly effective when used as a quickly-percussed sound that dies away leaving a fundamental-like tone held. The"B-3 Hammond" sound set-up sheet is a good example, or its variations. Due to the"short-lived" nature of quickly-percussed sounds, it is often necessary to insert the card into two adjacent Alterables (I&II or III&IIII) to double the amplitude of the sound so that the percussed tone will have a good impact during its brief envelope.

Percussions: Percussion cards are most effective inserted in Alterable Voices I and/or II, along with General Percussion "P", Sustain "S", Ensemble Channels "1" and "2" and Chorus "C". Some interesting variables are the Sustain Length control, omitting the General Sustain "S", or adding one of the Harmonics cards in Alterable Voice I or II. Usually both audio channels One and Two should be heard full and equal, however, special effects can be had by cross-fading. INSERT of "PIANO" + "RING MODULATOR"

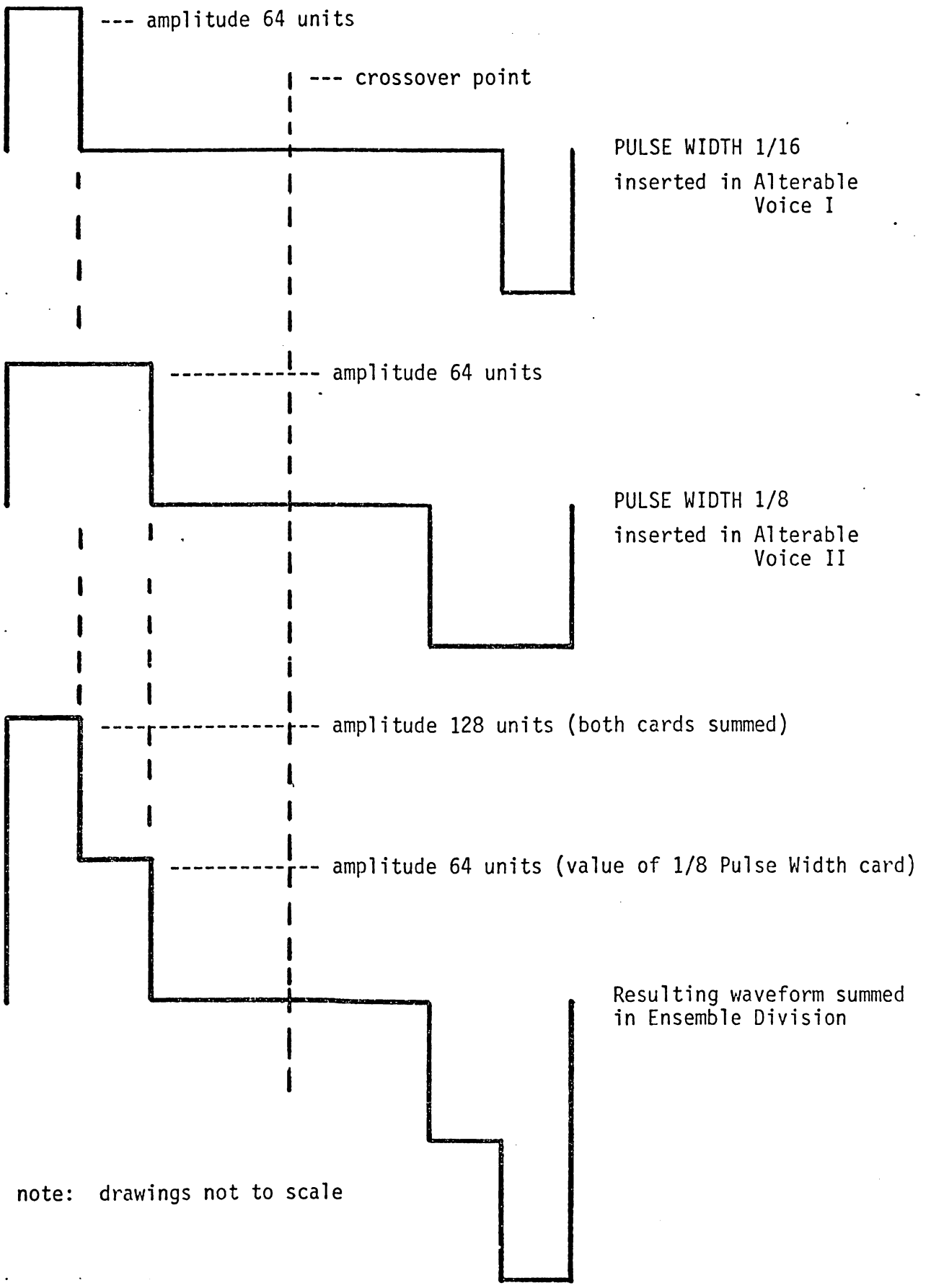
Special: A "catch-all" category for cards that do not really fit into other categories.

EXAMPLE: MIXING PULSE WAVES



This waveform has the effect of a square wave, but is thin and metallic due to its narrow pulse. If the spaces between the 1st and 16th pulses were filled in, a true square wave would be created. There would be more energy generated, causing more bass content.

EXAMPLE: MIXING PULSES TO CREATE STAIRCASE WAVEFORM



note: drawings not to scale

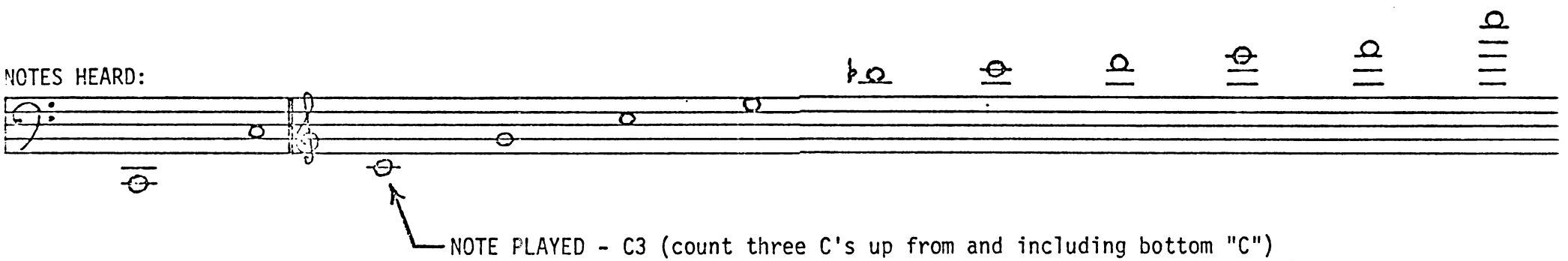
Geometric Waveforms: Card description is by geometric shape rather than sound or harmonic content. Performers who are familiar with analog synthesizers will recognize these waveforms. Linear Sawtooth (see graphic example) is a digitized representation of a linear ramp - a series of descending numbers. The Pulse Width series have positive-going duty cycles represented by a fraction. Pulse Width 1/2 would be 50% positive duty cycle, or a square wave. Keep in mind that the Computer also generates a negative duty cycle that is a "mirror image" of the positive cycle, creating a symmetrical waveform. All 16 of the series may be heard in succession in an experiment: turn off A.C. power briefly to"clear" the Alterable Voice memories, then slowly program the Pulse Width 1/2 into the reader while holding a chord - you will hear a 1/32 pulse width first, followed by 1/16, 3/32, 1/8, etc. until the card is all the way in at 1/2 pulse width. By slowly inserting the Blank card (number 00000 listed under "Special") the process can be reversed. Different Pulse Width cards can be added in Alterable Voices I & II or III & IIII to create staircase waveforms - one step per card. Pulse Width cards 1/16 and 1/8 together make a good rich staircase waveform, particularly effective for use with external filtering or "wah" pedal devices. Pulse Wave #1 Time Slot is a 1/32 pulse wave starting at the beginning of the cycle. Pulse Wave #2 Time Slot starts 1/32 later, causing a different phase relation. Each successive time slot number is an additional 1/32 later. It is interesting to note that slots #1 and #16 sound alike, as do #2 and #15, #3 and #14, etc., because of the symmetry. However, if #1 and #16 are mixed together in, for example, Alterable Voices I & II they will have the effect of a thin, metallic, square wave.

INSERT DRAWING

Experiments with as many as four cards mixed together in the Alterable Voices can be achieved by using only Channel One in the Ensemble Division and not using the Percussion or Sustain in the Solo Division, which allows the Solo Alterables to remain in Channel One.

INTERVAL CREATED:	OCTAVE	OCTAVE	UNISON	PERFECT FIFTH	OCTAVE	MAJOR THIRD	MINOR SEVENTH	OCTAVE	MAJOR SECOND	MAJOR THIRD	PERFECT FOURTH	OCTAVE
PITCH USED:	16'	8'	4'	2 2/3'	2'	1 3/5'	1 1/7'	1'	8/9'	4/5'	8/11'	1/2'

NOTES HEARD:



NOTE PLAYED - C3 (count three C's up from and including bottom "C")
The calculations for being tuned one octave down have been included.

Pitch footage numbers listed across the top of the chart refer to those numbers found on the Fixed Voice buttons or the Tone Cards. All even numbers represent octaves. All fractional numbers represent intervals or overtones that occur between octaves. Fractional pitch intervals are measured from the nearest octave below.

Notice that the 16' and 8' notes heard are written in the Bass Clef, and therefore are below the note played, which is "C3". The note played is heard as the same note only when a 4' voice is used. When other pitches are used, the note played will be heard above or below according to the chart. It is interesting to note that these fractional pitch overtones, although placed on the staff, do not actually belong to the tempered scale. They are, instead, natural harmonics. The over-all effect to the ear is more pleasant when adding harmonics to build up the full ensemble.

PITCH FOOTAGE CHART

ALL 16's AND WHITE VOICES EXCEPT B REMAIN ON CH. 1. H's REMAIN ON CH. 2. ALL OTHERS MOVE ACCORDING TO ENS. CONTROLS 1 2 AND SOLO CONTROLS P S

PEDALS: [illegible]
GNDING. ONE FOOT A 1+2
FULL SETTINGS - LEVELS
SET-UP AMPS

VIBRATO SPEED [illegible]:
OUTER CONTROL - SPEED OF ALL VIBRATOS
INNER CONTROL - TOUCH BAR INTENSITY
PULL INNER CONTROL OUT HOLDS TOUCH BAR "ON"

INTERNAL CONTROLS
SERVICE DATA

CHANNEL 1 VIBRATO

CHANNEL 2 VIBRATO VIA CH 2 BUTTON ENSEMBLE ONLY

SOLO VIBRATO WHEN UNDER THE INFLUENCE OF SOLO P OR S

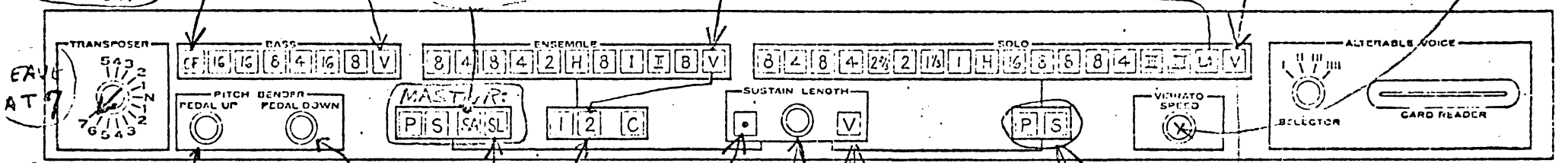
CHIFF
ADDS PROCESSOR MOVES SOLO DIV

SOFT ATTACK (VERY SUBTLE)

LA IS A GENERAL AFFECTING ALL DIVISIONS

ATTACK DECAY SUSTAIN ENVELOPE

ADDS



SET A 440 TUNE 4TH #

LATCHES ANY SUSTAINED VOICES INDEFINITELY

ADDS PROCESSOR

STACATO BUTTON:
CAUSES ALL ATTACKS AND DECAYS TO BECOME ABRUPT: ENVELOPE ATTACK DECAY

OVERRIDES ALL EFFECTS EXCEPT P WHICH KILLS OR [illegible] ES AUDIO.

MASTER SUSTAIN LENGTH
ALSO PERC DECAY AND LA ATTACK/DECAY

MASTER VIBRATO

ADDS ADDITIONAL PROCESSOR PER KEY PLAYED

PRESSING EITHER OR BOTH MOVES SOLO VOICES FROM CH 1 TO CH 2 EXCEPT 16+WHITES
ALSO CAUSES PERC/SUSTAIN

MASTER VIBRATO AND TOUCH BAR ARE FM. of MASTER CLOCK AFFECTING ALL [illegible] IONS

PITCH BENDER TECHNIQUE:

Few keyboard players have had the chance to change their pitch on an "infinitely-variable" basis by means of a pedal. On first approach, the device seems like the ultimate gimick - there is a great temptation to fiddle with it. However, if it is to become a musically-useful tool, it must be used with great care. Eventually, it will become second-nature to you just as the pedalboard is to an organist.

The first thing you will notice about the Pitch Bender Pedal is the fact that it is spring-loaded. The purpose is to assure return of the pitch to the "A" 440 standard when the Bender is not in use. Next, you will probably notice that the "curve" in pitch response is not linear. There are two reasons for this: 1. It is desirable to have less sensitivity at the beginning of the travel so that any imperfections in the return "stop" of the pedal (dirt, pieces of debris from the floor and feet) will not critically effect the tuning of the instrument. 2. It is also desirable to have less sensitivity at the beginning of the travel in order to give a wider spread to the first semi-tone or whole-step. Common usage of the Bender, particularly in jazz and rock, is the half-step or whole-step bend sharp and return, frequently followed by a heavy vibrato (a typical guitar lick). By having a wider spread in the first portion of the travel, the performer maintains greater accuracy in controlling these smaller intervals. the pitches. With a little practice, you will soon have an"educated ankle".

Most of the use of the Pitch Bender Pedal will fall into two categories: "bends" or "slides". The type of instrument you are imitating or creating will determine the category. Generally, solo instruments (single note) are effective with"bends" and accompaniment instruments (chordal) are effective with "slides". ~~The guitar is a good example.~~ Solo guitar makes much use of half-step and whole-step bends (not to mention between steps). Rhythm or accompaniment guitar often slides into or up to chords. Of course, these examples are only guidelines, not rigid rules. There will be many exceptions that are musically effective.

When applying these concepts to the Pitch Bender the performer must be constantly aware of the ideoms, limitations, and peculiarities of the instrument he is trying to imitate. For example, if two or three flutes are playing together in harmony, it is very unlikely that all three of them could bend the same amount at exactly the same time. Of course, if the Pitch Bender Pedal is moved, all three will move together by the same amount. ~~so~~ To avoid this unrealistic effect, two of the voices should take a brief rest while the remaining voice bends. Another important example is the case of the Pedal Steel Guitar slide. Set up the Pedal Steel combination as shown in the Owner's Manual (listed as "Steel Guitar & Organ"). The most effective "voicing" will be a three-note chord of "open" harmony in the right hand played in a "broken" manner in the 4th and 5th octave range (example: G4, E5, & C6). The bass line should be restricted to one note at a time, alternating octaves and fifth. Leave Channel One and Two Pedals fully open to gain the Chorus effect. As with the case of the three flutes, the bass line would lose some realism if it were to slide along with the other three voices. ~~The~~ THE effective technique is to give the bass line a brief rest during the slide. At the same time, this ~~technique~~ BRIEF REST IN THE BASS LINE will draw more attention to the slide effect IN THE RIGHT HAND. ~~due to the absence of the bass line~~

AT FIRST, YOU WILL NOTICE IT IS DIFFICULT TO COORDINATE A SMOOTH SOUNDING SLIDE; YOUR FOOT MUST COMPENSATE FOR THE NON-LINEARITY OF THE ... PRACTICE WILL MAKE IT YOURS.

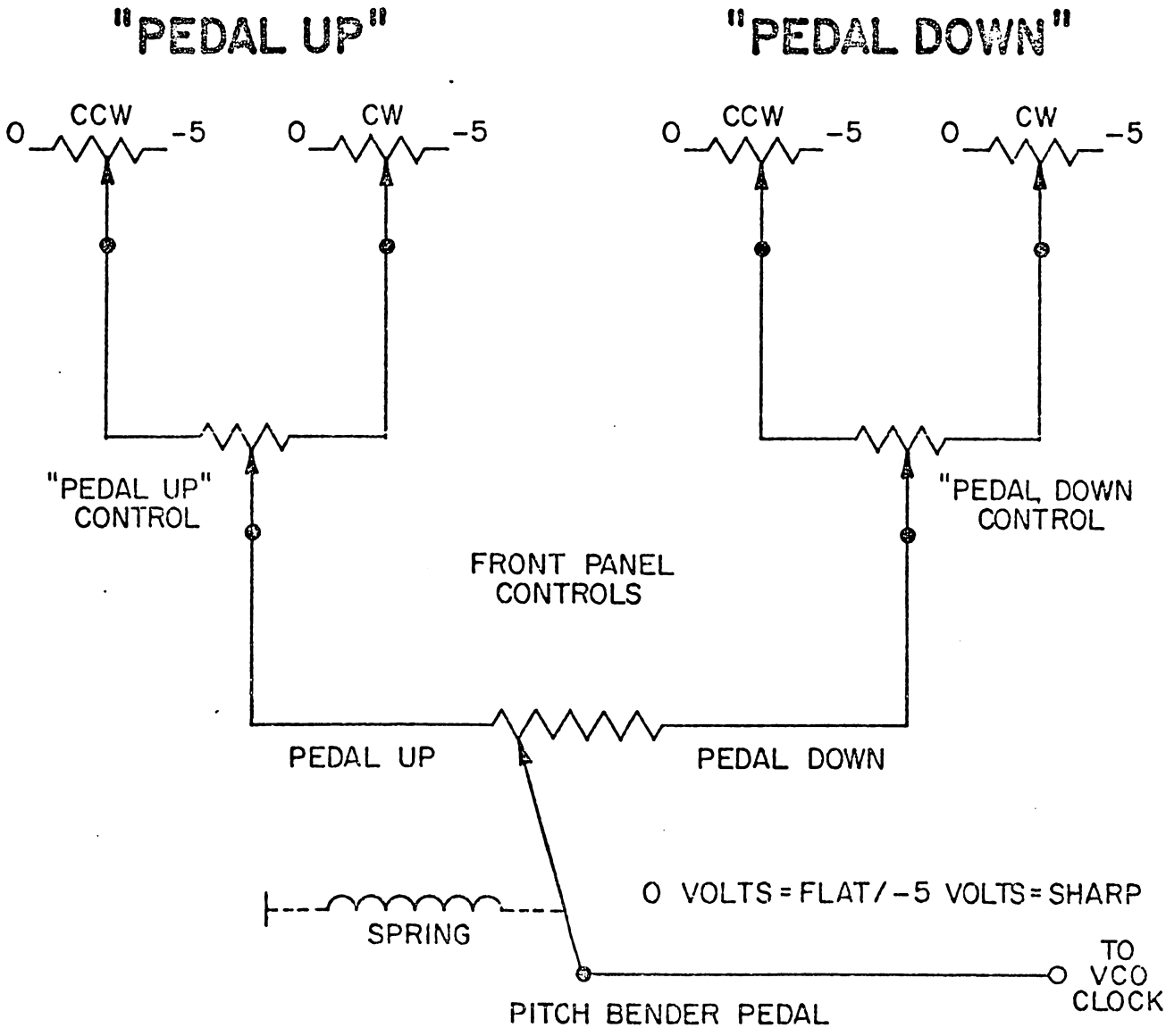
Aside from the Pedal Steel technique is the Rock Guitar technique. The guitar player sets his fingers to form the chord, placing them on the neck several steps below the desired chord. The other hand strikes the strings, immediately after which the fingers slide up to the proper chord. The critical thing to keep in mind here is the transposition that occurs. You hit the keys of a "C" chord then push the pedal all the way to the floor to slide up a fourth - now, you are in "F". It may be several measures before you desire to slide back, so during that time you must think in the transposed key while playing in another. There is, of course, another option: slide up a fourth to the desired chord, then between that chord and the next, return the pedal to the "up" position and simultaneously transpose the chord up a fourth by hand. ~~(The effect will be the same.)~~ ~~You will be amazed at some of the effects you can.~~ The pitch will not change, but it will be easier to play. YOU WILL HAVE TO DEVELOP SOME COORDINATION BY PRACTICE. After you get the hang of it, experiment with other techniques. You will probably discover ~~things~~ EFFECTS that never occurred to us.

PITCH BENDER CONTROLS:

Pedal Up Control: When the Pitch Bender Pedal is in its resting ~~position~~ or upper position, the pitch is under the influence of the "Pedal Up" Control. When the Pitch Bender Pedal is fully and firmly depressed to the floor, the keyboard pitch is under the influence of the "Pedal Down" Control. The normal set-up is to have "A" in the third octave on an 8' stop or card tuned to 220 cycles/second when the Pitch Bender Pedal is in the "Up" position. The "Pedal Up" Control has a range of about a semi-tone either side of "A" 220 - just enough to tune it to most other instruments. Depressing the Pitch Bender Pedal fully and holding it firmly to the floor should raise the keyboard pitch exactly the interval of a Perfect Fourth. While holding the pedal DOWN firmly, tune the "Pedal Down" Control to a Perfect Fourth (the "D" above "A" 220). The instrument is designed to operate effectively within the range of a Perfect Fourth - do not attempt other tunings unless you fully understand the Pitch Bender Control schematic, AND EVEN THEN IT IS NOT ADVISABLE. ~~The controls are located on a small board just inside the lid.~~ Intervals less than a Perfect Fourth are safe, however, intervals greater than a fourth may cause the clock speed to run faster than the M.O.S. logic can follow. IN THIS MODE, THE COMPUTER WILL TEMPORARILY CEASE TO PRODUCE MUSICAL RESULTS. ~~causing distortion, dropped notes, some heavy D.C. pulses, and generally non-musical noise.~~ No harm will come to the computer itself. However, if your amplifier has sufficient power, THE NOISES ~~it~~ may cause damage to your speakers. The range achieveable by the M.O.S. board (the largest board) will vary somewhat from unit to unit. All units are tested to achieve an Augmented Fourth (Diminished Fifth) SHARP, which allows a half-step safety margin above the Perfect Fourth. If you are in doubt as how to check the limitations of your unit, set up the combination for "Pedal Steel" as shown in the Owner's Manual, open Channel 1 & 2 Pedals, and play four-part harmony near the top end of the keyboard with the Pitch Bender Pedal fully depressed + HEAVY VIBRATO ADDED. Under this condition all twelve processors will be working simultaneously, causing all sections of the computer to operate at full capacity. Any errors in operation will show up in the audio as distortion or "break-up". The highest tuning should be one half-step below the "break-up" point to allow a safety margin.

K.C. PITCHBENDER CONTROLS

INTERNAL TRIM CONTROLS



This schematic applies only to models having a dual-concentric vibrato speed and intensity control on the front panel. The internal trim controls set the counter-clockwise and clockwise (CCW & CW) pitch limitations of the front panel "Pedal Up" and "Pedal Down" controls.

~~Let's take a look at the Front Panel:~~

TRANSPOSER: On the far left, there is a rotary switch labelled "Transposer". The "normal" position for this switch is fully clockwise, pointing to the number "7". Advancing the switch counter-clockwise raises the pitch in precise half-steps. All positions above the "N" position will cause the notes at the top of the keyboard to "double back" or repeat their pitches from the octave below. The keyboard may be transposed up one full octave by turning the switch fully counter-clockwise to the number "5" position, however, remember that the top five notes will "double back". Special effects can be created by placing the Transposer switch carefully between any two positions. It is best to use the "staccato" mode (red button with dot) to minimize spurious keying of unwanted notes. The effect achieved is that the lowest key held will instantly transpose all other keys. Holding a chord in the fourth octave and playing a sequence of notes in the first octave will cause the chord to be rapidly transposed. You will note that there is an inverse relation between the key causing the transposition and the notes being transposed. By playing rapid "runs" with your left hand you can create the effect of right-hand chord changes that would ordinarily be humanly impossible. To pull the effect off successfully takes some coordination and practice, so spend some time with it - explore. You will certainly make some bad sounds in the process, so to minimize the bass you sock to your amp, use a card with little fundamental such as the 1/16th Pulse Width. Don't forget to return the Transposer to the number "7" position when you are done.

PITCHES:

Across the top row of the front panel are a series of red, yellow, and white buttons with numbers engraved in them. These numbers represent the pitches of the Fixed Voices. Those who are familiar with the pitch footage numbers used on organs already understand this concept.

Assuming that the Pitch Bender Controls and the Transposer Switch are set in their normal positions (see sections referring to each), the pitch of the entire keyboard will be in the 16' range, or one octave lower than the pitch indicated on the buttons. This concept must be kept in mind at all times.

The numbering system has been ~~handed down by~~ tradition ~~through the history~~ of pipe organ building. The concepts have served organists and musicians effectively over the years and has been carried over to electronic organs and even some synthesizers. Harpsichords even borrowed the concept to denote relative pitch of string "registers". Pipe organs, in actuality, are nothing more than a sophisticated collection of whistles whose lengths are of assorted amounts. The longer the whistle, the lower the pitch. According to the laws of physics, when the length of a pipe is cut in half, its frequency doubles, jumping an octave higher. At standard or unison pitch (that of a piano) middle "A" in the third octave of a five octave keyboard will sound at 440 cycles per second. The termination used by pipe organs for this pitch range is 8', because the lowest pipe ("C" at the bottom of the keyboard) would be eight feet long if it were an open pipe. Moving the keyboard range down an octave would require a set of pipes whose length started at 16' - twice as long. Moving the range up an octave from the 8' would be starting at a 4' length. The same concept continues upward: 4', 2', 1', ½'. A pitch range starting at a half-foot at the bottom would easily run beyond audibility before it reached the top note. Carrying the concept in the opposite direction, the pitch would soon become a series of pulses to the listener, no longer appearing as a tuned pitch (the actual point at which this phenomenon occurs is a matter of opinion). The musical usefulness of these lower sounds is more that of providing an emotional sensation by physically shaking the body of the listener. Examples: 16', 32', 64'. All 16' voices in the Keyboard Computer are actually 32' sounding, because the

PITCHES

keyboard is already transposed or tuned down one octave (see the sections on the Transposer Switch and the Pitch Bender Controls). If the performer is to make effective use of these lower pitches, the Keyboard Computer must be played through an audio system that has high-powered amplifiers driving large speakers in proper enclosures (see the section on Audio).

K.C. ON LIMITING NUMBER of STOPS USED

REGISTRATION CONCEPTS

When approaching "registration" on the RMI Keyboard Computer, some of the following guidelines should be kept in mind if you wish to gain the best results from the instrument.

The data-handling circuitry of the RMI Keyboard Computer is identical to the Allen organ, however, the organ uses the circuitry for a different result - organ sound. Of course, organ sound can be produced by the Keyboard Computer, but by different means. A single "stop" is used to produce "full organ" sound on the RMI instrument, whereas in the Allen organ, or other organs, many stops would be registered to gain the same effect. The reason for this is simple: individual voices, such as the Violins, French Horn, Jazz Flute, and Alto Recorder, are designed to fill the room with sound on an individual basis - one at a time. Since the playing techniques, attacks, decays, and special effects of each of the above instruments is unique and different, they could not be played at the same time from the same keyboard. And since the volume of each is intended to fill the room, then the volume of two stops at the same time would more-than-likely be too much, causing distortion. Your thinking when you approach the task of registration should go something like "Which sound would I like to hear?". Then select the proper voice, and the proper attack and decay modes, and add any percussive effects that may be required. Then you are ready to play. Do not start adding other voices to the ensemble in order to change the tone color or you will destroy the individuality of the sound. If you prefer a different tone color, change to a different voice or use the card reader instead of the fixed voice.

~~Do not add voices - the volume will become excessive.~~

RMS VALUES IN CARDS - BUILD-UP

BASS DIVISION:

FIXED VOICES:

With the exception of the "CF" and "LA", all yellow, white,and red buttons in the top row are fixed voices. These voices are the same as used in the Allen Theatre Organ (also a digital computer). The intended use is mainly popular organ as found in home entertainment. All of the voices are contained on two LSI MOS devices which plug into the main MOS board computer. Because of this feature, future changes in the instrument cannot cause tonal obsolescence - the owner merely plugs in a new Voice Memory. Of course, the RMI and Allen Organ card libraries are constantly in a state of being up-dated, providing a constant source of new sounds.

With the exception of the "CF", "LA", and "B", all white buttons in the top row are flute voices - specifically, organ flutes. These flutes are of the "Tibia" family - a characteristic theatre organ voice with a prominent twelfth harmonic and a heavy fundamental. The card reader should be used to obtain orchestral or solo flute sounds (examples: Jazz Flute 4' or the Alto Recorder).

All yellow buttons in the top row are voices in the string family. Once again, these strings are organ strings and should not be confused with the strings heard in an orchestra. Organ strings, as used in the old theatre organs of silent film days were very thin in fundamental and contained a sizeable portion of twelfth harmonic. To create the sound of violins or strings as heard in an orchestra, the Sawtooth cards should be used. The alphabetical series "A" through "I" are largely experimental, however, you will find that the Sawtooth "A" creates a very pleasant mellow string. The most-used string sound (our preference) is the Linear Sawtooth. Either the Geometric version or the Harmonic is effective.

All red buttons in the top row are reed voices (this includes woodwinds). The reeds in the "Bass Division" are pedal reeds as found in organs. The reed in the "Ensemble Division" is a Clarinet (wooden type). "Solo Division" reeds are organ chorus reeds, with the exception of the two 8's starting at the left which are "Vox Humana" (traditional theatre organ "human voice") and "Oboe"., respectively.

VOICE PROCESSORS:

~~UNDERSTANDING THE~~ RMI KEYBOARD COMPUTER ~~FUNCTIONS~~ CONCEPT:

One concept must always be remembered by the performer - this instrument is not an organ or a piano, although it can be programmed to sound like either. Thinking of the Computer as an organ or piano will cause the performer to play it as one or the other, missing most of the potential available ~~and incurring unnecessary frustrations~~. The performer is best prepared by approaching the Keyboard Computer as a digital polyphonic synthesizer.

The Computer consists of twelve processors that can function simultaneously in real time. Each processor can be assigned an independent frequency, waveform, and envelope (attack and decay characteristics). A processor would be analogous to a "voice" in an analog-type synthesizer; ~~the frequency being determined by a voltage-controlled oscillator, the waveform by a voltage-controlled filter, and the envelope by an envelope generator.~~ However, the Computer contains no audio oscillators or filters. It employs a more precise and controllable method - digital logic.

Because fixed-waveform oscillators have been eliminated, there is no "characteristic" sound to the Keyboard Computer. Each waveform, whether simple or complex, is plotted on a graph and assigned digital numbers. When a key is held, the numbers are "read out" at the appropriate frequency causing a tone whose color exhibits the characteristics of the waveform. There are two sources of these waveforms - the fixed memory and the card reader.

Unlike the piano or organ where there is some sort of tone-producing mechanism for each key, the Computer provides twelve tone-producing mechanisms of a much higher order of complexity to be shared by all 61 keys on a "first-come, first-served" basis. With most people having only ten fingers, it would be assumed that the twelve processors ~~would be~~ ARE more than enough to cover all possibilities, giving the"sensation"of a separate tone-producing me chanism for each of the 61 keys. In fact, the Allen Organ operates in that manner. ~~However, the RMI Keyboard Computer allows further flexibility.~~ In the design of the RMI instrument, we assumed that most performers would not be attempting to play ten and twelve-note chords, but instead would average out somewhere in the area of four to six notes in a chord. If this were the case, then much

FIXED VOICE

In the Ensemble Division is a white button labeled "B" which is not a flute. The "B" means "Bell". This particular bell is typical of that used in the percussion division of a theatre organ - the Chrysoglott. The "B" button contains only the proper waveshape or harmonic content of the bell - not the envelope information, which should be percussion "P" and sustain "S".

Buttons labeled "H" (yellow) refer to "Highs". They add brilliance or upper work to the sound. In actuality, these voices are organ "mixtures". Mixtures are used to bring out the top melodic line in organ registration. The voice consists of three or four individual voices (pipes) tuned to different pitches to reinforce the harmonic structure of those sounds below. The pitches are usually thirds, fourths, fifths or octaves. In an attempt to maintain high pitches over the range of the entire keyboard, mixtures, as they chromatically descend the keyboard, jump back up in pitch at various points. These jumps are called "breaks". If you play only the mixture or "H" button on the Keyboard Computer, you will notice "breaks" between the first and second octaves, and second and third octaves. This is a "three rank" mixture (three pitches). The "H" in the Ensemble Division is a four rank mixture, having an additional "break" between the third and fourth octaves. The only time these "H" voices should be used is when you are trying to create the effect of a pipe organ, however, you may find an exception to the rule somewhere.

Another general rule that will usually lead to the best sounds on the RMI Keyboard Computer is to limit the use of the Fixed Voices (with the exception of the Bell and Clarinet) to the creation of pipe organ sound. All other sounds are best created by using the Card Reader exclusively.

The numbers engraved on the buttons refer to "pitch footages" which is explained in the section titled "Pitches".

of the processing ability of the Computer would be wasted. To allow the most use from the available processors at one time, we provided for assigning more than one processor to the same key. Assigning an additional processor to each key played would allow the performer to play more than one "instrument" or effect simultaneously. Finally, a third processor may be assigned to each key, allowing even further development of complex sounds in real time. The obvious conclusions may be drawn: when two processors are assigned to each key, playing six keys will activate all twelve processors, and when three processors are assigned to each key, playing four keys will activate all twelve processors. Any additional keys pressed will not play until other keys held are released - earliest keys played have priority.

The above-mentioned "rules" to the game must be kept in mind at all times by the player. By now, it must be evident that merely applying piano or organ technique to the Computer will not be sufficient. A new technique must be developed - Keyboard Computer technique. It requires a little more thought as to how many "keys" you are playing. If you think about chord structure used in piano and organ, you will realize that notes are often added in the right hand to create "richness" of sound, and frequently bass lines in the left hand are doubled in octaves. Let's analyze that. The basic sound of a piano never varies, so to gain added richness, you add more notes. Once the dynamic limitations of a single bass note on the piano have been reached, the only way to add more power is to play in octaves. These techniques have become second-nature to musicians. Now that the Keyboard Computer is available, you have complete control of richness and bass content through harmonics. One can, of course, still play the Computer in the "one-processor-to-a-key" mode, using as many keys as he can reach. However, the more exciting and unique sounds come from using more than one processor per key. Four or six-part harmony can take on new excitement when there is more that one voice per key. If you have background in piano or organ, use it to your advantage, but do not let it hinder your approach to a new technique.

INSTRUMENTAL REALISM STYLES:

Once the proper controls have been set-up on the Computer for creating a given sound, particularly a familiar instrument, the playing style should be plausible if the illusion of the instrument being created is to be put forth. As an example, if you were to set-up the sound of an Alto Recorder and then play ~~the keys as if it were an organ~~ IN A "CHORD BASS" ORGAN STYLE, the results would not at all be convincing.

There is a problem here. Most people who purchase a Keyboard Computer are keyboard players having familiarity with organ and piano. We might assume that,on the average, such performers ~~would~~ have spent most of their musical time on the keyboard with little, if no, experience on other instruments. Now, however, appears the RMI Keyboard Computer with its ability to sound very convincingly like other instruments. The hitch is that it is hooked to a standard keyboard. When keyboard players see a standard keyboard, there is a great temptation to play in standard styles. This would be O.K. if the Computer were set-up at the moment for piano, organ, Clavinet, or harpsichord, but suppose it were set-up for Jazz Flute. What then? Step one is to study the characteristics of the Jazz Flute or whatever instrument you are trying to create.

YOU ARE TRYING TO CREATE.

The first thing to do is listen to some recordings of the instrument. Some things to note are: 1.Is it Solo or Polyphonic? 2. If polyphonic, how many voices can play at once? 3. What pitch range do they cover? 4. Are there certain types of harmony that are typical to arranging for the instrument - open, close, etc? 5. Are there any unusual characteristic traits of the instrument such as bending notes, strumming, or sliding? 6. If a solo instrument is being created, how many"players" are there going to be? Example: If there were two flute players performing on stage , they could only produce two-part harmony. If you, as a keyboard player, are trying to create the same illusion, you will have to contain yourself to a predetermined number of voices. The fewer the parts, the better chance the listener has of hearing musical interplay between the parts. One good study source is the new RMI demo record - ask your dealer.

RMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: _____

_____

_____

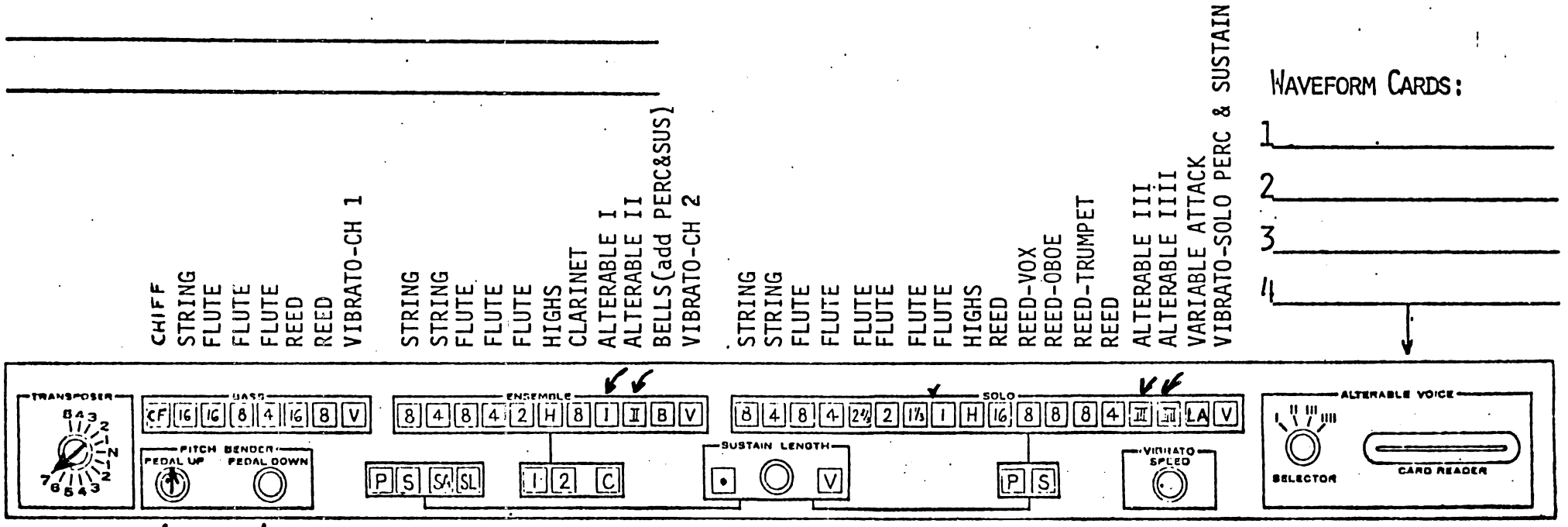
WAVEFORM CARDS:

1 _____

2 _____

3 _____

4 _____



PEDALS:

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
All Bass Voices Ch 1 Ensemble Voices Ch 2 Ensemble Flutes All Flute Voices 16' REED - Solo Div. Solo Voices without perc or sustain	Ch 2 Ensemble Non-Flute Ensemble & Solo Highs Solo Perc.& Sustain	Digital Waveforms: Fuzz-Brass Accents (spring return)	Tune "Pedal Up" to A440 Tune "Pedal Down" to to desired slide pitch. (spring return)

PROGRAMMING SHEET # _____

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801

CONTROL FUNCTIONS

IRMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: USE CH. 1 AND CH. 2 SEPARATELY, MAKING CLEAN, RAPID CHANGES. JAZZ FLUTE: USE 2, 3, OR 4 VOICES AT MOST. START W. 1, THEN ADD. PITCH BEND ON SINGLE VOICE ONLY. CONTRAST RHYTHM BETWEEN VOICES. CLAVINET: STACATTO CHORDS - FUNK IDEOM.

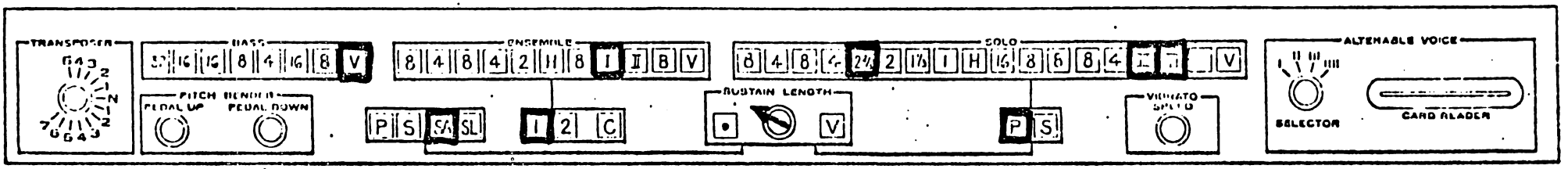
WAVEFORM CARDS:

1 JAZZ FLUTE

2 _____

3 PULSE WIDTH 1/8

4 PULSE WIDTH 1/8



TUNE A 440

TUNE: _____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
JAZZ FLUTE	CLAVINET		

PROGRAMMING SHEET # _____

TITLE: JAZZ FLUTE AND CLAVINET

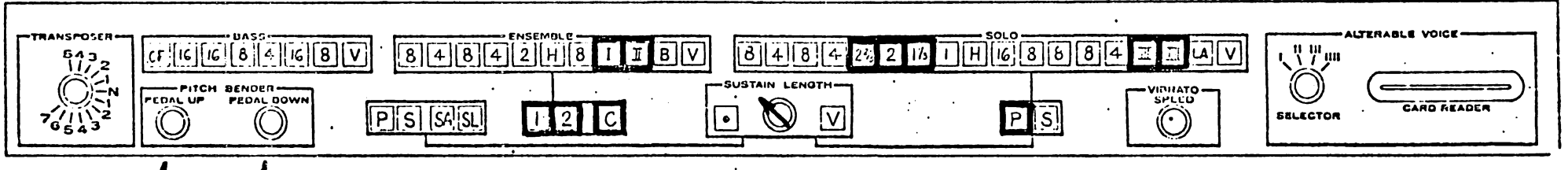
ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

IRMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: RIGHT HAND IN THIRD OR FOURTH OCTAVE - 3 NOTE CHORDS.
SINGLE-NOTE BASS LINE.

WAVEFORM CARDS:
1 FRENCH HORN
2 CORNOPEAN
3 SPANISH TRUMPET
4 BARPFEIFE

ALTERNATE OR COMBINE



TUNE A 440

TUNE: _____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
ORGAN W. PERC.	STEEL GUITAR OR CLAVINET. "CHORALE" EFFECT	FUZZ SOUND	SLIDE FOURTH

PROGRAMMING SHEET # _____

TITLE: STEEL GUITAR + ORGAN

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

RMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: 4-PART HARMONY

WAVEFORM CARDS:

1 FRENCH HORN "B"

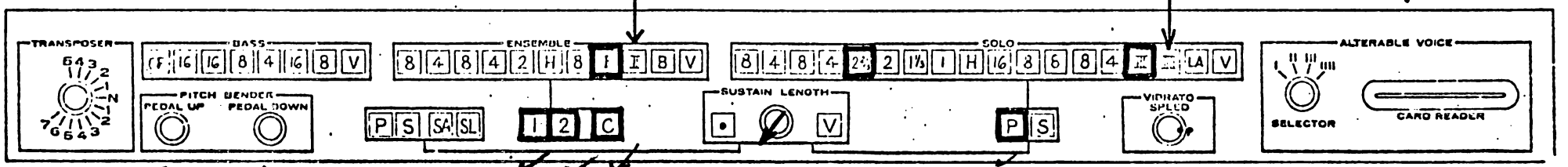
2 _____

3 FLUTE 2⅔ B

4 _____

DOUBLE FRENCH HORN IF MORE "BODY" IS DESIRED →

DOUBLE 2⅔ IF MORE PERCUSSION IS DESIRED →



TUNE A 440

TUNE: _____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
MAINTAIN EQUAL VOLUME IN BOTH PEDALS		DOES NOT APPLY TO HAMMOND SOUND	

PROGRAMMING SHEET # _____

TITLE: HAMMOND "B-3" SOUND

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

IRMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: 4-PART HARMONY

WAVEFORM CARDS:

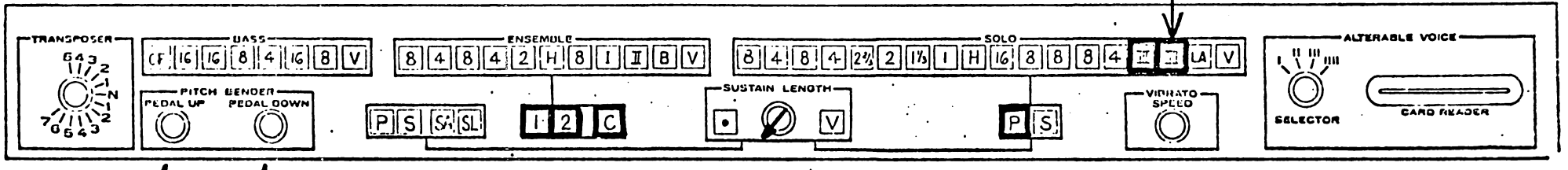
1 FRENCH HORN "B"

2

3 SINE 1'

4 SINE 1'

OPTIONAL →



TUNE A 440

TUNE: _____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
EQUAL			

PROGRAMMING SHEET # _____

TITLE: "B-3" PERC. VARIATION

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 · 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

RMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: 6-PART HARMONY

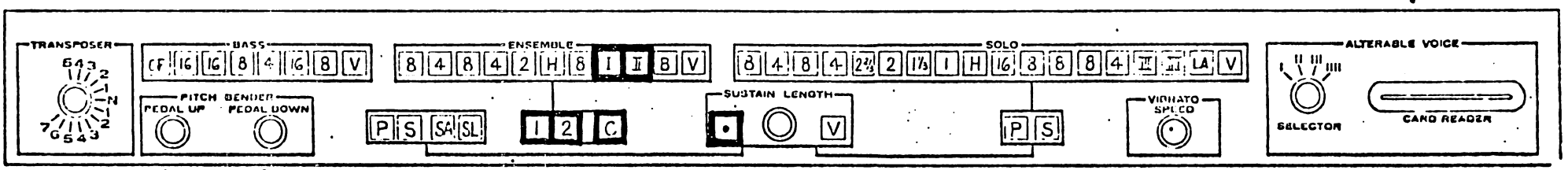
WAVEFORM CARDS:

1 SINE CHORUS

2 SINE 1'

3 _____

4 _____



TUNE A 440

TUNE: _____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER

PROGRAMMING SHEET # _____

TITLE: ELECTRIC ORGAN

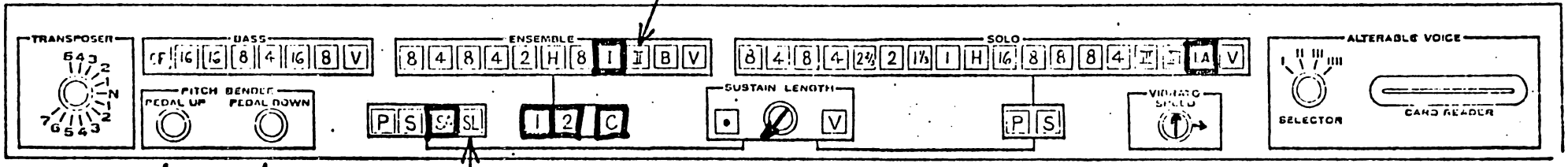
ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

IRMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: 6-PART HARMONY.
BEST EFFECTS W. 3 OR 4 VOICES.
OPEN VOICING. USE UPPER OCTAVES.
ADD TOUCH-BAR VIBRATO AS EACH
MUSICAL PHRASE BUILDS. INCREASE
VOLUME PEDALS AS PHRASE BUILDS.

WAVEFORM CARDS:
1 LINEAR SAWTOOTH
2 SAWTOOTH 4'
3 _____
4 _____

ALTERNATE for HIGHER PITCH → 2
(DO NOT USE WITH LINEAR SAWTOOTH)



TUNE A 440
TUNE: _____

TOUCH BAR INTENSITY ABOUT 12 O'CLOCK
VIBRATO SPEED ABOUT 3 O'CLOCK

SUSTAIN LATCH WILL HOLD A CHORD INDEFINITELY WHILE YOU MAKE CHANGES ON ANOTHER INSTRUMENT OR USE AS A BACKGROUND.

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
EQUAL VOLUME			

PROGRAMMING SHEET # _____

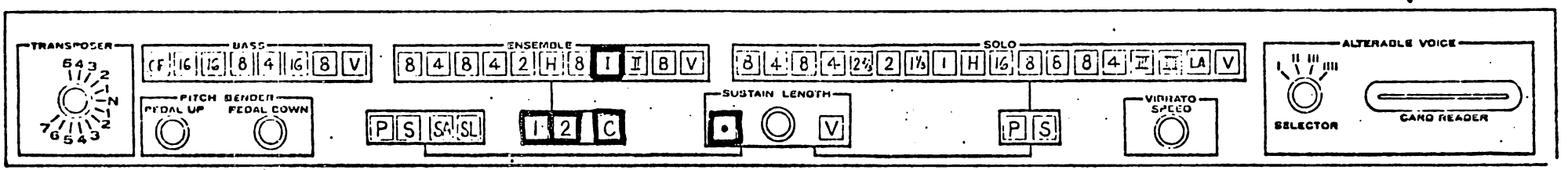
TITLE: STRINGS

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

IRMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: 6-PART HARMONY
RAPID STACATTO ACTION.
CLAVINET-LIKE.

WAVEFORM CARDS:
1 PULSE WIDTH 1/8
2 _____
3 _____
4 _____



TUNE A 440
TUNE: _____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
← EQUAL VOLUME →		PASS THRU FILTER IN SYNTHESIZER -OR- USE A "WAH" PEDAL	

PROGRAMMING SHEET # _____

TITLE: FUNKY PULSE-FATTER

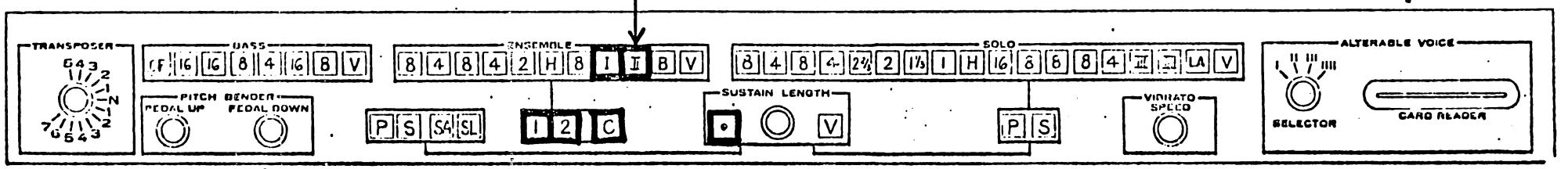
ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 · 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

RMII KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: 6-PART HARMONY.
RAPID STACATTO ACTION.
CLAVINET-LIKE.

WAVEFORM CARDS:
1 PULSE WIDTH 1/16
2 PULSE WIDTH 1/12
3 _____
4 _____

OPTIONAL TO OBTAIN VOLUME



TUNE A 440
TUNE: _____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
EQUAL VOLUME		PASS THRU FILTER IN SYNTHESIZER -OR- USE A "WAH" PEDAL	

PROGRAMMING SHEET # _____

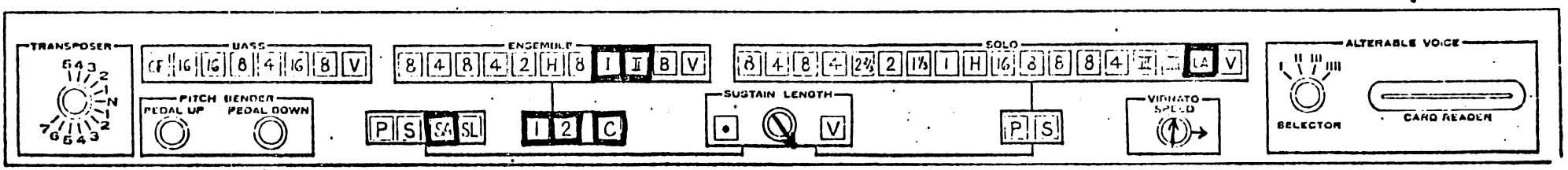
TITLE: FUNKY PULSE

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

IRMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: 6-PART HARMONY.
LIMIT HARMONY TO 2 OR 3 VOICES for BEST EFFECT. PLAY SLOWLY. CENTER HARMONY AROUND MIDDLE of FOURTH OCTAVE. ADD VIBRATO AND VOLUME AS PHRASE BUILDS.

WAVEFORM CARDS:
✓ 1 VOWEL FEMALE "AH"
2 VOWEL "OO"
3 _____
4 _____



TUNE A 440
TUNE: _____

TOUCH BAR INTENSITY ABOUT 12 O'CLOCK
VIBRATO SPEED ABOUT 3 O'CLOCK OR SLOWER

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
START CLOSED. OPEN AS PHRASE BUILDS.	ADD CHANNEL TWO ON SECOND PHRASE.		
← THEN, KEEP EQUAL VOLUME →			

PROGRAMMING SHEET # _____

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

TITLE: "VOICES" CATHEDRAL CHOIR

RMI KEYBOARD COMPUTER

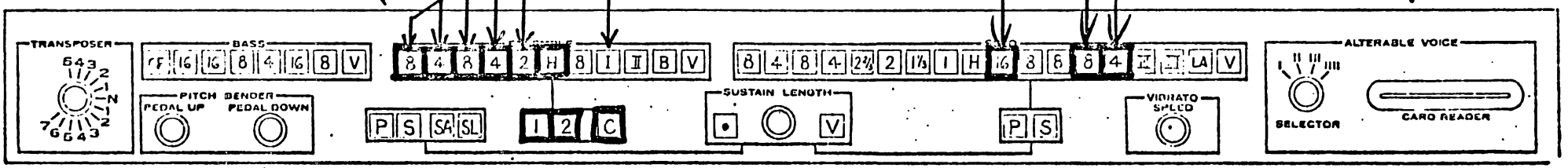
KEYBOARD TECHNIQUE: 6-NOTE HARMONY. LEGATO ORGAN STYLE. 3 VOICES OR 4 IN RIGHT HAND (3RD or 4TH OCTAVE). BASS LINE IN LEFT HAND (1ST or 2ND OCTAVE).

OPTIONAL DIAPASON CHORUS

FLUTE-STRING CHORUS OR

REED CHORUS OPTIONAL

WAVEFORM CARDS:
1 PIPE ORGAN ENSEMBLE
2 _____
3 _____
4 _____



TUNE A 440

TUNE: _____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
← EQUAL VOLUME →		MAY BE BROUGHT IN AS CRASHING BRASS CRESENDO ON FINAL CHORD.	

PROGRAMMING SHEET # _____

TITLE: PIPE ORGAN

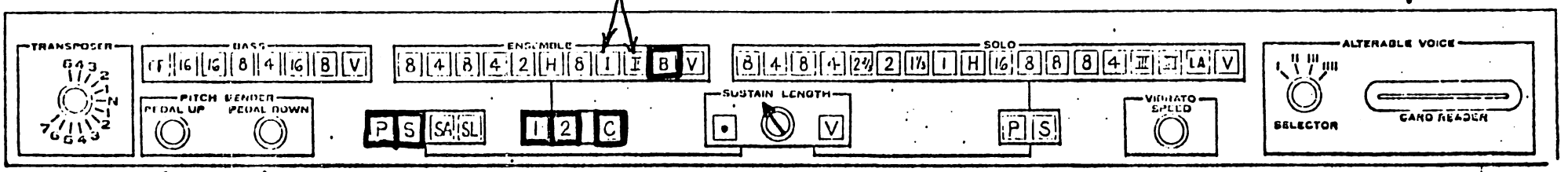
ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/966-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

IRMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: 6-PART HARMONY. PLAY UPPER OCTAVES. USE PIANO STYLE W. ARPEGGIOS AND STACATTO FINGERING. DO NOT HOLD KEYS. OPEN HARMONY IS EFFECTIVE. BEST EFFECT ACHIEVED WITH 3 OR 4 VOICE HARMONY.

WAVEFORM CARDS:
1 FLUTE 24TH 4'/5
2 SEPTIEME 1 1/7 B
3 _____
4 _____

OPTIONAL for BRILLIANCE
(USE ALTERNATELY OR TOGETHER)



TUNE A 440
TUNE: _____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
EQUAL VOLUME			

PROGRAMMING SHEET # _____

TITLE: BELL CHORUS

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 · 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

IRMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: 4-PART HARMONY.

ORGAN STYLE.

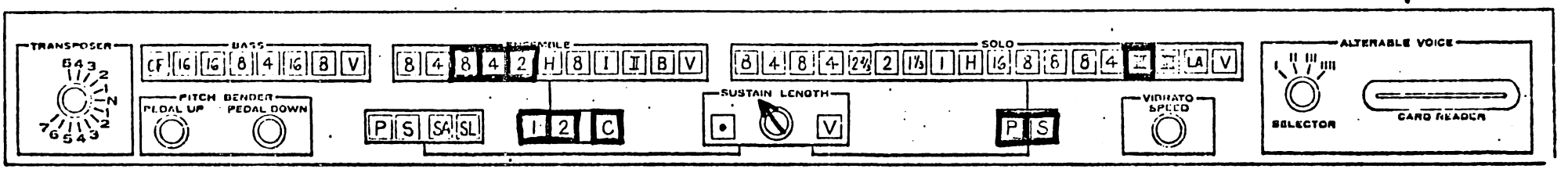
WAVEFORM CARDS:

1 _____

2 _____

OR ANY BELL CARD WITH HIGH PARTIALS → 3 CHRYSOGLOTT

4 _____



TUNE A 440

TUNE: _____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
ORGAN	BELLS		

PROGRAMMING SHEET # _____

TITLE: ORGAN WITH BELLS

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

RMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: _____

_____

_____

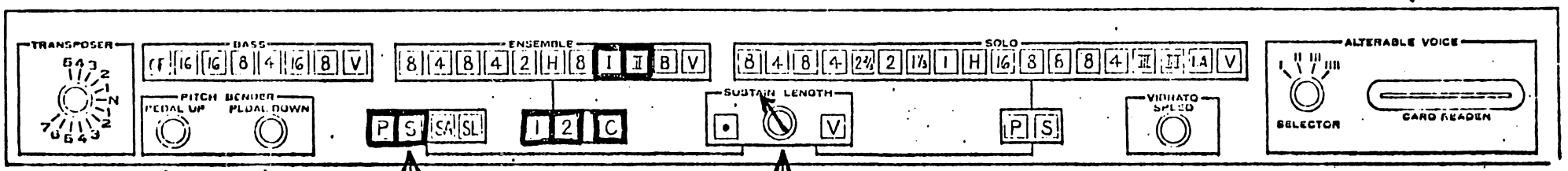
WAVEFORM CARDS:

1 RING MODULATOR

2 RING MODULATOR

3 _____

4 _____



TUNE A 440

TUNE: _____

FOR VARIATIONS REMOVE SUSTAIN AND/OR VARY SUSTAIN LENGTH

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
EQUAL VOLUME OR for VARIATION "PUMP" PEDALS IN A "PING-PONG" STEREO EFFECT.			

PROGRAMMING SHEET # _____

TITLE: RING MODULATOR ENSEMBLE

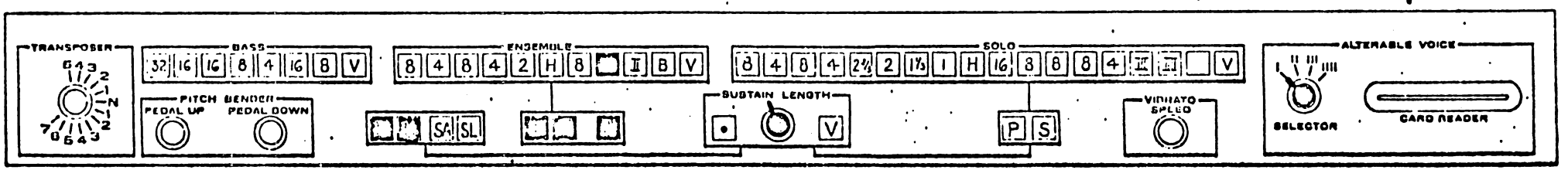
ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 · 215/966-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

RMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: STACCATO

TRY EVERY CARD YOU HAVE IN ALTERABLE I WHILE SET-UP for PERCUSSION.
TRY CARDS THAT YOU WOULD NOT THINK of AS BEING PERCUSSION.
EXAMPLE: FRENCH HORN
VIOLIN
ETC.

WAVEFORM CARDS:
1 ALL CARDS
2
3
4



TUNE A 440

TUNE: _____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
ONE FOOT			

PROGRAMMING SHEET # P1

TITLE: PERCUSSION EXPERIMENT

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/966-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

RMI KEYBOARD COMPUTER

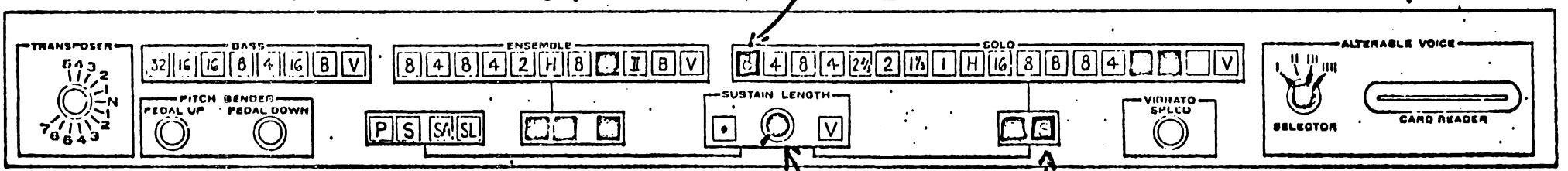
KEYBOARD TECHNIQUE: STACCATO

TRY THE SERIES of HARMONICS CARDS PERCUSSED. LOAD EACH ONE INTO [III] AND [IIII] FOR DOUBLE STRENGTH.

FLUTE $2\frac{2}{3}'$
FLUTE $1\frac{3}{6}'$
SEPTIEME $1\frac{1}{7}'$ A
SEPTIEME $1\frac{1}{7}'$ Bw. DISS.
FLUTE 23RD $8/9'$
FLUTE 24TH $4/5'$
FLUTE 25TH $8/11'$
FLUTE 29TH $1/2'$

WAVEFORM CARDS:
1 FRENCH HORN
2
3 SAME
4 SAME

ADD A PERCUSSED FUNDAMENTAL



TUNE A 440

TUNE: _____

VARY SUSTAIN LENGTH

ADD SUSTAIN

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER
ONE FOOT			

PROGRAMMING SHEET # P2

TITLE: PERCUSSION EXPERIMENT

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 · 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

RMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE: _____

_____

_____

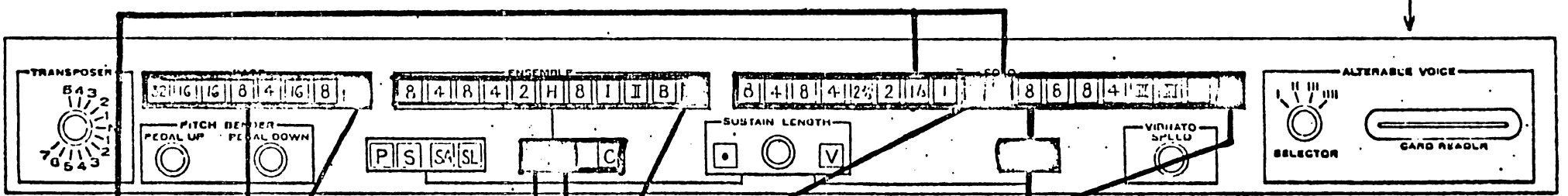
WAVEFORM CARDS:

1 _____

2 _____

3 _____

4 _____



TUNE A 440

TUNE: _____

FLUTES

HI

CHANNEL ONE

CHANNEL TWO

CHANNEL THREE

PITCH BENDER

PROGRAMMING SHEET # _____

TITLE: CHANNEL ASSIGNMENT

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 · 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT ROCKY MOUNT N.C. 27801

RMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE:_____

_____

_____

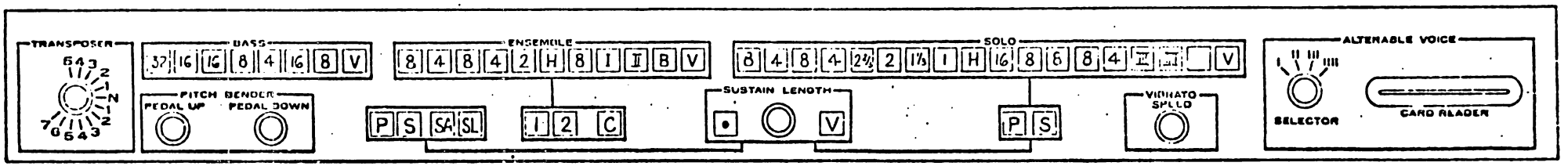
WAVEFORM CARDS:

1_____

2_____

3_____

4_____



TUNE A 440

TUNE:_____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER

PROGRAMMING SHEET #_____

TITLE:_____

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

RMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE:_____

_____

_____

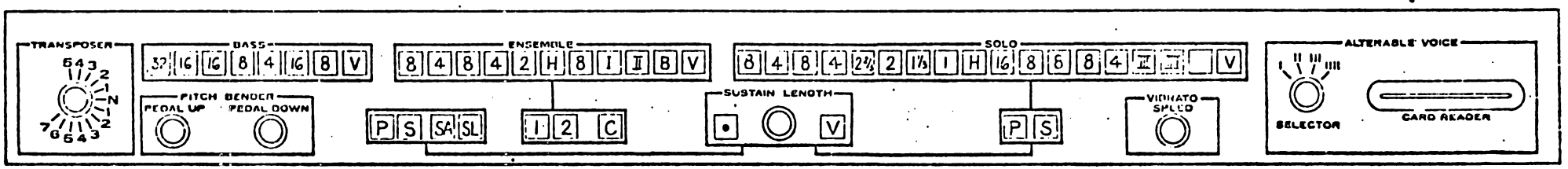
WAVEFORM CARDS:

1_____

2_____

3_____

4_____



TUNE A 440

TUNE:_____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER

PROGRAMMING SHEET #_____

TITLE:_____

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801

RMI KEYBOARD COMPUTER

KEYBOARD TECHNIQUE:_____

_____

_____

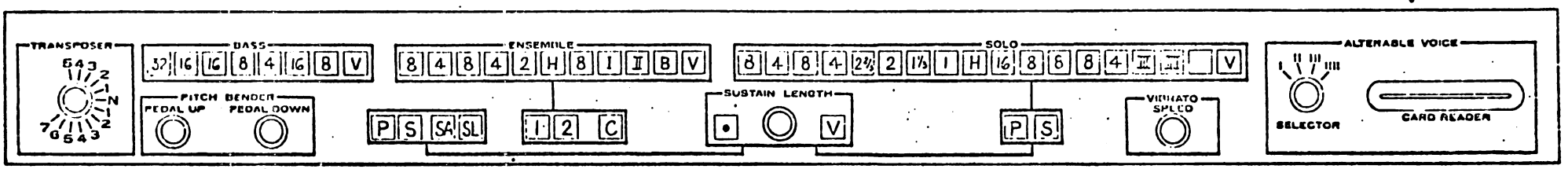
WAVEFORM CARDS:

1_____

2_____

3_____

4_____



TUNE A 440

TUNE:_____

CHANNEL ONE	CHANNEL TWO	CHANNEL THREE	PITCH BENDER

PROGRAMMING SHEET #_____

TITLE:_____

ROCKY MOUNT INSTRUMENTS, INC. MACUNGIE, PENNSYLVANIA 18062 215/965-9801
A SUBSIDIARY OF ALLEN ORGAN COMPANY PLANT: ROCKY MOUNT, N.C. 27801