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ELECTRONICS-MUSIC-HOME RECORDING September/October 1982

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THE SNARE PLUS PERCUSSIVE VOICE CIRCUIT

8 TRACK REVIEWS

PLUS FOUR SIMPLE GUITAR PROJECTS

THE VOICE 400

The Fastest, Most Versatile and Musical Synthesizer Voice Available

Oscillator A

continuous waveshaping, variable pulse width, modulation by S/H or LFO, lower octave, linear F.M.

Keypad and Bank Switch

Selects one of thirty-two presets.

Operating Mode Switches

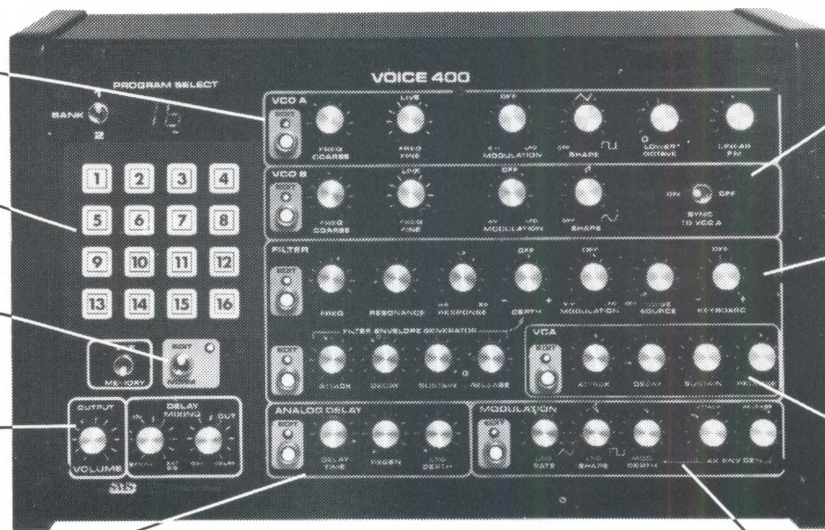
control Live, Memory and Edit functions.

Output Section

mixes your external signal into the delay, mixes Dry/Delay, and output volume control.

Analog Delay

wide range low noise delay line operates from flanging to multiple repeats. Regeneration and LFO depth control will create a wide range of effects.



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- * A voice for a sequencer or computer.
- * A complete synthesizer for wind or string controllers.
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Cover illustration by Vesta Copestakes.

Letters

ADDRESSES?

I am looking for the addresses of the following manufacturers: Buchla, Fairlight, and Rhodes. I can't find the addresses in any of my music journals...not even Rhodes! I would certainly appreciate any help you can give me. Also - how about an article on utilizing external effects (flanging, chorus, echo, etc.).

Eric Sjogren
Piscataway, NJ

Eric - No problem. Here they are: Buchla and Associates, PO Box 5051, Berkeley, CA 94705; Fairlight CMI, 1616 Butler Avenue, W. Los Angeles, CA 90025; Fender-Rogers-Rhodes, 1300 Valencia Dr., Fullerton, CA 92631.

Re the article on utilizing effects, see my piece in the August 1982 issue of Keyboard magazine on using time delay effects with keyboards. That should tell you what you need to know.

HELP!

We are a fairly large keyboard distributor in Australia. We have a Steiner Synthesystem but have neither the owner's manual or service manual. Anything you can do to get us these manuals or copies of the manuals would be greatly appreciated!

Rick Chadwick
Orbital Music Pty. Ltd.
503 Pittwater Road
Brookvale, NSW 2100
Australia

MXR OWNERS TAKE NOTE

I have four of the small MXR metal boxes in my pedalboard, and wanted to tie them together in one package. It's easy: Take the nut off of the output jack of the first box, and remove the input jack from the next box. Butt the two boxes together with the output and input jack holes facing each other; stick the output jack collar through the input jack hole of the second box, and tighten down the nut on the inside of the second box. Of course, this means

that you'll have to hardwire the output to the input, but you can route this wire through the jack. This approach means that you'll end up with a sturdy package that has no patch cords.

Doug Young
Barberton, OH

CONCERT TIP

A lot of groups are using wireless transmitters; so, I smuggled an AM/FM radio into a Styx concert and tuned in between FM stations. This let me pick up the sound off the transmitters, so I was able to hear all of the guitar and bass licks individually, and it was sensational! No kidding - it was really awesome. Check it out.

Bob Bath
San Juan Capistrano, CA

ONE LESS KEYBOARD

I'd like to mention to Pratt-Read keyboard users something that may have escaped their attention: there are two busses on the 37 note AGO keyboard. Most digital applications call for only one - the other "gate" buss is wasted. When I recently added a Proteus to my setup, I realized that I had two digitally-encoded keyboards (one for my 8700 system, and one for the Proteus) where only one was needed. By removing the Proteus key contact circuit board (not as terrible a job as it may appear) and cutting the circuit traces between the key contacts on the "gate" buss, I gained another electrically isolated buss suitable to support an encoder. Now both my encoders are run from the same keyboard. This is perfect for multi-track work, where a second keyboard only takes up space; and I now have a spare full-sized keyboard to interface with my Casio MT-40 to make it a playable instrument.

By the way, I would appreciate hearing from any Polyphony readers who have had any success (or failure) running their Proteus from a computer. Lastly, whatever happened to John Simonton? He

hasn't appeared in Polyphony in quite some time.

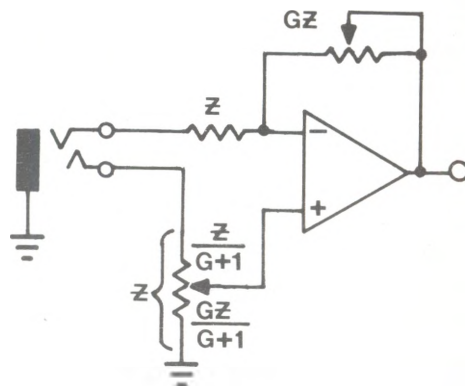
G. M. Montalbano
University of California
2200 University Ave., Rm 681
Berkeley, CA 94720

G. M. - A lot of people have asked when John would be coming back - including me!! He's been real busy with PAIA; however, you'll be glad to hear that he plans to resume Lab Notes on a semi-regular basis starting with the next issue. He sounds like he's got some pretty neat projects planned, too!

GOZINDA REVISITED

"The Story of Gozinda and Gozouta" in the July/August 1981 issue of Polyphony has an erroneous statement in it. The article states that an op amp can be used as a balanced input stage only if operated in a unity gain mode. This is incorrect. The circuit can be operated with any desired gain (G) and input impedance (Z) using the equations shown.

The following is a complete circuit with adjustable gain and input balance:



(Example: G = 3)

R2 = Z = 20k
R1 = GZ = 60k
R4 = Z/(G+1) = 5k
R3 = Z-R4 = 15k

Dennis Bohn replies:

"While George is right that a difference amp can have balanced inputs and gain, the equations he included contained the same mistake I had fallen into regarding the negative input impedance (see Jan/Feb '82). So,

Letters

I have worked out new design equations reprinted below:

$$\begin{aligned}R2 &= Z \left(\frac{1+2G}{1+G} \right) \\R1 &= G R2 \\R4 &= Z/(1+G) \\R3 &= Z-R4\end{aligned}$$

Thanks for the tip, George, and thanks also to John Roberts from Phoenix Systems for writing in on a related 'detail'."

MUSIC MATH FEEDBACK

While I applaud your efforts to present basic circuit design fundamentals for beginners ("Electronic Music Math", March/April 1982 issue), there are two points which require further explanation.

First, the time constant equation given in the article stated the time required for an exponentially decaying voltage to fall to 36.8% of its original value. A more useful formula when designing for attack and decay times is $\text{Time} = 5RC$, since our exponentially decaying voltage will fall to within 1% of its final value after five time constants. Hence, in the hypothetical limiter with 10 uF timing capacitor and 10 ms attack time, R should equal 5T/C, or 5k.

Second, under current drain, $E=IR$ holds true but you forgot to mention the fact that a forward biased LED drops about 1.7V (a standard diode drops about 0.7V). Thus for a 10 mA current, $E = 10 - 1.7 = 8.3$ so $R = E/I = 830$ Ohms. For large supply voltages the difference made by ignoring the voltage drop is minimal, but for smaller voltages it does matter. I hope this helps avert any possible confusion.

James F. McConkey
Mine Hill, NJ

James - Thanks for the additional info. I was aware of the LED voltage drop, but to keep things simple - and since most synthesizers use relatively high supply voltages - I decided not to complicate matters with LED voltage drop information. But, your point is well taken and as Dennis Bohn says, attention to details is important.

Robert Carlberg's

re-view

(As fall approaches, so does the biggest season for music buying. We're running an extra-long review column this month not just to clear out our file of back reviews held back because of previous space limitations, but to function as sort of a "buyer's guide" for those who looking to add some new and interesting music to their collections. -Ed.)

Android Ahead of Your Time/Images (single; AMP 2081). It is widely believed, among the white shoe types who run the record industry, that heavy promotion can make "the next big thing". A.M.P. Records, which stands for Alternative Music Productions, apparently agrees, as they have taken out several large ads in every E. M. periodical. In addition to the record, however, they also advertise bumper stickers, posters, color transfers and thermodynamic discs - an unusual move for an independent.

It wasn't surprising to find their music to be self-penned synthesizer pop tunes on factory-set synthesizer voices. Using a rather elaborate drumbox as a starting point, John Brock (leader) has written, produced, engineered, and published pleasant rock tunes with lyrics like:

Now that you know how it happens/Just as you're making it rhyme/There's no escaping the question/Will you be ahead of your time?

His friends Gary Gotcher and Chris Levy fill in synthesizer parts using Arpish, exaggerated LFO settings that are too common. In short, although these two tunes aren't bad, they don't really qualify as "alternative music" either. AMP's slogan is "Support Better Music", which seems like good advice to me.

Peter Baumann Repeat Repeat (Virgin 2214). I have enthusiastically embraced Peter Baumann's two previous solo albums, as well as crediting him with most of what's good in Tangerine Dream's history. But I confess that this album leaves me wondering how much of his past was calculated and

what was simply accidental.

The problems with this album are several: first, Baumann sings, if you call one-note vocals singing. Second, he has written the lyrics too, if you can call these lyrics:

Tell me, how are you doing?/-
How was the movie?/Did you like the game last night?/I like the small talk/It makes me feel so real.

I don't know if he's putting us on or whether there has been a serious breakdown somewhere, but he plays it absolutely straight-faced. The synthesis on this album isn't even up to his usual standards, with very plain, common voices playing uninspiredly. Backing him are a 4/4 steady-state drumbox, two guitarists, a drummer, a background vocalist, and a second keyboardist. I always thought the problem with Tangerine Dream was that Edgar Froese couldn't decide if he was Ted Nugent or Mister Science. I figured Baumann left the group in 1977 because he knew better - but I guess I was wrong.

Michael Garrison Prisms (Windspell 112881). Like **Android**, **Prisms** is written, produced, performed, recorded, published, and edited by one person, on a private label. Garrison has done his homework, however, both in distribution (it's available in better record stores nationally) and in music - no silly lyrics, cliché synthesizer voices, or tired old formulas.

Garrison's first album, also self-produced and titled **In the Regions of Sun Return**, has sold in excess of 33,000 copies and for good reason. The disc is full of beautiful synthesizer work, and creates a style of composition which is unique. It draws on the sequencer-dominated Berlin school, the phase music of Riley, Glass, and Reich, and the more common (too common!) synthesizer rock school. Yet "drawing on" is a far cry from rote imitation, and **Sun Return** blazes a new path between

Continued on page 6

Next Month:

Who says there are no new effects?

Next month,

Polyphony's issue on synthesizer modules includes a Dynamic Touch Controller for under \$30 and a "Barberpole" control voltage generator plus, there is a report on "New Age" music, info on buss distribution, how to synthesize choirs as well as the usual mix of reviews, information & tips !

All this and more planned for the **NOVEMBER/DECEMBER** issue

in
Polyphony

re-view

Continued from page 5

all of these styles, taking what is good and creating a new genre: memorable tunes, heavily orchestrated with repeated phrases in the background. The album was easily accessible without being syrupy, and due to the frequent key changes and imaginative voicing, could be heard over and over again without ear rot.

Prisms continues in the same Garrison-style with important advances to mark the two year hiatus - it's slightly freer, slightly more complicated, and just a little bit better than **Sun Return**. There are some encouraging places where he doubles the tempo, and some surprising choices in voicing and mixing. In particular, the electronic percussion which accompanies the sequenced bass line deserves praise.

(Michael tells me that **Prisms** was remixed for European release on Ariola, and he liked the European mix so much that the second US pressing will be from the new mix. This attention to detail is typical.)

Peter Davison **Glide** (Avocado 102). Peter Davison is another synthesist whose second private release encourages a fresh look at his first (**Selamat Siang - Music on the Way**, Avocado 101, reviewed May/June 1981). **Glide** elaborates on the "non-drone" sections of **Selamat Siang** in a very positive way. There is still a fair amount of flute soloing over synthesizer, but the Serge seems to have been pushed a little harder this time out, producing some lovely sitar-like accompaniment, some bird-calls, some wind and surf synthesis. The balance is exactly opposite from the first album, with the majority given over to non-drone compositions for flute, harp, piano, marimba, and tape echo which owe equal allegiance to Riley, Glass and Reich's phase music and the French Impressionists Ravel, Debussy, and Faure. One track provides a virtual reading of Faure's Pavane, symbolizing the album as a whole - delicate, respectful of the past, and very up-to-date. If you can't find his albums locally, Avocado's address is 1924 Euclid, Santa Monica, CA 90404.

Penguin Cafe Orchestra **Penguin Cafe Orchestra** (Editions E.G. 113). Another second record by a contemporary chamber group, this time combining rock sensibilities with traditional instruments like cello, violin, and piano. PCO's first album, **Music from the Penguin Cafe**, was the high point of the Obscure label for its smashing of expectations/barriers/segmentations. This one's just as good and just as revolutionary in a quiet way. Imagine ukelele, rubber bands, and bongos used in foot-tapping 20th century parlor pieces. One number is even based on a telephone's dialing tones. The album isn't particularly electronic, but it says a lot to electronic musicians about keeping your minds, and ears, open.

This Heat **Deceit** (Rough Trade 26). Whereas Penguin Cafe Orchestra is chamber music from a rock point of view, This Heat is rock music from an electronic point of view. Also a second LP, **Deceit** follows the mind-blowing first album **This Heat** (Piano THIS 1) which still leaves me reeling every time I hear it. From such a simple and time-worn line-up as guitar, bass, organ, and drums, **This Heat** creates a seamless, challenging re-examination of the nature of rock and roll. Odd drum rhythms, atonal guitar solos and growling organ fuse into songs, but songs which follow none of the rules. Lots of spooky sounds go on in the background, and each track slowly turns into the next track with no clear dividing line. In all, it's a powerful work quite alone in its universe.

There was a follow-up EP entitled **Health and Efficiency** (Piano THIS 1201) but it is best forgotten - outtakes from the album purposely left out. One side was a repetitious churning rhythm, reminiscent of Tony Conrad's **Outside the Dream Syndicate** (the ultimate boredom), and the other side was simply a tape loop on a variable-speed tape deck.

Deceit, however, is a full-fledged sequel to **This Heat**. Ten new songs, not quite as seamless but equally powerful. Consider these lyrics:

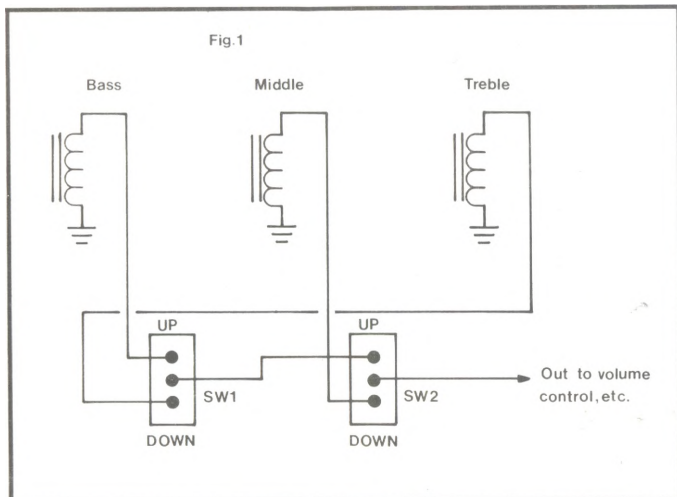
History repeats itself/Rememberance Sunday/A war to end all war/And the war that came after that/To keep freedom's flag flying.

Continued on page 14

Triple Pick-up Switcher

By: David F. Suggs

Here's a simple way to use two switches to get a variety of sounds out of a triple pickup guitar. I used two Gibson toggle switches (as used in standard two pickup Gibson guitars). They're very sturdy and a big target to aim at, especially compared to those mini-toggles.



Referring to figure 1, SW1 works just like a two pickup Les Paul switch, and sends the signal from either or both pickups to SW2. SW2 selects middle pickup only, SW1 signal only, or middle pickup plus whatever SW1 is set for. I think that Gibson players can "relate" to three pickups better with this particular switching scheme. Here's an overview of the switch positions.

SW1	SW2	Pickups on
Down	Down	Treble
Center	Down	Bass and Treble
Up	Down	Bass
Down	Center	Mid and Treble
Center	Center	All three
Up	Center	Mid and Bass
*	Up	Mid

*Any position.

Examples: Slap both switches down for the Treble (lead) pickup, quick and easy! No rotary switches or five position sliders or three mini-toggles.

This worked real good for me, I hope it works real good for you too.

Polyphony

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...for the money Telex outperformed all others we tried...

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*US Patent No. 4293955. Other patents applied for.

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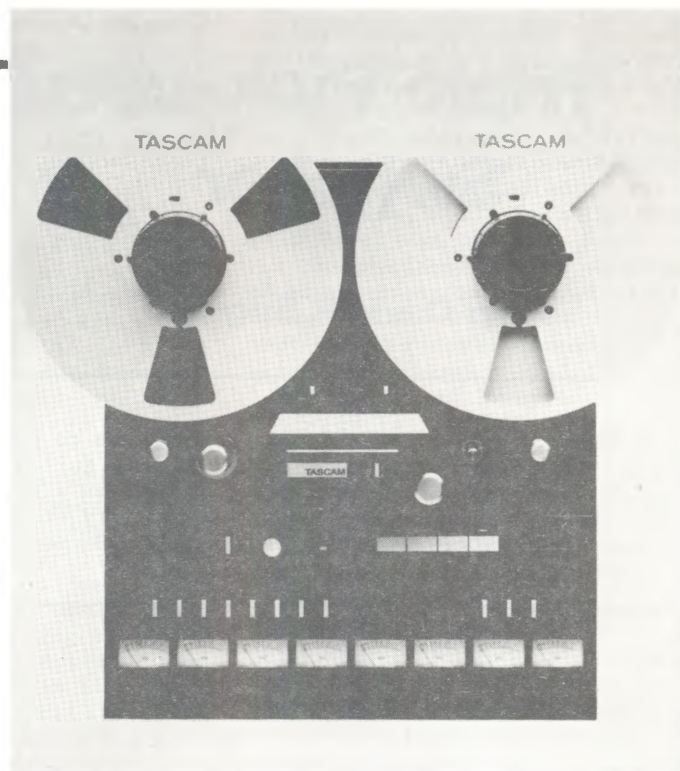


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8 TRACK REVIEWS



Which 8 Track Is For You?



FOSTEX A-8 TEAC MODEL 38

In the beginning, 8 track meant one inch tape and 4 track meant one half inch tape. Then TEAC created a machine which put 4 tracks on 1/4 inch tape, and a little later, their 80-8 put 8 tracks on 1/2 inch tape. But things didn't stop there - next came 4 tracks on 1/8 inch tape with TEAC's Portastudio, and then, Fostex put 8 tracks on 1/4 inch tape for under \$3000. Now, TEAC has countered with the Model 38 eight track which uses the standard 1/2 inch format - but like the Fostex, lists for under \$3000.

Which 8 track is for you? Which approach will give you the best results? For this article, Mark Styles - musician, performer, and an associate of Roger Powell - gives his thoughts on the Fostex A-8 as well as their companion Model 350 Mixer, while Jim Aikin - record reviewer extraordinaire and writer for Keyboard magazine - tells us about the Model 38.

_____ The Editor.

—TEAC MODEL 38—

Fifty years ago, being a serious musician meant practice, practice, and more practice. There wasn't a whole lot to it other than that. To a saxophonist, "equipment" meant his sax, plus maybe a couple of spare reeds and a bow tie for society gigs. Today, alas, things are a lot more complicated. You still have to practice, but you also have to surround yourself with stacks of electronic gadgets. They'll do wonders for your sound, no question about it, but buying them will definitely keep you broke.

The item at the top of the "wish list" for many players is an 8 track tape deck. Given the high cost of studio time and the complexity of the art of recording, learning at home is ultimately the only sensible way to go. And while you can get along for a quite a while with a 4 track, especially if you're in a band and can get four or five parts recorded on two tracks, recording on a 4 track means making compromises. With a 4 track, it's tough to get a convincing stereo image; and if you plan to do much overdubbing, you'll have to make some very touchy decisions about the relative volumes of various instruments in your first submix - well before you

Review By: Mark Styles

have adequate information on what the later tracks are going to sound like.

With an 8 track, both of these problems are much less severe. As it turns out, the complexity of the music you can record on an 8 track - between five and ten separate instruments active at any given time - correlates well with the amount of complexity the human ear can comfortably deal with. When you go 16 track, you're starting to talk about luxury items like stereo imaging and saving multiple solos to pick and choose from. Such things will definitely enhance your sound, but they don't increase the musical complexity appreciably.

For a long time, the uncontested leader in the home 8 track market has been the 80-8. But evidently the people at TEAC figured out that there were a lot of musicians who would like to own an 80-8 but were having trouble scraping together the bucks, because last spring they introduced their new "budget" 8 track, the Model 38. Basically, the 38 is a stripped-down version of the 80-8. A spokesman for TEAC told me that the circuit design of the 80-8 was used as a starting point; he also said that the drive unit had been completely re-designed. The 38 retails for a good deal less - \$2,750 list, as opposed to \$3,990. A store that discounts will probably sell it to you for around \$2,300. The machine doesn't have a lot of frills, but surprisingly, it does have some thoughtful features which many musicians will appreciate.

The most obvious cost-cutting factor is that the input and output level controls have been eliminated. There are eight input and output jacks on

—FOSTEX A-8—

The Fostex 8 track tape deck and mixer represent an innovative approach towards 8 track home recording. Both are small, inexpensive, and highly functional units, manufactured in Japan and distributed from California.

The tape deck weighs in at 29 lbs.; its overall dimensions are 14" X 13.4" X 6.75". The companion Model 350 mixer weighs 18 lbs. and its dimensions are 3.75" X 18.5" X 16". Both the deck and mixer were designed for the serious home recorder or audio-visual production team. You can buy the 8 track (\$2,500 list), mixer and meter bridge (\$1,125 list), and a few other goodies for the same price that you would have expected to pay for an 8 track alone just a year ago. Fostex has made a few well chosen design considerations in order to give you this kind of price/performance ratio.

Construction is basically a front panel which bolts to a one piece plastic shell. The deck runs at 15 IPS only, and will accept only 7" reels. However, using a 1 mil tape like Scotch 227 will give you up to 22 minutes on a reel of tape. I suspect Fostex saved a lot of money by designing for

Review By: Jim Aikin

small reels only; it keeps the deck much smaller and doesn't require large, powerful motors. After a few sessions, I've found that I do not miss the large reels at all since I don't plan on composing one continuous piece longer than 22 minutes.

The A-8 incorporates a new Dolby C noise reduction system which, according to the Dolby brochure packed with the deck, is 10 dB quieter than Dolby B normally used on cassette decks. "Yes, but how quiet is it and how much crosstalk is there?" I can hear you asking (at least that was my first question). It's very quiet, and crosstalk is no problem at all. The Dolby C system is also more amenable to taking a strong signal without "pumping". I've found that by using 1.5 mil mastering tape (Ampex 456, Scotch 250 or 226) I can record a good hot signal with no noise or bleed-through.

The Fostex deck has only four channels of record electronics which switch in groups of four. In other words, you can never record on more than four tracks at a time; there is a master switch for tracks 1-4 or 5-8. While this would present a problem for the home engineer into recording bands, it actually makes life easier for those of us who are "overdubbers". There are 8 playback channels and all the self-sync capabilities are present and extremely easy to use. Because the Fostex only uses two heads (erase and record/playback) you need never fear forgetting something and ending up with a track out of sync.

There is an LED tape counter with a return to zero function (very handy). The noise reduction may be switched out if you wish to patch in another

TEAC MODEL 38

the back (all standard line-level RCA phono jacks) and eight VU meters on the front, and that's it for signal ins and outs. The rationale for this move, as explained in the owner's manual, is that most users will have some kind of mixer anyway, in order to get from an 8 track master to a stereo end-product, so pots on the 38 would be redundant. On the other hand, I have a friend who runs his synthesizers straight into the 38 with no mixer at all. He just uses the output volume on the synth and the VU meter on the 38 to control his levels. He reports that this works just fine.

There are three other jacks on the back panel of the 38, two multi-pin connectors - one for remote forward-reverse switching, and the other for simultaneous control of an outboard dbx unit - and a 1/4" phone jack for remote punch-ins and punch-outs. If you're a one-person band and want to punch in a guitar fill on a crowded track, you'll definitely appreciate being able to use a footswitch for this function.

The front panel isn't a whole lot more complicated. The forward, stop, fast forward, reverse, pause, and record buttons will be familiar to everybody. There is also the usual set of three buttons used for selecting what output you'll listen to - the input signal, the playback head (called "repro"), or the record head (called "sync"). A set of eight buttons selects which of the tracks you'll be recording on. The 38 has no restrictions as to how many tracks you can record on at one time.

The tape counter is a sexy green fluorescent readout. Next to it is a "return-to-zero" button. If you hit rewind while this button is activated, the machine will shift back and forth from fast forward to rewind until it gets close to zero, at which point the transport stops. But since the tape counter, like most tape counters, is inclined to creep, it's hard to see how an automatic return is much of an improvement over doing it yourself.

The front panel has three other features. There's an "edit" button, which disables the take-up reel so that tape spills out on to the floor; if you're trying to get rid of unwanted tape, say while editing or assembling, this is very useful. But since 1/2" tape is currently running about \$35 a reel, you may not find yourself using this feature too often. Then there's a cue lever, which pushes the tape up closer to the record head, providing easier cuing as you move the tape back and forth by hand to find the right point for a splice. There's a variable speed knob, which is highly useful if you're recording an instrument of fixed pitch (such as piano), since variations in the frequency of the voltage coming out of your wall socket will cause most tape deck's speed to change slightly from day to day, thus making the piano sound out of tune with itself on subsequent overdubs.

The Model 38 uses standard 1/2" tape on 10-1/2" reels for compatibility with other TEAC (and Otari) 8 track studios. It runs at 15 IPS only. The tape path is also standard, with a plastic cover over the heads which flips up for easy head cleaning. Unfortunately, the capstan isn't completely uncovered by this procedure, making it virtually impossible to clean its upper side. But if you clean the side you can reach every day, the law of averages says you'll clean the whole thing once or twice a week, so it's

FOSTEX A-8

system. To facilitate editing, there is an "edit" switch which cuts power to the take-up reel to allow for controlled spilling of the tape. It works in "play" mode only so don't worry about shooting your new piece all over the room by mistake. The pitch control has a generous range of +10%. You may purchase a remote control which is an exact copy of the transport logic found on the deck, and there is also a jack on the back of the deck which accepts any standard on/off footswitch so you may punch in and out easily.

The A-8's head cover must be raised and lowered manually; there is also a cue lever to make life a little easier. The standard record LEDs blink when ready to record and remain lit in the record mode. The VU meters and LEDs on the deck are slightly recessed and have a protective window over them. Unfortunately because of the recessed window, the LEDs are not always in direct line of view unless you are standing face level to the deck itself. Inadvertently erasing one track is enough of a lesson for me to double check the record status.

The Model 350 mixer is small, but highly efficient, eight in/four out with an auxiliary stereo out. Each channel has a variable trimmer ranging from mic to line level, and can also switch over to look at the tape output. Next, you must assign the channel's output to either busses A-B, off, or C-D. A pan control can then set the balance of this stereo output. There is also an aux input and attenuator to the four channel busses.

The aux buss has its own input selector, gain pots, and pan pot. It is totally independent from the four buss output and can be used for monitoring a combination of tape or direct input, or may be used as an effects send. Each channel also has a two band parametric equalizer which does its job well. The meter bridge is considered an extra by Fostex but unfortunately is a necessity for the serious engineer. It is your standard VU meter bridge which mounts on the mixer and has a nice solid connector. The six meters display the four busses and the stereo aux out. Each channel has an LED peak indicator beside the input fader.

The input faders are really the only weak feature of the mixer. They are small and function well, but you wouldn't want your Uncle Ralph the truck driver playing with them - they just do not have a solid "feel". I suspect I could easily break the slider if I applied too much pressure on the stem.

Two stereo headphone jacks and a level control make monitoring easy. You may select any of the four busses or aux out to monitor. At night I sometimes leave my speakers and amp off and monitor through the mixer with phones.

The rear panel is well designed and very functional. There is your normal input jack, tape in jack, four channel buss in and out, stereo aux in and out. Two stereo phono input/outputs hint at DJ mixing and AV productions, although how they function is not clearly specified in the manual. Each channel has a direct output that is after the input fader and equalizer. This can be used with a sub-mixer, a direct input to a multi-track machine, or an effects send. Each channel also features accessory send/receive jacks, supplied with normals (an RCA double pin plug). You may remove this normal

TEAC MODEL 38

no big deal (you can turn the capstan by hand, but getting finger oils in the tape path isn't a good idea).

The bottom line in evaluating any piece of musical equipment is what it sounds like. Ideally, a tape recorder should sound like nothing - being as transparent to sound as clear glass is to light. Since the 38 is a budget tape deck, it's not too surprising that it can't possibly live up to this ideal. I've noticed no problems with noise or crosstalk; but then, I'm using noise reduction. The weakness of the 38 seems to be flutter. If you're recording material which consists of pure, sustained tones (such as unaccompanied piano, steel-string guitar, or untreated synthesizer oscillator), you will almost certainly notice a slight tremor in the tone on playback (however, if I had something called a "wow-and-flutter meter", I could probably improve the specs by following the instructions in the owner's manual). But this is only objectionable when the instruments are being used by themselves. If you're recording a band, or add a bit of phasing or vibrato, the flutter should be entirely masked, making the sound quality quite acceptable. It may not have the crispness that you'd get at a professional studio - but then, what are you using for monitor speakers? And how are the acoustics of your garage? As a component of what you might call a semi-pro studio, the 38 definitely holds its own.

One other item may come as a bit of a shock - the contents of the owner's manual. Three quarters of this manual is a technical maintenance manual, obviously directed at budding engineers who not only own their own studios but are equipped to do their own trouble-shooting and routine calibration and maintenance as well. The technical material seems very complete, and if your 38 breaks down while you're socked in at Pt. Barrow, Alaska, or yachting in the Trobriand Islands, you'll undoubtedly appreciate having it handy. But for the relative novice, it is quite intimidating - I don't even own any of the test equipment they're talking about. Still, including this stuff in the manual does serve to let you know that you're dealing with hi-tech equipment; the 38 isn't a magic wand, it's a piece of hardware, and like any piece of hardware it will work best when you treat it with tender loving care.

After giving my 38 some heavy use for a couple of months, I have no complaints. I've already learned a lot about composing and arranging, and if my only choice was the 80-8, I'd still be saving my nickels to buy the thing. I'm grateful to TEAC for offering a solidly crafted tape deck at a price I can afford.

FOSTEX A-8

plug and insert limiters, external EQ, or processing devices at these jacks.

The layout of the board and the use of colored knobs makes it easy to understand and use. It complements the 8 track very well and functions as an inexpensive portable mixer in its own right. I would have liked solo buttons to check out individual channels, but with only 8 channels it's not too hard to trace things down.

The 15 page mixer manual is clear and written from an elementary viewpoint. It does not, however, provide any technical information and discourages the user from exploring.

After 40 hours of use my Fostex suffered from a problem of some kind. The VU meters would light up, but the LED counter remained blank and you could hear relays "chattering". Being in the middle of an important session and having no technical info on the system left me feeling a little helpless. Luckily a friend who happens to work as a maintenance man at a local studio isolated the problem to a bad solder joint on the power supply board, and had me up and running in two hours. Being a synthesist-engineer type, I prefer to have schematics and some technical info on my equipment. Incidentally, while repairing the Fostex my friend commented that this was the first reel to reel deck he had seen which utilized cassette deck technology. The insides are very dense, some boards swing out and others plug in.

All in all, the Fostex recorder and mixer represent a well designed package which offers the user a lot of capability for a very reasonable price. For the home recordist or AV show producer, this combination makes an excellent buy.

John Simonton's "LAB NOTES" Column Returns in the next issue of **Polyphony**

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Another Cheap Trick Tone Bypass for Fender Amps

By: Steve Morrison

How many times have you cranked your amp's volume and tone controls up to "10" in an effort to obtain the fullest, most distorted sound possible, only to find yourself not quite satisfied? Ever wished you could turn the knobs just a bit further to get the sound you're after? Well, you can't! But you can do something just as good (better, actually), and even if you've never damaged a pot from trying to turn the knobs too far, this is still a neat trick to pull on your amp; all it will cost you is a short length of wire and the time it takes to rearrange a few connections.

The tone bypass. We're going to follow Mesa-Boogie's lead and install a "tone bypass" footswitch jack. For those unfamiliar with what this does, here's the "Reader's Digest Condensed Version" of how it works.

It is an unavoidable fact that the passive tone control circuits used in tube guitar amps eat a certain amount of signal, even when the controls are set wide open. If we cut these signal-eaters out of the circuit and go straight to the next amplification stage, we regain enough level to cause distortion at high volume settings. Now, to completely bypass the tone controls we'd need a DPDT switch and a new coupling capacitor, but what we're really going to do is much less costly and not nearly so cumbersome. All we need to do is break the ground connection in the tone control circuit, leaving the signal we lost before nowhere to go but on to the next stage (see figure 1). Wasn't that easy?

The modification. Here's how to do it to your amp. Rather than drilling a new hole, I chose to disconnect the #2 input jack and convert it to a footswitch jack since I, like 90% of everybody, never use this input anyway. Referring to figure 2, remove the two input jacks from the front panel and disconnect the red wire from the junction of the two 68k resistors which connect to the jacks. Now melt the solder connecting the jacks together, pull the jacks apart, and remove the 68k resistors. Take the jack with the 1 Meg resistor soldered between its tip and sleeve lugs, and re-install it in the hole with the number 1 above it. Then take the red wire unsoldered earlier and solder it to the tip lug of this jack. This is now your input jack.

Next, connect a suitable length of solid wire to the tip lug of the remaining jack and connect the other two lugs together. Install this jack in the #2 hole. This will be your footswitch jack, when the other end of its wire is connected. Where you make this connection depends on whether or not your amp is equipped with a "middle" control on the channel you're working on. In either case, plan the routing of this wire so that it can be tucked in neatly under the controls when you're done. If this channel does have a middle control, unsolder the grounded lug of the 10k pot and connect the above-mentioned wire to this lug. If there is no middle control, there will be a 6.8k resistor soldered to the case of the 250k bass control pot. Unsolder the resistor lead from the pot case (leave the other

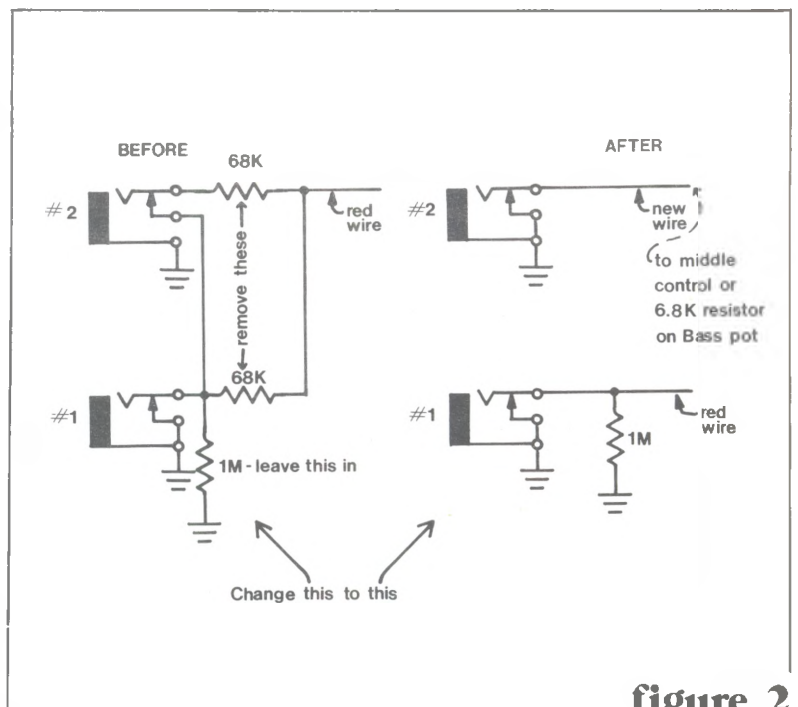
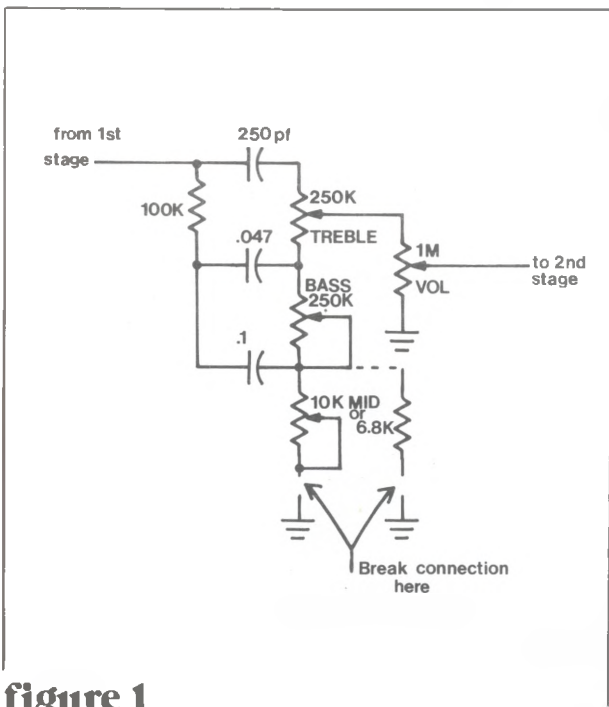


figure 1

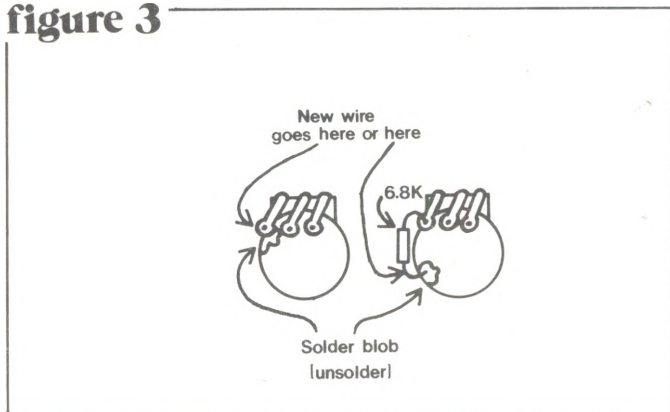
figure 2

lead connected) and connect the wire to this lead. Insulate this connection with shrink tubing. Now, stuff the new wire in with the rest of the wiring and that's it - you're done!

Testing time. Now it's test time. As a safety measure, after turning on the amp plug a standard plug into jack #2 and measure for any voltage present at the hot lug. If a voltage is present, then there is a wiring mistake which could be dangerous. Re-check your wiring before continuing. If no voltage is present, then carry on. Plug your guitar in jack #1 and a standard SPST footswitch in jack #2 (figure 4a), and experiment with different tone control settings as you play and push the footswitch on and off. Note that the tone controls are useless when the switch is open (although the treble control still has a very slight effect), but the volume control still works normally. Now crank all the controls up to "10" and notice the difference when you push the switch. Amazing! It's just like instantly turning all the knobs from "10" up to "13" or so.

On amps with "middle" controls, the footswitch can also be used as a "cancel" switch for the channel it's plugged into. Simply set all three tone controls to zero, and the switch will now select between no sound at all and whatever level is set on the volume control. You don't get any control over tone this way, but it's still a useful feature.

figure 3



CAUTION!

Make sure the amplifier is unplugged before working on it, and that all power supply filter caps are discharged (you may discharge the caps by clipping a 47 ohm, 1 watt resistor between both filter cap terminals for a period of about 30 seconds). Be careful not to alter any wiring beyond that mentioned in the article, and make sure no wire clippings or solder blobs fall into the amplifier circuitry to cause possible short circuits. Reassemble the amp completely before testing the results of your work, and check that no voltage is present at the hot tip of the footswitch jack before using the modified amplifier.

In addition to providing the tone bypass and cancel functions, this new jack can also be thought of as a sort of "preamp patch point". This opens up a few more possibilities that are not at all obvious. Using this jack as an input bypasses the first preamp stage (and the tone controls), allowing you to plug in high level devices which would overload the regular input. This is great for getting a clean sound with ultra-hot pickups. Used as an output, this jack opens the door to the most absolutely excruciating distortion you can possibly get out of your amp short of hard-wiring the preamps in series. Wanna try it? Referring to figure 4b, unplug the footswitch and run a patch cord from the footswitch jack to the other channel's #1 input jack. Set the main channel's volume control on zero (the tone settings don't matter), and control the volume and tone from the other channel. Turning up the main channel's volume control with this patch causes both channels to be mixed together out of phase, resulting in varying degrees of cancellation. Experimenting with different volume (both channels) and tone (other channel only, not the main channel controls) settings can now provide interesting tone colorations that aren't available from a stock amp.

If after trying these tricks you still want a more distorted sound, I have one last procedure to suggest: unplug everything, sell your axe, and buy a chainsaw!

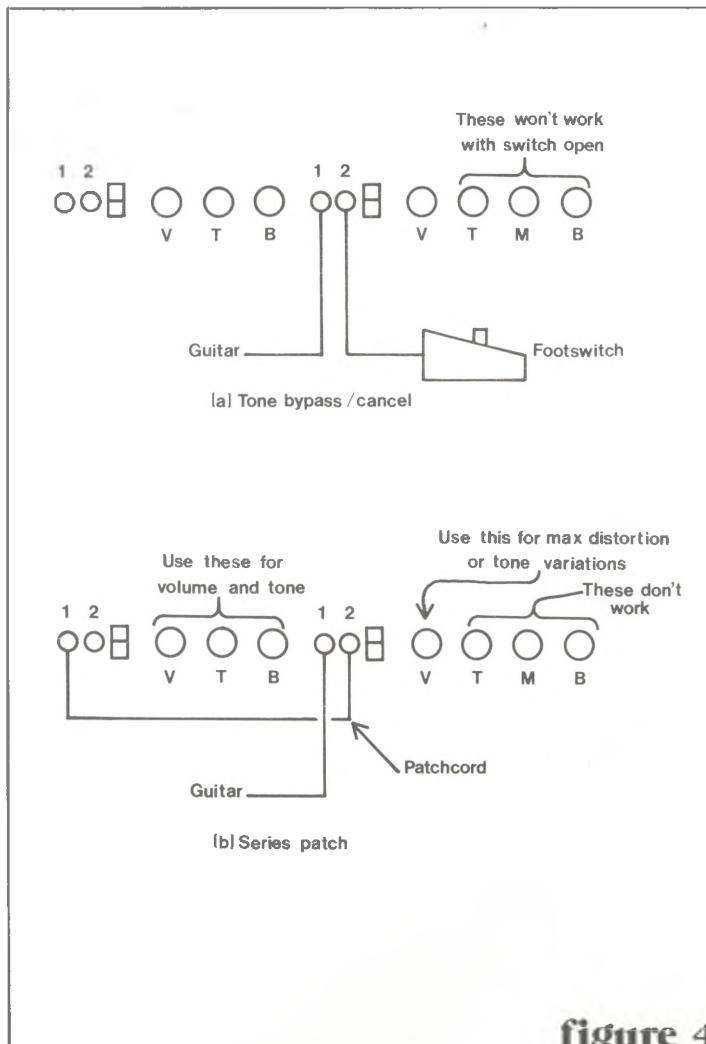


figure 4

re-view

Continued from page 6

Jean Michel Jarre **The Concerts in China** (Polydor PODV3). Jarre plays (sort of) his greatest hits (sort of) for a live audience (sort of) - three other synthesists have to help him perform stripped-down versions which sound extensively studio sweetened. Still, there are six new pieces and some live recordings on the street which bear listening.

David Tudor **Rainforest IV** (Gramavision GR-EB-1). Sounds like a walk through the bird house at the zoo, except these birds are electronic. You could get real bored trying to listen to it, but it makes a dandy background. From NMDS (New Music Distribution Service).

Daniel Lentz **After Images** (Cold Blue E4, 10" EP). Lentz provides a 32 second echo which recycles, recombines, and redefines gentle vocal and keyboard fragments by

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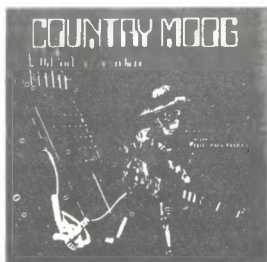
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Arlene Flynn Dunlap. Reminiscent at times of Eno's "Music for Airports". From NMDS.

Ghostwriters **Objects in Mirrors are Closer Than They Appear** (Red 001). Bouncy, accomplished little tunes for synthesizer by New York duo Jeff Cain and Charles Cohen. The sounds are similar to Cluster's "Zuckerseit", but the writing is more seriously musician-like. From NMDS.

Ray Buttigieg/Cykx **Compucircuit 0.008 ms** (Cykx 6001). I believe it is the sonata form which goes A-B-A, where the middle section differs from similar beginnings and endings. Anyway, **Compucircuit** (both sides) begins and ends in a free-form electronic jumble, with a long organ interlude (both sides) in the middle. From NMDS.

Joel Chadabe **Rhythms** (Lovely Music 1301). Chadabe comes from the minimalist school of repetitive, chance-directed music and this album shows some of the largely untapped potential of that style. He combines randomly changing computer generated rhythms with humanly-operated acoustic percussion such as vibes, marimba, log drums, temple blocks, etc. The result is both more lighthearted and more unmechanical than most computer music. From NMDS.

David Behrman **On the Other Ocean/Figure in a Clearing** (Lovely Music 1041). Chadabe's "Rhythms" brings to mind another, earlier Lovely release combining random computers and human responses. On this record the computer provides changing drone chords over which bassoon and flute (on side one) and cello (side two) improvise. It doesn't sound like "computer music" either.

Conrad Schnitzler **Conrad & Sohn** (Gregor S GS-1001). Another in the continuing onslaught of Conny albums (there are none so prolific as those who used to be obscure). It's broken up into several short tracks, so even though the self-triggered synthesizer patterns and ring-modulated singing aren't his best, it isn't boring either.

Roberts Owen **Immature Oocytes** (Mortsleam Records). Roberts Owen is the leader of the avant-garde jazz ensemble Maelstrom, and his solo album maintains a similar orientation. The instrumentation, personnel, and mood vary with each

track, but improvisation and electronic keyboards are the keynotes.

Moebius & Plank **Material** (Sky 067). The second release by the "other half" of Cluster differs only in detail from the first, reviewed Jan/Feb 1981. Bass, guitar, and drums furnish a strongly-rhythmic base for assorted oddball excursions on synthesizers, saxes, and what-have-you. Postpsychotic dance music.

Phil Manzanera **Primitive Guitars** (Editions E.G. 14). Ex-Roxy member Manzanera is one of the most innovative guitarists active today, working to expand the role of the instrument through subtle use of effects and studio production techniques. The release of an album highlighting his guitar variations instead of his usual rock songs is therefore an intelligent and logical move. "Among my abiding interests", say the liner notes, "has been the possibility of making the guitar sound as unlike a guitar as possible".

Brian Eno **On Land (Ambient #4)** (Editions E.G. 20). Ambient music is a much maligned term for an old idea - the "knife and fork" music of Charles Ives or the "musical furniture" of Erik Satie for instance. Eno's past attempts by and large have been more musical than ambient, which is perhaps a double reversal on the nature of the LP. At any rate, **On Land** is comprised mainly of slowed down keyboards with a few backgroundish synthesizer things thrown in, and it's his most ambient (least musical?) release so far. It's great for reading, making love, or anything else you don't want interrupted.

Steve Tibbetts **Northern Song** (ECM 1-1218). Tibbetts had two highly successful private LPs on his own Frammis label, and wonder of wonders, somebody noticed! Perhaps due to the hassle and expense of recording in a commercial studio (Talent in Oslo), recording time was held to two days, which obviously affects the type of music he could put on this album. Rather than his usual elaborate overdubbed, heavily-produced epic tomes (which he did at home on his own 8 track), **Northern Song** is a fairly Spartan, ECM-ism production spotlighting Tibbetts' clean guitar lines and Marc Anderson's percussion. It still tastes like Tibbetts, but perhaps a little distillate rather than full-strength.

Continued on page 35

When Quality

Record Manufacturing Counts

By: Diane Sward Rapaport

My ideal new record doesn't sound like it was packaged by Rice Krispies: no snaps, crackles, or pops. No scratches. No warps. No surface noise. I hear sustained quiet between notes and all the overtones and harmonics, especially from instruments like guitar or piano. When the record gets towards the end, I don't experience noticeable dropoffs in volume. The sound is undistorted throughout. And I can play my new record more than three times before the grooves start caving in, causing my needle to hopscotch around.

And I will return records when these ideals aren't met (even though record store owners say I'm in the gross minority!). "If more people returned defective records, maybe record companies would stop making them..."

The artist/band, together with the producer/engineer, are responsible for making sure that the finished record sounds as good as (or even better than) the finished tape, and that all the ideals listed above are met. It is possible to reach these standards of quality; here's how.

I'm assuming that you are not only beginning with music which you feel represents your best work, but has also been well recorded. No illusions - please - about fixing it in the mastering room. And I'm also assuming that your goal is to end up with a quality record.

The manufacturing process can be divided into four main segments: (1) pre-mastering; (2) mastering; (3) plating; and (4) pressing and packaging. Highest quality is best assured when mastering and plating is performed by a person or firm specializing in each. Good quality pressings are most consistently achieved at small manufacturing plants catering to independent labels.

Pre-mastering Pre-mastering technically refers to readying your tape for the disc-masterer. Aside from purely routine steps, such as properly leadering the master tapes and putting on alignment tones, the most important consideration is this: will the final record accommodate the amount of music you wish per side without distortion, loss of volume, or loss of highs and lows (especially towards the inner grooves)? Generally, music of great dynamic range or a generous amount of low frequency information (bass) needs to be held to 18 minutes per side or less for highest quality transfer and reproduction. Symphonies, rock and roll, disco music, rhythm and blues are examples of music most frequently falling under this generalization.

The longer the running time of the music, the more grooves which have to be physically crammed on to the record (the technical term is lpi - groove lines per inch). Music which contains a great deal of information - dynamic range, highs and lows, etc.

takes up more space in the grooves. If you looked under a microscope at a record, you could physically see this represented as unevenly wavy spirals. When the grooves become crowded (for example towards the inner grooves of the record), mistracking or skipping can occur, along with dropoffs in volume or distortion. That's one of the reasons why engineers will argue for quieter tracks at the end of a side.

In any case, you can assure best results by not sequencing your music before talking with both your engineer and disc masterer about it. They'll give you good advice about sequencing and optimum running time.

Disc mastering Disc mastering is the process of transforming the music on tape into grooves cut into an aluminum disc (called the "master lacquer"). The grooves physically represent the music. In fact, some engineers can "read" records and tell you the type of music on it by the pitch, depth, and width of the grooves.

Begin by choosing a mastering facility with a reputation for quality work. In general, disc cutters who also work for major labels are your best bet.

Reputation is best checked by asking for the names of record companies who have used the services on the company. If you are an independent label, ask for the names of independent labels. Table I lists some of the major US disc mastering facilities. Generally, disc cutters are highly trained and proficient people. This is usually not the area to look for problems when records come out defective.

Second, be clear about instructions to the mastering engineer. You should talk over your priorities with your recording engineer and let him or her communicate with the disc cutter. They talk the same language. You can request that the lacquers be cut flat, in which case the goal is to make the lacquer sound exactly like the tape. Or you can request such changes as adding equalization to certain cuts to make them "hotter", adjusting the amount of stereo separation, increasing or decreasing speed, and so on.

Third, assure your results by requesting reference acetates. These are samples cut on acetate, not aluminum, and are sent to you for listening prior to cutting the master lacquers. As they are made, the disc masterer will note levels in order to exactly duplicate the results on lacquers after your approval. The reference acetates are good for about five or six plays before the sound deteriorates. Play them once with your engineer/producer. If changes are needed, or you are simply dissatisfied with the results, be specific about what changes you want made and request new acetates. Once you have

approved the acetates, save them so that you can compare results with the test pressings later down the line.

Plating

Plating, or matrixing, is a three-step process which uses the master lacquers as forms from which to make stampers or molds. Think of the lacquers at this point not as music, but simply as a piece of sculpture to be exactly reproduced thousands of times.

The first step in this process involves coating the master lacquer with a thin film of silver and electroplating it in a tank containing a nickel solution. When the nickel plating is peeled or stripped from the master lacquer, the result is a mold showing an exact negative impression of the lacquer (grooves project upwards).

For this step to occur flawlessly, lacquers need to be plated within 24 to 48 hours - the sooner the better. In the worst case situation, the groove walls of the master lacquer dry out and powder or cave in. Where that happens, you'll get skips and pops in the finished record.

To ensure quick plating, make sure that the plating facility knows when to expect the lacquers and make sure that the plating will happen almost immediately upon their arrival. Be there if you can.

After the lacquers have been plated, the "master" is plated again to produce a positive ("mother"). Several mothers can be produced from one master. Some plating facilities will often play one of these mothers to verify the plating process. The mother should look like the master lacquer if examined microscopically.

In the third process, the mother is electroplated again to produce a permanent metal mold (the "stamper"). The mold is a positive - i.e. the grooves point upward.

Some plating facilities will chrome plate the stamper to seal the metal surface. Although this process makes for a stronger mold which will deteriorate less quickly during pressing, it will also increase the chances for pops and clicks in the final records. For best quality, ask that your stampers not be chrome plated.

More than one stamper can be produced from the mother. Stampers can be stored for up to twenty years or be shipped anywhere in the world you want to have records pressed.

If quality is what you're after, absolutely reject pressing records from "converted stampers". With this process, the first nickel plated mold (the master) is set up for short runs (like under 1000 copies). Once used, it's chucked into the garbage; if you want more records, you'll need another master lacquer. Making records from converted stampers is also called a "one step process".

The very best plating facilities can make stampers which turn out up to 3500 records before they begin to deteriorate (the grooves begin to wear thin; the groove walls collapse). In poor stampers, the nickel plating is brittle and wears out more easily. How will you know the difference? Check the reputation of the plating plant with the pressing plant that will use the stampers. If the two are one and the same, check with the labels that most often use them. Ask this question of the pressing plant: How many records can you normally make from your stampers before there is a deterioration in quality?

Pressing

Most defective records can be traced to errors made in the pressing stage. Lots can go wrong...

Physically, the pressing process goes something like this: a hot ball of vinyl is placed between the plates of a hydraulic press. The stampers are mounted on the plates. The plates close and the ball is squished, filling in all of the grooves in the stampers. Presto! The plates are opened, and a record spits out, the grooves cut exactly the way they're supposed to be. The excess vinyl that has flowed to the edge ("flash") is trimmed off. Once the record cools, it is packaged.

For this process to work just right, the temperature of the vinyl before it is compressed has to be correct and uniform throughout; it also has to cool just the right amount of time before the hydraulic plates open up. If the vinyl isn't the right temperature, it won't flow into all the grooves. If the records are cooled too much, the record will stick to the stamper and have to be peeled off by hand. Once the records are pulled off the press, they have to be cooled from 12 to 14 hours before being packaged, or they'll warp.

Defects can be physically spotted. In firms where quality control is a priority, records will be visually checked regularly, as often as every 35th record. And the stampers will be checked for deterioration every half hour or so. Some firms will even visually inspect every single record before placing it into the jacket.

Vinyl comes in different grades, each containing a slightly different resin formula. The very best vinyl results in low surface noise. Most firms advertise that they use 100% virgin vinyl, but don't often give you a choice in grade. The best pressing plants do. For example, Record Technology (in Camarillo, CA) gives clients a choice between a domestic vinyl (good), QUIEX II (better), and Teldec (among the very best). If you want premium vinyl, make sure your pressing plant offers or can get it. The difference in price will be 50% to 100% higher than for the standard domestic grade.

Some pressing plants also use regrind - a mixture of virgin vinyl and vinyl melted down from defective records. Regrind sets up stronger and lasts longer. The only reason why regrind is suspect is (1) some pressing plants are careless about making sure that paper from the labels isn't mixed in and (2) sheer prejudice or ignorance on the consumer end. As a result, most pressing plants simply advertise 100% virgin vinyl.

Some pressing plants also add carbon black to the vinyl (this helps to avoid bubbles), and will add an anti-static compound which helps keep dust from collecting in the grooves. The best pressing plants don't do either, but are vague about the reasons why they don't.

Many pressing plants now use automated machinery because this turns out a more consistent product. Temperature and humidity can be carefully monitored and personnel best used for quality control checking. On the other hand, sometimes automation has simply meant fewer people on the floor checking records. It is extremely important that you check out a firm's method for quality control. Be specific. How many machines do you run simultaneously? How many records are checked out of every hundred? Are records spot played? And so on.

In non-automated plants, record quality is dependent on the skill of the operator and the

quality of supervision. In recent years, stories of rapid personnel turnover and poor working conditions - particularly near Southern border towns/cities - clue me to advise caution.

So now that you understand how much can go wrong in the process, what can you do to assure that it mostly goes right?

First, carefully search out companies with reputations for turning out quality products. How? Find any record which is made to your standards, and ask where it was pressed. Some record companies even credit their pressing plants on the back of the jackets.

Second, if at all possible, visit the pressing plant. Watch the records come off the presses. Ask about quality control. Talk not just to the salesperson who will write up your order, but the operator of the presses, the project supervisor, etc. Make clear that you care about your own records and are willing to spend extra money to insure quality. Setting up personal relationships will help. That doesn't mean "riding people's asses" - it simply means being personable and curious and into the details. Your attitude, once you have found a good firm, is that they want to work cooperatively with you to assure quality pressings.

Third, request test pressings. The pressing plant will mount the stampers on the hydraulic

plates and run off a few test records. These test records will verify the plating process. Skips, pops, or drop-outs may clue a faulty stamper. Or, unfortunately, they might also be the result of the vinyl not having been heated to the proper temperature. Until you get test pressings you like, don't approve a final run.

Test pressings will sound a little brighter than the reference lacquers (vinyl is a harder compound), resulting in higher frequency output. If the sound is duller or if there are mysterious noises, reject the test pressings and order new ones.

Repeatedly bad test pressings mean either faulty plating or faulty disc mastering. Your reference acetate will help you reject the latter possibility as the problem; but without it, you won't have a chance of convincing the plating facility that it was their fault and not the disc masterers.

Finally, if you have spent the money for quality throughout the process, end by requesting loosely shrink-wrapped product. Tight shrinkwrapping is a major contributor to record warping.

(Diane Sward Rapaport has written for *Keyboard* magazine and several others, as well as writing the excellent book "How to Make and Sell Your Own Record".)

Major U.S. Disc Cutting Facilities

A + M Recording
1416 N. La Brea Ave.
Hollywood, CA 90028
(213) 469-2411

Agency Recording
1730 E. 24 St.
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(216) 621-0810

Annex Studios
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Ardent Mastering
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Memphis, TN 38104
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Artisan Sound
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Hollywood, CA 90028
(213) 461-2751

Atlantic Studios
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Automatt
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San Francisco, CA 94107
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Capitol Recorders
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Hollywood, CA 90028
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Columbia Recording Studios
34 Music Square E.
Nashville, TN 37203
(615) 259-4321

Columbia Recording Studios
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New York, NY 10022
(212) 765-5901

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Miami, FL 33181
(305) 947-5611

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Cincinnati, OH 45231
(513) 522-9336

JVC Cutting Center
6363 Sunset Blvd., Suite 500
Hollywood, CA 90028
(213) 467-1166

Kendun Recorders
619 S. Glenwood Place
Burbank, CA 91506
(213) 843-8096

(The above list of disc mastering facilities is from the book "Basic Disc Mastering" by Larry Boden of Hollywood, CA. Copyright 1980

PARAMETRIC EQ TIPS

By: David Doty

One of the most useful tools for any home recording studio is the parametric equalizer. This article will serve as an introduction to those who are not familiar with this versatile device, and offer a few additional hints for those who are.

The basic parametric. A typical parametric consists of three or four stages, each stage being a bandpass filter with three user-controlled parameters: center frequency, bandwidth (also called resonance on some models), and amount of boost or cut (typically +12 to 20 dB). Normally, the frequency response of each stage is optimized for a particular range (say, lower midrange, upper midrange, bass frequencies, treble frequencies), with the ranges of successive stages overlapping slightly. Four stages can provide coverage of the full audio spectrum with a good degree of resolution for each stage.

Buying a parametric. If you are considering purchase of a parametric, make sure you are getting the real thing. I have seen some devices which, though advertised as parametric equalizers, lack some of the above-mentioned controls on one or more stages. Remember, a true parametric has variable center frequency, bandwidth, and cut/boost on each stage. A device which lacks some of these features should be called semi- or quasi-parametric.

Parametric applications. A parametric is useful in any situation where subtle adjustments of frequency and bandwidth are necessary to achieve a desired sound. Subtle boosts or cuts over fairly wide bands can add color and definition to instrumental tracks. More drastic alterations and narrower bandwidths are also useful, especially for suppressing unwanted noises without drastically altering the rest of the audio spectrum.

Whatever task you wish your parametric to perform, it will be easier to accomplish if you are able to think in terms of frequency and bandwidth. While a sensitive ear should be the final judge in any EQ-ing situation, becoming familiar with the frequency ranges of the instruments that you work with will enable you to achieve satisfactory results with a minimum amount of trial and error. Any good musical acoustics book will contain information on the frequency ranges of common instruments.

While my experience with parametrics has derived primarily from recording acoustic instruments, I think the techniques outlined below are applicable to a variety of musical situations. I generally work with an ensemble of tuned percussion instruments, made of aluminum, brass, and rosewood. It seems that many common microphones give these instruments a harsh and brittle sound, emphasizing the

dissonant upper partials and strike tones characteristic of such instruments. To correct this, I simply set one stage to moderately boost the fundamental frequencies of the instrument, choosing a bandwidth slightly wider than the range of the part to be played. Another stage attenuates the range in which the upper partials fall, typically two or more octaves above the fundamentals. The result is a more fluid, less percussive timbre. Carried to extremes, this technique results in a tone which is more flute-like than percussive. The opposite procedure, boosting the upper partials and/or attenuating the fundamentals, gives a more cutting, percussive timbre.

Many acoustic instruments also produce a certain amount of mechanical noise. These thumps and squeaks, which are hardly noticeable in live performance, may become obtrusive when the instrument is close-miked in the studio. A parametric does an excellent job of "notching out" these noises. Begin by setting the controls of the stage in whose frequency range the noise falls for a fairly strong boost and narrow bandwidth. Next, slowly sweep the frequency control up and down while listening to the instrument. When the correct frequency is reached, the unwanted noise will increase sharply. Finally, simply change the boost to an appropriate amount of cut and adjust the bandwidth for maximum rejection of the noise with minimum disturbance of the music. This technique is applicable to all sorts of narrow-band noises, such as squeaky drum pedals, mysterious room rattles and buzzes, and untraceable electronic hums.

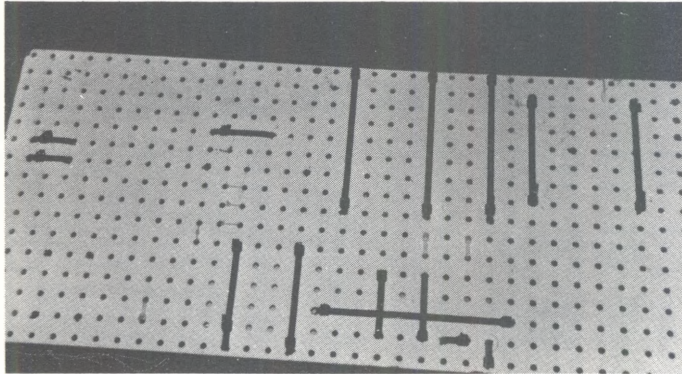
Yet another use for the parametric is to add formant-like resonance peaks to synthesized sounds. Loosely speaking, formants are resonance peaks of fixed frequency and bandwidth, which make strong contributions to the characteristic sounds of certain instruments, especially woodwinds and the human voice. The oboe, for instance, has a fundamental range of 293 Hz to 1568 Hz (D4 to G6), with strong formants centered just below 1 kHz and 3 kHz. These peaks result in note-to-note and register-to-register differences in timbre, reinforcing any partials of a tone which may fall within their respective bands. Due to the lack of this kind of timbral variety, among other factors, imitative synthesizer patches often lack a certain warmth and life characteristic of their acoustic counterparts. Processing your synthesizer through a parametric, set for the appropriate peaks and dips, is an easy way of simulating these characteristics. Once again, a good musical acoustics text can provide information on the formant frequencies of common instruments. Many non-imitative patches may become more interesting with the addition of a few tastefully chosen formants, too.

These are just a few possible applications for the parametric equalizer. No doubt, your own experiences will provide many others. Happy recording...

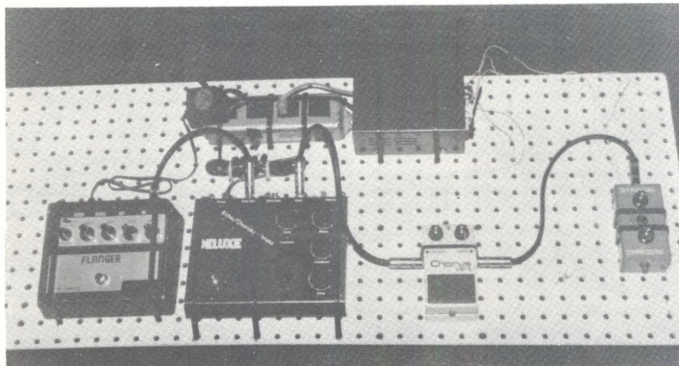
PEDAL BOARD TIP

By: Thomas Figuerido

Pedalboard tip. Here is a method for making a simple pedalboard out of pegboard and Panduit wire ties. If you have only a few effects and they are reasonably light, the technique illustrated in the two photographs gives you an easy way to "get it all together" without drills or other tools (it worked very well for me until I got an A/DA Harmony Synthesizer, which is too heavy for the thin pegboard).



With larger effects, you'll have to hook together two pieces of heavy duty Panduit to go around the unit once. Note that the heavy duty Panduit is expensive, so arrange things carefully before strapping them down. Also, try to run everything from adaptors so you won't have to change batteries.



FX MODS

By: Thomas Figuerido

FX mods. While we're on the subject of effects, I've come up with a modification for the Electro-Harmonix Memory Man and Boss CE-2 Chorus. Both of these units include 4558 ICs; they are good versions and fairly quiet, but if you replace them with Texas Instruments TL072s you will notice what appears to be about 50% less hiss, and you will also hear improved high frequency response. I feel that these JFET op amps are quieter than any of the others I've tried (LF353, CA3140, LF356, etc.).

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- #0302: 11/77: The Sensuous Envelope Follower, digital gates, LED wall art, build a bionic sax, data to music peripheral project, Apple II as a music controller, using the NE566 as a VCO, patches.
- #0303: 2/78: computer controlled Gnome, using joysticks, build a bionic trumpet, ultra-VCO modifications, voltage control the Mu-Tron Bi-Phase, oral joystick, patches.
- #0304: April/May 78: Minimoog modifications, non-keyboard module use, phasing and flanging (theory and circuits), memory expansion for programmable drums, digitally addressed transposer project, polyphonic software (with software transient generators), patches, Volume 3 index.
- #0402: Sept/Oct 78: electronic music notation, notes on the recording of "Cords" by Larry Fast, sequencer software - part one, rhythmic control of analog sequencers, touch switch projects, modular vocoder techniques, PET as a music controller, patches.
- #0404: January/March 79: add-ons for vocal F and V converter, shorthand patch notation, more on note to frequency conversion, graphic monitor project, George Russell, super VCA circuit, echo software, Vol. 4 index.
- #0502: July/August 79: hex VCA/mixer project, electronic music schools and studios, modify the Oberheim Expander Module, profile of Ernest Garthwaite, budget microphones, digitizer projects and software, bar graph ICs.
- #0505: January/February 80: Joseph Byrd, Mort Garson, Larry Fast on 'Games', composing for 'live plus tape', using the CA3280, recording vocals, ADSR circuits.
- #0506: March/April 80: Computers in Music: real time audio processing hardware, Powell sequencer system, Max Mathews, advanced STG software, PortaStudio, phase modulation, Volume 5 index.
- #0601: May/June 80: Gary Numan, Microcomputers in Real Time Audio, Build a Digital Audio Delay Line, writing Documentation, Richard Hayman Composer/Performer Home Recording: Applying Harmonizing and Pitch Transposing Techniques by: Craig Anderton.
- #0602: July/August 80: Peter Gabriel, digital VCO project, dream modules, optimum level settings, dynamic phrasing, patches.
- #0603: Sept/Oct combined with Nov/Dec 80: alternate controllers, add voices to Casio M-10, voltage controlled quadrature oscillator project, cordless patch bay, recording rules, patches.
- #0604: January/February 81: Special Construction Edition; Build: Audio Circuit Breaker, Pulse Width Multiplier, Magnetic Harp, 50 Watt/Channel Stereo Power Amp, Quad Sequential Switch, DOD Mods, patches.
- #0605: March/April 81: Portable Music Issue, reviews of Remco's FX, E-H Mini-synthesizer, Casio's VL-Tone, plus mods for the M-10, GR-500, mini-amp, and the Korg X-911. Introducing; Practical Circuitry and On Location, new columns.
- #0606: May/June 81: Synthesizer: Hardware Mods and Software. Modular Synthesizer Effects, Environmental music, Keyboard assignment for the 8700, new columns; Details, Practical Circuitry, and On Location. Volume 6 index.
- #0701: July/August: Guitar Electronics: Modify; Fender Amp, MXR Phase 100, GR-500. Input/Output Structures, \$5 Analog Programmer, Sample and Hold technique, Modular Synthesizer Effects, new column: Applied Synthesis, Marketing Your Records.
- #0702: Sept./Oct.'81: Harald Bode Interview, Live Plus Tape - New Technique, Xenharmonics, Kraftwerk Live - Review, Psycho-Acoustic Experiments, Practical Circuitry - Super Controller, Applied synthesis - Brass, Construction Tips For Beginners.
- #0703: Nov./Dec.'81: Dave Rossum interview, Applied Synthesis: Strings, Details: Series-parallel/Sum-Difference. The Sound Gizmo and Pro-One Reviews, Practical Circuitry: VCO Deluxe.
- #0704 Jan./Feb.'82: Bob Moog interview, Chip Power - STK-050/070, Simple Square Wave Shaper, Tape Timer Router, Practical Circuitry: VCAs made simple, Details: Gozinda & Gozouta Revisited, Korg Trident & Casiotone 202 Reviews.
- #0705 Mar./Apr.'82: Electronic Music Math, Analog Delay Clock / Modulation; Frequency Domain Modifiers; Screen-Wave for the TRS-80; Touch Switches Revisited; Practical Circuitry: ADSR the Easy Way; Getting the most out of a Cheapo (Guitar).
- #0706 May/August '82: Anatomy of a Private record, Don Slepian Interview, Understanding Digital Synthesizers: A Digital Filter, Syn-Bow Review, Optical Audio, Profiles of SSM 2033 & 2044, The PAL Filter, Bill Rhodes Applied synthesis: Bells, Pipe Organ, Harpsichord, Electronic piano; The Realistic MG-1 Reviewed.

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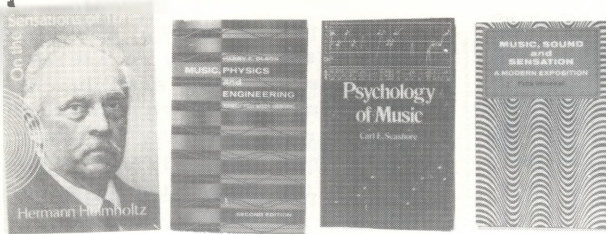


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TECHNIQUE

Synthesists must be well versed in a number of techniques and principles. "How to" and project oriented books are a great way to pick up these skills. **Multitrack Primer** by Teac is a step-by-step guide to building, outfitting, and operating your home studio. The Byte book of **Computer Music** describes computer control of electro-mechanical instruments, Fourier analysis, circuits and loads of software. **Home Recording For Musicians** is the original guide to outfitting and operating a budget studio for maximum results, including mixer and audio processing circuits and a demo recording.

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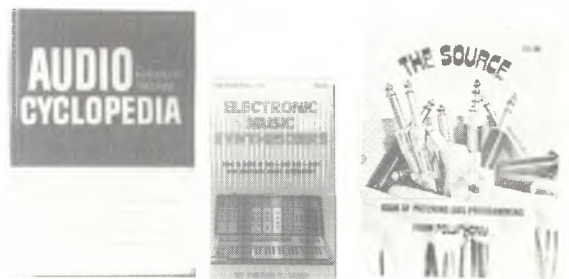
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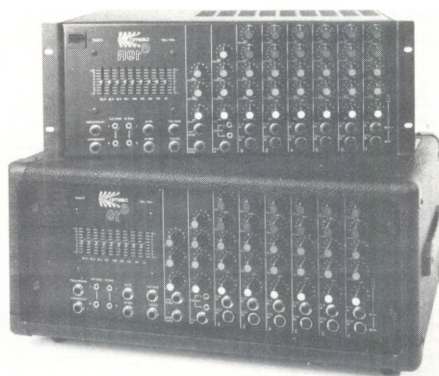
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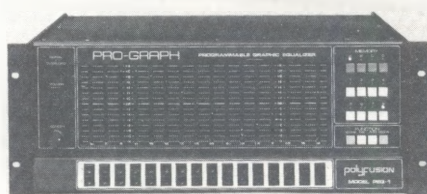
Space, PO Box 31321, San Francisco, CA 94131.

Speech technology filters down. Motorola has announced the MC145414, a CMOS dual tunable low pass filter that works over the 1 to 10 kHz range. It comprises two 5th order elliptic filters along with two op amps suitable for gain adjustment. Claimed specs include passband ripple, 0.3 dB; power dissipation of 30 mW; and dynamic range of 80 dB.

New Biamp mixer. Biamp Systems, Inc. (PO Box 728, Beaverton, OR 97075) has announced the 619 mixer, available in case or rack mount. This six channel mixer includes a 350 Watt power amp and a "thermal compressor" which turns down, rather than shuts off, the unit in the event of thermal overload.

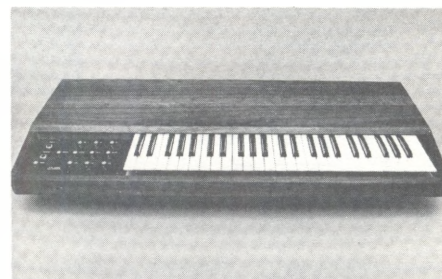


Programmable EQ. The PEQ-1 from Polyfusion (92 Benbro Drive, Buffalo, NY 14225) is a 16 band programmable EQ which can store up to 64 response curves. It also includes bypass switch, balanced/unbalanced inputs/outputs, two computer I/O ports, and more. List price is \$1,495.



Software. Insoft (10175 SW Barbur Blvd. #202B, Portland, OR 97219) has introduced the "Electric Duet" software package for the Apple II. This \$29.95 package lets you create two part harmonies without additional hardware; users can play selections included on the diskette, or create their own music with the music editor.

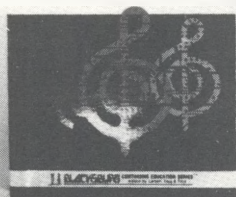
Software Affair (858 Rubis Dr., Sunnyvale, CA 94087) has introduced a hardware/software combination for the TRS-80 II which synthesizes stereo music in 4 part harmony using any combination of violin, trumpet, organ, oboe, clarinet, and percussion effects. Call (408) 295-9195 for more info.



Deluxe string synth. Howard W. Cano Electronics (7057 Vivian Ct., Arvada, CO 80004) offers a string synth with separate waveform generator, envelope generator, and VCA for each note. These hand built units include oiled walnut case, flight case, and other extras. \$1750 list.

New Lexicon Delay. Lexicon's PCM-42 is the first digital delay unit with a programmable metronome/clock. The output may be programmed to a precise fraction of the delay period, allowing the creation of "solid state tape loops" (though use of the infinite repeat function) whose length may be an exact predetermined number of measures in length. Many drum units and sequencers can also be clocked by the metronome for synchro-sonic effects. Other features include 2.4 seconds of delay standard (4.8 optional), input overload limiting, delay time readout, 16 kHz bandwidth, modulation, and more.

ELECTRONIC MUSIC CIRCUITS

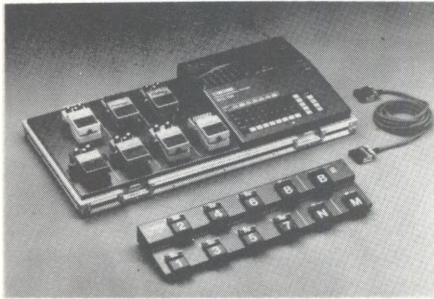


New book. Electronic Music Circuits by Barry Klein discusses synthesizer system design, power supplies, control voltage generators, VCOs, filters, analog multipliers, and more. Containing lots of schematics (many reprinted from Electronotes and overseas publications), as well as data sheets on most popular music-oriented ICs, this book is an excellent technical reference and should be very popular with DIY-oriented musicians. 302 pages, 5.5 X 8.5 inch, softbound; available from Polymart for \$16.95 plus shipping.

Testing, testing. Phoenix Audio Labs (91 Elm Street, Manchester, CT 06040) has introduced the TS-1 Audio Test Set. This device includes an audio sine wave oscillator and 4 digit meter which measures either dB or frequency. The TS-1 is designed for such purposes as tape recorder alignment, finding filter center frequencies, checking frequency response, etc. with high accuracy at low cost (\$249 list).

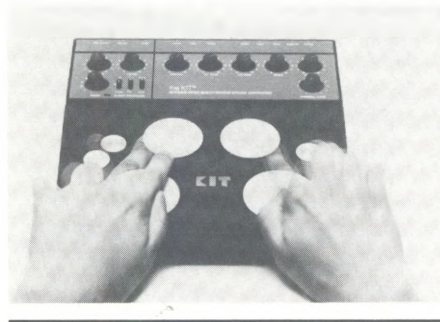
Innerspace music listing. "Music From the Hearts of Space", on KPFA radio, is Northern California's most popular radio show featuring "cosmic, transcendent, and innerspace" music. Now Stephen Hill and Anna Turner, the show's creators, have published an annotated listing of all music heard on the show since 1973. This 90 page book is a virtual directory of new age music and is available for \$7.50 plus \$1.50 shipping (Californians add tax) from: Music from the Hearts of

CURRENT EVENTS



Boss SCC-700 Sound Control Center. Boss (1022 South La Cienega Blvd., Los Angeles, CA 90035) has introduced the SCC-700 computer-controlled effects programmer, designed to program up to seven different effects devices in as many as 32 patch combinations. There are three distinct parts: the SCC-700 controller (\$695 list), SCC-700F remote footswitch (\$350 list), and SCC-700B case which houses up to seven effects and supplies them with power (\$525 list).

MXR Drums. MXR (740 Driving Park Avenue, Rochester, NY 14613) is the sole US distributor for "The Kit", a four piece electronic drum set which lists for \$350. Touch sensitive pads control the bass, snare, and dual tom sounds; there are three smaller pads for open hi-hat, closed hi-hat, and cymbal sounds. There is also a built-in rhythm unit which can automatically trigger the hi-hats.



POLYTEST: snare+ drum unit Construction Article on page 28

At last - an inexpensive drum voice that has a punchy, full sound. If you're accustomed to "dinky-sounding" electronically-generated drum effects, you'll be pleasantly surprised by the sound of the Snare+. Of course, no electronic circuit is going to sound like an acoustic drum - but then again, no acoustic drum spans the range from bass drum to wood-block, has adjustable decay and other parameters, and costs under \$30 as well!

Although the Snare+ sounds just fine without any processing, the snare effect in particular benefits from equalization, and a little reverb also gives a more realistic effect. Perhaps the biggest surprise was the quality of the tom-tom sounds; because of the modulation circuit and impact strike tone, the sound is full and

fat-sounding. Varying R37 as you trigger the unit to simulate a drum roll sounds like you're going around a kit with six or seven tom-toms - quite something!

Bass drum sounds are harder to find among all the possible control settings, but they are there - keep R37 fairly low, add a lot of modulation, and add just the right amount of strike tone. Some of the higher percussive sounds are worth checking out as well, such as bells and "percussion toys" effects.

All in all, the Snare+ delivers a lot of drum sounds, and I would unhesitatingly recommend it to anybody who's tired of the thin sound found in most electronic drum units. And when you add a little slapback echo...

- Editor

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Tube Preamp

By: Jack Orman

With the introduction of reliable and powerful solid state devices, a number of amplifier manufacturers gave up on tubes, preferring all solid state designs. No sooner did this happen than musicians began arguing the points of tube vs. transistor designs, and there is merit in the call for tube circuits in some cases (tube imitating circuits notwithstanding). This led to the recent introduction by manufacturers of the amplifier with two different preamp stages, one tube design, one solid state - an approach which I personally favor.

Before we get into construction of our tube preamp, it's important to note that you must use resistors rated at 1/2 Watt or more, and capacitors with a minimum working voltage of 400 Volts. Tubes need much higher voltages than ICs and transistors, and therefore require much more attention to safety. Never work on the device with it plugged in, and make sure that all leads are dressed well away from any chassis that you might use. Support high voltage connections on terminal strips wherever possible.

How it works. The 12AX7A tube is a dual triode that can function as two separate preamps (say, one for each channel). Figure 1 shows the schematic diagram for a basic preamp; numbers in parenthesis designate the pins for use with the other half of the tube. Note that cathode resistor R2 has been partially bypassed by C3 and R4 in this circuit. Partial bypassing increases the available gain, without any serious loss of quality.

To add a volume control, simply connect a 1M audio taper pot as shown.

Power supply. The power supply (see figure 2) for this project is a bit unusual. Tubes require a voltage applied to their heater elements to function properly, in addition to the regular power supply for the circuit. Transformer T1 provides this heater voltage; no rectification or filtering is necessary as AC works

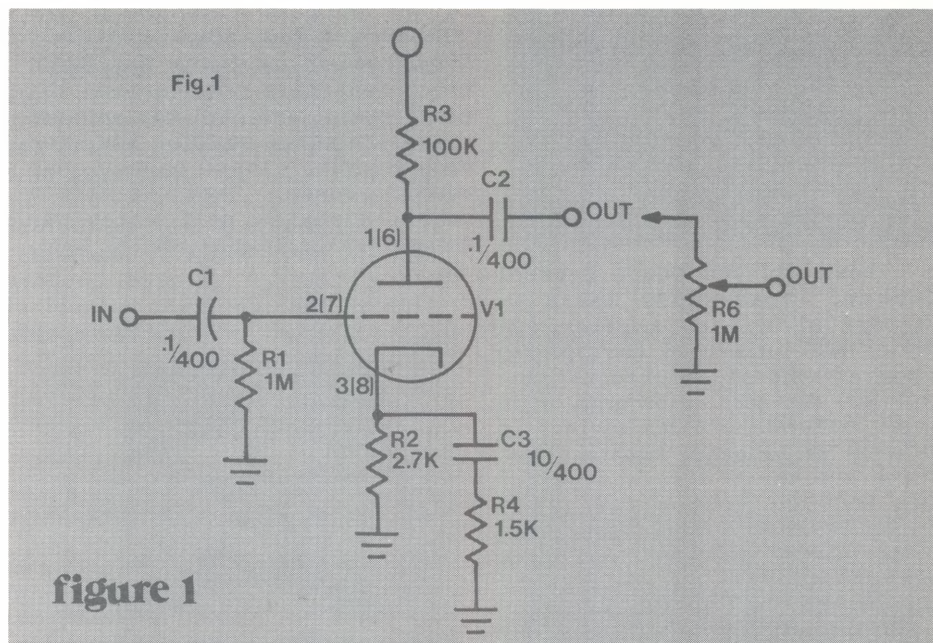


figure 1

fine here. T2 is a 1:1 isolation transformer which provides 117V AC to the full wave doubler consisting of D1, D2, C4, and C5. The voltage measured across points A and B should be filtered DC at twice the value of the transformer secondary, or approximately 234V. R5 is a current limiting resistor and should be a 10 Watt type. You will notice the lack of any large value electrolytic filtering capacitors in the supply circuit.

Tubes are relatively insensitive to supply voltage ripple, consequently we can save some money by eliminating any more elaborate filtering.

I can hear some of you wondering, "Why have a transformer with a 117V primary and 117V secondary? Can't we just connect the power supply straight to the AC line?" The answer is NO! DON'T! EVER!!! Sure, it "works" but this is the "hot chassis"

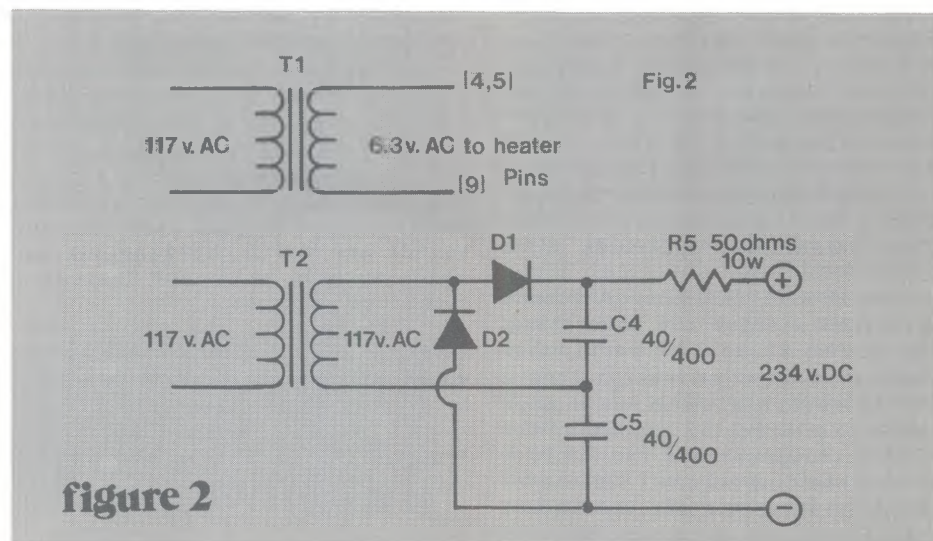


figure 2

technique used in many inexpensive television sets, and when used around audio equipment is a good way to get 117V flowing through your body. Always (repeat, ALWAYS) use an isolation transformer; it's not expensive considering the safety factor it provides.

Final comments. This simple to build preamp lets you experiment with tube effects - try overloading it, or using it to overload other devices. Remember, though, that this is a high voltage device so treat it with a lot of respect. If you don't know how to follow good high voltage wiring practice, better stick to semiconductors for the time being.

Parts list

Resistors (1/2 Watt or more)

R1	1 Meg
R2	2.7k
R3	100k
R4	1.5k
R5	50 Ohm

Capacitors (400 working Volts)

C1, C2	0.1 uF
C3	10 uF
C4, C5	40 uF

Other parts

V1	12AX7A Tube
D1, D2	Any 500 P.I.V., 1A diodes

ATTENTION

Independent Musicians

by Robert Carlberg and Craig Anderton

Powerful groups are lobbying congress for a surcharge on all blank tape sold in this country, as well as some types of tape recorders. While the motives are well-intentioned - namely, preventing wholesale violations of the copyright laws - there must be a better solution than penalizing everyone who uses cassettes, whether for data storage, dictation, sending demo cassettes to record companies, etc.

Record piracy is a problem, make no mistake about that. Many hard-working musicians are being deprived of the fruits of their labors. But the blanket solution proposed by various lobbies seems at best naive and at worst, highly counter-productive. If you agree, we urge you to send the following coupon, or better yet, a letter expressing your own thoughts in your own words to your representative and senator. You may find the address of these elected officials by calling any newspaper or the League of Women Voters chapter in your area.

Dear Senator/Congressman _____:

I am a musician with a tape recorder in my home, and I object to any attempt by the record industry to tax blank tape. Such a tax would unfairly penalize me and the thousands of other law-abiding citizens who use our equipment for our own music and other non-copyrighted materials. To levy an open-ended tax amounts to sentencing without trial, and I fervently hope that you will oppose any such bills, resolutions, or amendments which limit my freedom to record and distribute my own music. In limiting the distribution of non-copyrighted artists, the record industry risks stifling new artist development, which is the exact opposite of a solution to their current economic problems. Please consider my side of the issue before voting.

Sincerely,

Simulated Stereo: Problems and Solutions

By: Dave DeLeersnyder

We've heard a lot lately about running effects in series, in parallel, and in combination of the two. A setup I often use for home recording or performing involves splitting my chain of effects into two individual chains, and running each chain into either a separate channel of a tape deck or a stereo power amp and speaker system. This creates the illusion of spreading the instrument between the two stereo channels, so I call it simulated stereo - creating a stereo sound from a single sound source.

Before explaining the stereo setup in detail, I should describe my effects and how I normally set them up. All of my effects are low level devices which connect in series between my guitar and amp; I go through a distortion unit, combination wa-wa/volume pedal, Maestro phase shifter, MXR flanger, and EP-3 Echoplex.

For the stereo setup I made a little passive splitter box - simply a 1/4" input jack and two output jacks in parallel. From the guitar, I run as I normally do into the distortion unit and wa-wa/volume pedal. From there, I go into the splitter. From one splitter output, I go into the flanger and then to one amp head and its speaker system. The other output goes to the phase shifter, Echoplex, and then to a second amp head and its speaker system. For home recording, I run the flanger output into one of the stereo inputs of the recorder and the Echoplex output into the other input. (My recorder has high impedance microphone inputs which easily accept low level guitar or effects chain outputs.)

With a straight guitar signal, you get a mono signal - the same information from both channels. Using the effects before the splitter does not change this, since I like to have my distortion unit and volume pedal affecting both channels when I use them. Using either a phase shifting or time delay effect after the split-

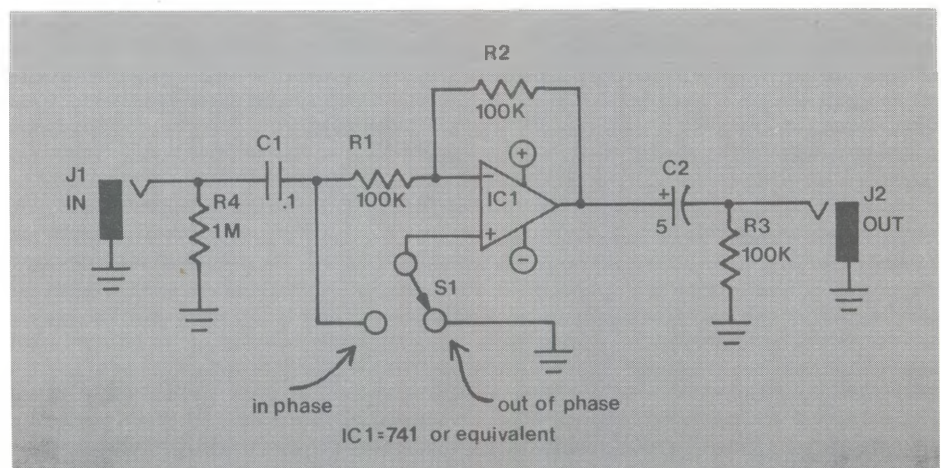
ter gives a stereo spread. With either of these effects on, the effect channel output is constantly adding and cancelling with the output of the straight channel. With both the flanger and phaser on and in opposite channels, the overall signal is constantly changing phase in a variety of combinations, depending on how the various controls are set on the individual effects; this results in a sound which is constantly floating between the two channels. Since the flanger is a time delay device as well as a phase shifting device, having it in the channel opposite the Echoplex means that you can vary the degree of time delay in both channels, adding more versatility to the overall sound.

Now for an interesting "problem" I ran into with this technique. While listening to a recording I made with this setup, I switched my recorder output from stereo to mono. The mono sound was very thin and there was a significant loss of level - the two channels were not in phase; but I also noticed that with none of the effects on, I was still out of phase. Turning on the Echoplex, the phase shifter, or both made no difference. But with the flanger on, the mono signal was full, with little difference in level between the stereo and mono

signals. This was true whether the Echoplex and phase shifter were on or not.

At this point, I decided to check each of my effects to see which one - or ones - were inverting the signal. I found that my EP-3 Echoplex and the wa-wa/volume pedal invert the output signal 180 degrees from the input signal. Neither of these effects are completely bypassed in the off position. The signal inversion of the volume pedal does not concern me, because I have always used it before the splitter. But with the Echoplex following the splitter, it always causes one of the stereo channels to be out of phase with the other. Upon examining the schematic of the Echoplex, I found that in the bypassed position, the signal goes through a single inverting stage before going to the output. With the echo effect in, the signal goes through an odd number of inverting stages, so that it is in phase with the straight signal, but out of phase with the input signal. Phase shifting devices, like the phaser and flanger, are constantly changing the phase of the signal when switched on. However, the output of the flanger is more out of phase than in phase with the input, while just the opposite is

Continued on page 35



Solo/Cut Circuit

Adds provision for Soloing individual channels
on the TASCAM Model 3 Mixing Board

By: Lindsay Haisley

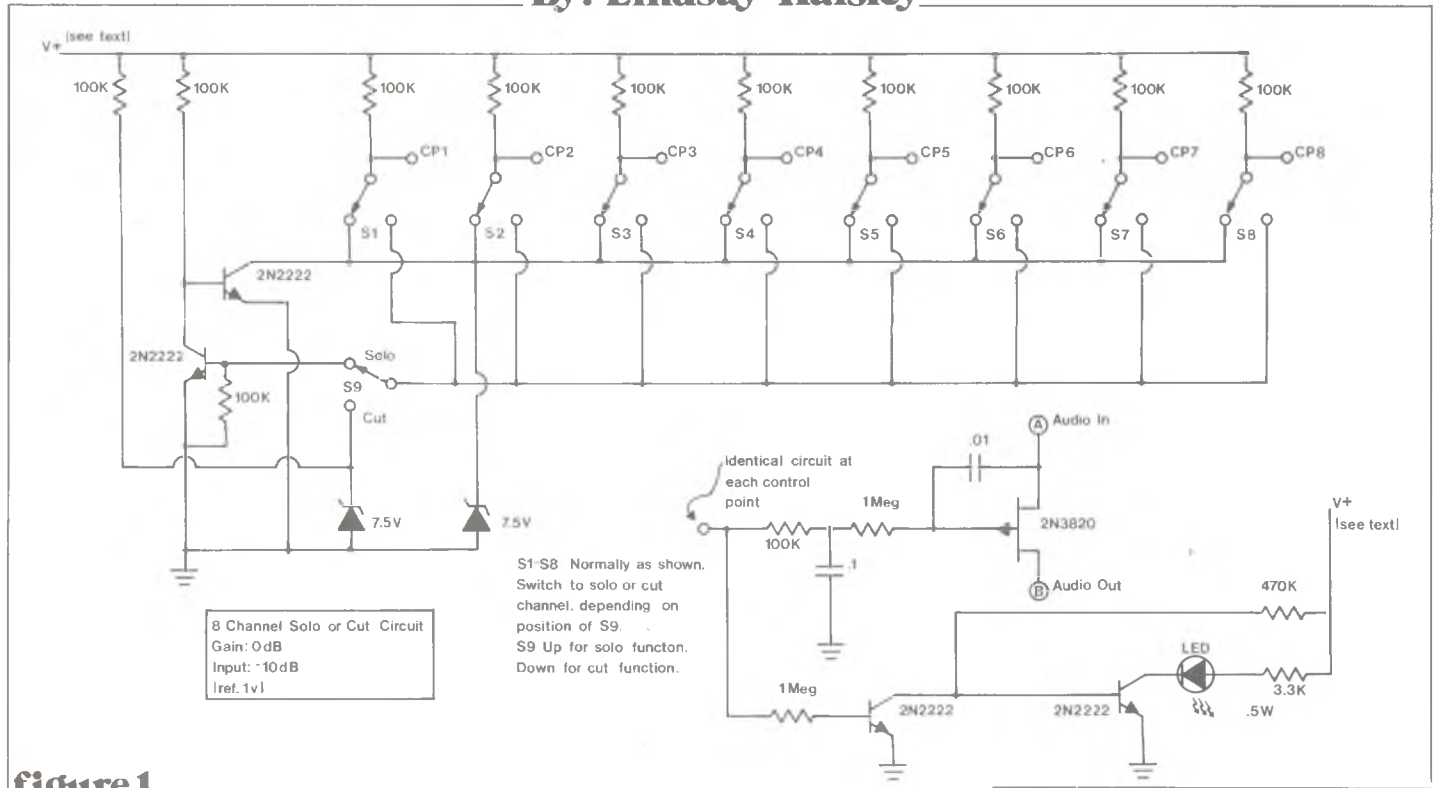


figure 1

I developed the circuit shown in figure 1 for use with a Tascam Model 3 mixing board which has no provision for soloing individual channels. If any of the switches S1 - S8 is toggled, only the signal on that channel is passed, and all other channels are cut. Switch S9 reverses this function, so that S1 - S8 cut off channels, leaving the others on.

The circuit will run off a wide voltage range. I run it from +33V DC, which happens to be the voltage of my phantom power supply. Any phantom power voltage from +18 to +40 Volts would probably work okay. This circuit has the additional advantage that if no voltage at all is applied to the circuit, it becomes completely transparent. All channels are on and the circuit is passive.

The network in the lower right quarter of the diagram is repeated eight times and attached to each of the control points (marked CP). The choice of the 2N3820 is dubious, since this

transistor is no longer manufactured (TI was the only manufacturer); however, big supply houses still have stocks of it. If you have trouble finding the 2N3820, any P-channel FET which is totally cut off at 7.5V will do. N-channel FETs will also work if you rework the circuit to run from a negative supply, but it will no longer be compatible with standard phantom power supplies.

I wanted to use SPDT pushbutton switches (push-push) for S1 through S9, but these are also rare birds. I settled for mini-toggle switches.

When wiring the circuit into the mixer, there are a few things to look out for. All FETs have limited dynamic range, and will not pass large signals without significant distortion. Therefore, the best place to wire in the FETs is right before the summing junction of the main op amp used to mix together the various channels (see figure 2). The

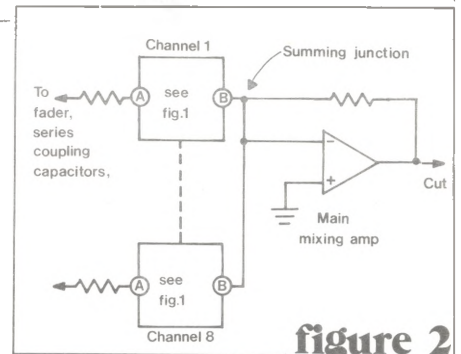


figure 2

voltage appearing across the FETs is quite small - in the millivolt range - and therefore distortion is not a problem. Incidentally, this is something to keep in mind whenever using FETs to switch signals which are greater than several hundred millivolts.

(Editor's note: The 2N3820 PFEET is available for \$0.45 each from Solid State Sales, PO Box 74P, Somerville, MA 02143. Minimum order \$5; add 10% postage for orders under \$25. For more information, call 617-547-7053.)

The Snare + Drum Voice

By: Thomas Henry

I used to think synthesizing drum sounds was easy. That was before I tried it! As it turns out, percussive sounds are very difficult to synthesize in a useful way; and when it comes to home recording, you will find that not only are realistic sounds hard to generate, but they are also somewhat touchy to record...things like background noise, tape saturation, and bleed-through become critical issues. I won't be able to answer your recording questions here, but I can help you generate some realistic drum sounds.

I call this circuit the "Snare+" drum voice, because it does much more than just create snare drum sounds - it can generate sounds from tom-toms to space collisions. I'm not going to claim that this circuit duplicates a snare drum, bass drum, or tom-tom exactly; if you want "real" drums, you would be well advised to hire a real drummer with a real drum set. However, this circuit certainly suggests drum voicings more closely than any other percussive voice with which I've played.

Putting things into an historical context, early snare voices usually imposed an amplitude envelope on some white noise. The kindest thing that can be said about this type of circuit is that it indeed sounded more like a snare drum than, say, a bass drum. Later on, designers added in a simultaneous damped sinusoid with the white noise. This simulated the shell resonance common to all drums, and did wonders in improving the overall effect; it almost sounded like a drum. However, the sound was still "splatty". Circuits such as this never quite gave the impression of a drum stick striking a stretched drum skin. And that brings us to the first of the Snare+'s two magic ingredients: the strike tone. In addition to the two sounds mentioned above (the snares and the shell resonance), one must add in a strike tone to gain a convincing drum sound. The first time I saw

this in print was in an article by Roger Powell ("Practical Synthesis: Percussion Sounds", *Contemporary Keyboard*, April 1981, p. 51). After reading the article, I ran into the other room and tried out a patch derived from the article. I was amazed! For the first time in my life I could almost visualize a stick cracking against a drum head!

How is it done? The answer will probably surprise you. A very sharp envelope frequency modulates a pulse wave. The envelope has such a fast attack and decay time that you won't hear a sweeping tone; instead, you'll hear a "thud" if the VCO is tuned low or a "crack" if the VCO is tuned up higher.

As neat as this patch is, the major drawback is that it consumes two VCOs, one noise source, two VCAs, a mixer, two ADSRs and a VCF just to do one quasi-snare sound. That doesn't leave much left over to synthesize the rest of the drum kit! However, the Snare+ has been pre-patched to approximate the arrangement mentioned in Roger Powell's original article. One module does the job of many, which leaves the rest of the synthesizer free.

The second magic ingredient is the shell resonance modulation circuit. When you first strike a drum, the head stretches tightly, raising the resonant frequency. Upon removing the stick, the head goes back to its relaxed state, returning to its normal frequency. The resonance modulation circuit creates this effect by raising the shell resonance frequency slightly when the drum is first triggered, and decaying over time back its normal frequency. With short decay times (the best choice for a "realistic" sound), this frequency modulation happens too fast to sound gimmicky, although with maximum modulation, you can even get those "dooo-doooo-dooooo" electronic drum sounds which were so popular a few years back. In any event, when the strike tone and modulation are properly ad-

justed, the sound is uncannily like that of an acoustic drum.

How it works. Figure 1 shows a block diagram of the circuit. All of the "modules" marked with asterisks are internal to the SN76477, the main chip used in the circuit. As you can see, this chip just about does it all! First, the noise source creates the sound of the snares. Since this is a digital noise source, we can modulate the clock rate (see "Tricks With the SN76477, Part 2", *Polyphony*, July/August 1981, pp. 16-17, for more information on this). The sonic effect is very similar to a VCF closing down, so in the diagram this function is labelled "VCF". The "VCF" is modulated by an envelope produced by envelope generator #1. This creates the illusion of snares losing energy. The noise output can be further altered by the manual filter.

The SN76477's LFO, configured as a manually adjustable audio oscillator with optional modulation, creates the shell resonance sound. The output of this oscillator is a triangle wave, which is nothing more than a sine wave with 20% total harmonic distortion.

The impact noise is created by using the SN76477's internal envelope generator (set for a fixed, short attack and decay time) to sweep the VCO, which is also internal. The initial frequency can be adjusted by the "Impact Pitch" control.

Envelope generator #1 and VCA #1 are outboard to the SN76477. This pair has the job of imposing a final envelope on the mix of snares, shell resonance, and impact noise. The master envelope has a fixed attack time, but the decay is adjustable.

Looking at the block diagram, you'll see seven controls. By manipulating these in various ways, countless other sounds are possible. I think you will find this to be one of the most versatile percussive voices around. And unlike many such units, this one, with its impact tone and

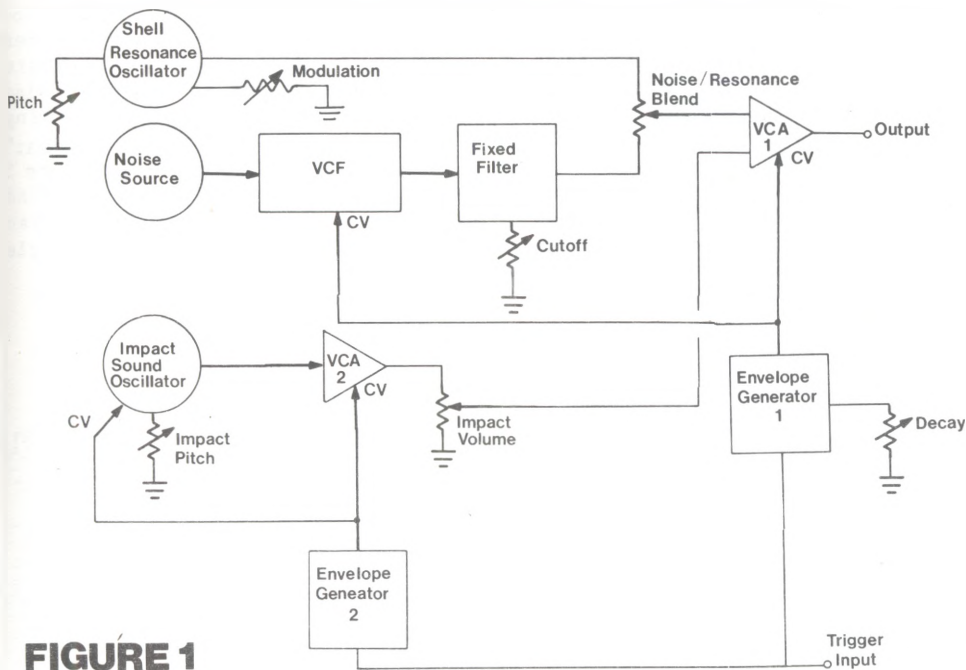


FIGURE 1

shell resonance modulation, really gives the illusion of someone drumming!

Nuts and bolts. Since the basic setup has been described above, we can breeze through the actual circuit operation. Look at figure 2. The heart of the whole circuit is the SN76477, which is powered by a dropping resistor from the +15V supply to pin 14. The SN76477's internal regulator takes this and produces +5V at pin 15 to power the sound generating circuitry. The other chips are powered by a bipolar +15V supply.

Taking a tour of the complex noise chip, Q1 forms a voltage control input for the noise clock. As mentioned above, this sounds like a VCF closing down when modulated. Q2 forms a similar voltage control input, but this time it is the impact tone VCO which is being modulated. Q4 acts in a similar manner to Q1 and Q2 and modulates the shell resonance frequency. Pin 8 is the output of the internal envelope generator, and this is the voltage which sweeps the VCO. The impact tone output is available at pin 13.

The shell resonance sound taps off C6/C2; a triangle wave appears at the output of A2. Since R33 blends the triangle wave and noise source together, this pot should have a linear taper to insure a smooth transition between

the two extremes. The noise/resonance blend and the impact tone are then summed by IC3, which is the master VCA for the system.

To form the master envelope generator, when the unit is triggered we simply dump some charge on capacitor C9 via diode D2. R5 sets the minimum decay time, while R34 gives a variable decay time. Q3 buffers the voltage present on C9; the voltage output of this buffer taps off the tie point of R7 and R10, which not only modulates Q4 via R41 and Q1 via R40, but is also converted to a control current by Q5. This control current then modulates IC3, the master VCA.

Op amp A1 conditions the input trigger, so that just about anything may be used to trigger the unit. C3 and R29 differentiate the trigger, thus narrowing the pulse width. D1, R6, and R11 chop the signal down to a 0 to +5V range, suitable for firing the SN76477.

Like other circuits shown in this column, the unit features a trigger level of +5V and an audio level of 10V p-p. If this is a bit hefty for your system, add a voltage divider to the output of op amp A4.

Construction details. There is only one critical area in the project. White noise can be diabolical in the way in which it

infiltrates other parts of a synthesizer. Be sure to include sufficient power supply decoupling to keep that noise from getting back to other parts of your system (this is provided by R1/R2 and C12/C13 in the circuit). In addition, if you have a long way to go from the circuit board to the front panel, be sure to use some shielded cable on any of the noise source related controls. Other than this, construction of the circuit is non-critical.

Construction can be carried out via any means you prefer. However, due to the relative complexity (caused mainly by a 28 pin chip), printed circuit construction is preferred.

All of the non-electrolytic capacitors should be mylar. For best results, use 5% tolerance resistors.

One quirk that you should be aware of is the unusual action of the impact pitch control, R21. Since the VCO internal to the SN76477 increases in frequency with a decreasing voltage input, the sense of R21 should be reversed; in other words, reverse the hot wire and the ground wire on R21 from the normal way of wiring audio pots. You want it wired so that turning the pot counter-clockwise moves the wiper closer to the hot side.

There are several ways to mount the Snare+, but a 1.75" high, 19" wide rack panel is probably your best option since all controls and switches fit easily in the available space (see Polymart for a source of these panels).

Using the Snare+. Of course there are zillions of sounds this thing can make, but to get you started here's how to create a quasi-snare sound. Patch in an LFO to the trigger input to fire the unit continuously (not too fast) for experimentation purposes. Hook up the output to a good amplifier and speaker. Now let's concentrate on the shell resonance. Start off by closing S1 and S2, then make sure that R22 and R36 are turned all the way down and that R33, the noise/resonance blend control, is set for resonance sound only. Next fiddle with R37, the resonance pitch control, until you hear a tone which approximates a snare drum with its snares turned off. Now add some more modulation by turning up R36. This may raise

the perceived pitch of the drum, so might want to readjust R37 downwards a little bit. (Incidentally, note that the modulation has less effect as you raise the shell resonance pitch via R37.)

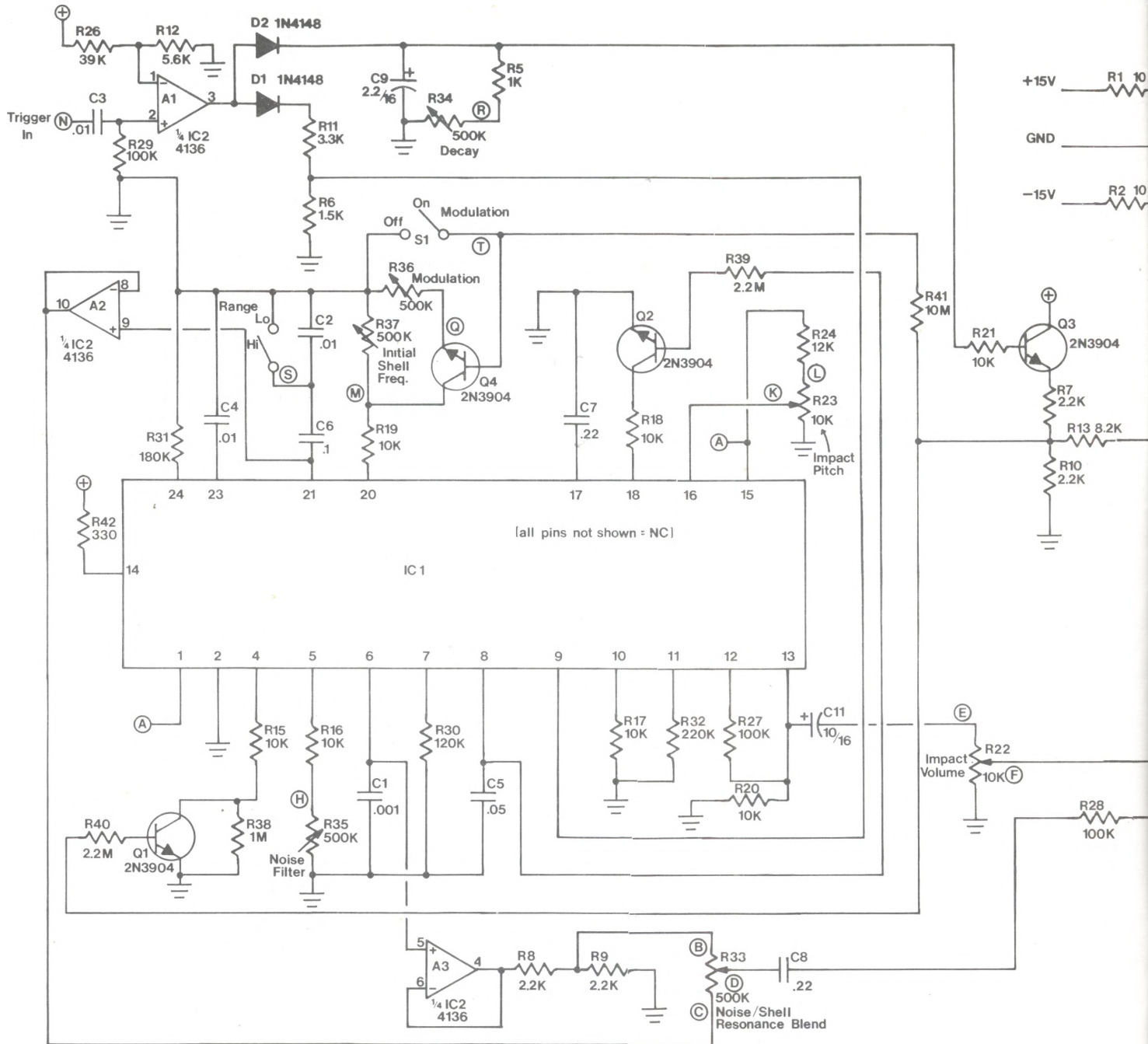
At this point, ease up on R22 to add in some impact sound. Adjust R23 to create an impact sound which sounds good with the chosen resonance pitch. The low end gives a dull "thud" while the high end gives a bright "crack"...some-

where in the middle is probably about right.

Finally, turn up R33 to add in some snare sound. Not too much; it's easy to overdo this control! Finally, adjust R34 to create the most realistic decay. At this point you should be hearing some sort of snare drum sound. Now go back and fine tune everything until it's "just right".

It's also important to note what some equalization can do for

the realism of this sound. The preferred tool would be a parametric equalizer (see related story in this issue), although other bandpass-type equalizers (state variable filters et al) will also do the job. Generally, boosting in the 1 kHz region gives a "fat" sound, while a boost around 2 to 3 kHz gives a real "sharp" sound which, incidentally, can also sound like handclaps with a little delay and short decay time.



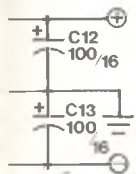
Of course, only an acoustic drum can sound exactly like an acoustic drum. Nonetheless, with proper adjustment (some of these controls work in a fairly subtle way) at some point, everything will fall into place and if you close your eyes, you'll swear you're hearing a tight, well-tuned snare drum.

As you experiment, try for a bass drum sound (similar to the above, but no noise source and

deeper in tone). You can get a good tom sound by adding a bit more modulation, and increasing decay time for lower-tuned drums and decreasing decay time for higher-tuned drums. By flicking S1 to the "hi" position, you can get a variety of bell/woodblock sounds. Then try some high hat sounds (white noise only, and vary R34 manually), some outer space drum sounds, and then try for...the sky's the limit!

DON'T MISS POLYTEST Page 23 FOR EDITORIAL COMMENTS ON THIS PROJECT

Copyright 1982 by Thomas Henry



Snare & Drum Voice
All resistors in Ohms
All capacitors in mfd
Op amp power supply connections:
IC2 pin 7: ⊖ pin 11: ⊕
IC3 pin 4: ⊖ pin 7: ⊕

○ (circle) keys schematic to circuit board legend
Point (A) connects to point (A)

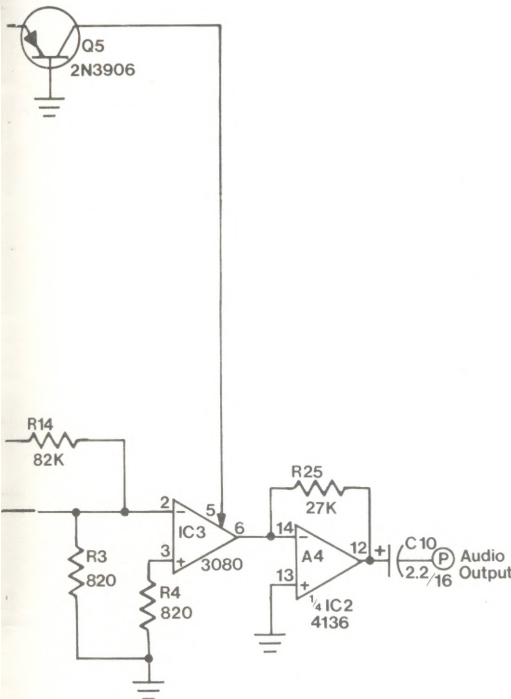


FIGURE 2

PARTS LIST

Resistors (1/4 Watt, 10% except as noted)

- R1, R2 10 Ohms
- R3, R4 820 Ohms
- R5 1k
- R6 1.5k (1k5)
- R7-R10 2.2k (2k2)
- R11 3.3k (3k3)
- R12 5.6k (5k6)
- R13 8.2k (8k2)
- R15-R21 10k
- R22 10k pot
(impact volume)
- R23 10k pot
(impact pitch)
- R24 12k
- R25 27k
- R26 39k
- R14 82k
- R27-R29 100k
- R30 120k
- R31 180k
- R32 220k
- R33 500k pot
(noise/shell mix)
- R34 500k pot (decay)
- R35 500k pot
(noise filter)
- R36 500k pot
(shell tone mod)
- R37 500k pot
(initial shell res)
- R38 1M
- R39, R40 2.2M
- R41 10M
- R42 330 Ohms

Capacitors (15 WVDC or greater)

- C1 .001 µF (1 nF)
- C2-C4 .01 µF (10 nF)
- C5 .05 µF (50 nF)

- C6 .1 µF (100 nF)
- C7, C8 .22 µF (220 nF)
- C9, C10 2.2 µF (2u2)
- C11 10 µF
- C12, C13 100 µF

Note: C1 is polystyrene or mylar, C2-C8 are mylar, C9-C13 are electrolytic.

Semiconductors

- IC1 SN76477 noise chip
- IC2 4136 quad op amp
- IC3 3080 amp
- Q1-Q4 2N3904 (NPN)
- Q5 2N3906 (PNP)
- D1-D2 1N914 or equivalent

Miscellaneous

- S1, S2 SPST switches
- J1, J2 Input and output jacks
- Misc. Panel, knobs, wire, solder, etc.

PARTS AVAILABILITY

A kit of parts for the "Snare+ Drum Voice" including all parts listed above (except for "misc."), and an etched/drilled circuit board, is available from PGS Electronics for \$29.95; orders received from Polyphony readers before 12/15/82 will be shipped postpaid. Order by phone (VISA, Mastercard, or COD; COD add \$1.50), or by mail. Please - all inquiries should be by mail.

PGS Electronics, PO Box 749-C, Terre Haute, IN 47808 (order desk tel. 812-894-2839).

INDEPENDENT RECORD MANUFACTURERS CONVENTION

By: Gilbert Trythall

More than 70 record manufacturers, 23 record distributors and 18 pressing plant operators, promoters, recording artists, and other interested persons attended the Annual Convention of the National Association of Independent Record Distributors and Manufacturers (NAIRD) at the Philadelphia Centre Hotel, June 3 through June 6. There were eight workshops following the keynote speech by Stan Marshall of Bainbridge Records; here are some of the highlights.

Session I: Marketing and advertising on a shoestring. Jack Iacchei of Polygram Distribution began the session with the observation, "The days of big advertising budgets are past". The problem now is "how to do more with less". His suggestions included shared promotions with radio stations and increased numbers of free albums for giveaways. The albums are mentioned and played on the air for only the cost of the albums.

Robert Miller of Lee Myles Associates stressed that ads must be run continually - one ad will not do it. "People are just beginning to see it when you are getting tired of it. Better to run ads consistently in one or two publications than to scatter them."

Bruce Iglauer of Alligator Records suggested that ads should be run in relation to an artist's concert appearances and coordinated with retail outlets in the area. He indicated that artist posters, display contests, and video promotional clips increase sales. Alligator now includes a postcard request for their record catalog in every record, which has increased direct mail sales.

Rich Nevins of Shanachie Records commented "College radio is where it is at". Augie Blume, head of a west coast public relations firm added, "Radio has

tightened up - they don't know what is happening to their audience". These observations were echoed throughout the convention.

Session II: Promotional alternatives. Philadelphia Daily News writer Jonathan Takiff stressed "Timing is everything in promotion". Mailings to press and radio stations should be made 4 weeks before the artist arrives, followed up at 3 weeks and 2 weeks before. Mary Armstrong of WXPN-FM, the PBS station at the University of Pennsylvania, agreed that "Coordination is terribly important". She also stressed the need for 8 X 10 glossies accompanying records for review. The picture can then accompany the published review. "Find out", she said, "who the people are that are aware of your interest area and contact them." Most non-profit stations make public service announcements of concerts, but be sure to send phonetic pronunciations of unusual names.

Wendy Newton of Green Linnet Records stated that from every 30 postcard returns packaged with their albums they receive two direct mail sales.

Session III: Overseas sales. The session covered export problems (tariffs and licensing agreements) in foreign countries. Chris Strachwitz of Arhoolie Records explained, "Record licensing is the way to go but you lose control". A record manufacturer in another country can be licensed to manufacture your record; but there is no guarantee of a true count of sales or timely return of the master tape.

Bill Schubart of Philo Records urged those interested in overseas sales to "attend MIDEM in Cannes, France the last week in January". Licensing agreements are made at MIDEM between manufacturers in different countries.

Chuck Nessa of Steeplechase Records stated that 40% of his

business is in Europe but "high interest rates have so affected the exchange rate that Europeans can no longer afford to buy them".

In answer to an audience question, the panel agreed that a lower royalty rate to artists on exported records is normal, and "mechanicals" (song royalties to publishers) are not paid on exported records - these are paid by the importer.

Session IV: Special interest groups (jazz, country, folk, blues, rock, and distribution). There was no electronic interest group - that remains for the future - so I visited the rock group and learned from Michael Minky of Slash Records that cassettes now constitute about one fifth of their total sales; eight track is dead.

Saturday opened dark, rainy and gloomy with the next session...

Session V: Entertainment law. Lloyd Zane Remick, Esq. (why does anyone use esquire after their name?), a Philadelphia lawyer and professional manager, provided an enlightening discussion of recording and management contract negotiations, stating that a good artist contract has clear time limits, clear statements of what each party is to do, minimal levels of earnings stated in terms of gross (never net which equals zero), limitations on expenses without approval, the right to inspect books and audits (hard to get), limitations on the rights of assignment, and input on the selection of a producer. Mr. Remick commented that 5% of retail was a livable solo artist record royalty rate. Superstars, of course, get more. Other areas discussed were agreements by a small label for distribution by a major label. He also stressed that artists as well as labels should have contract representation, but artists must understand that "little money is

made from record deals". Only 17% to 19% of all records return their investment, less than one record out of every five!

Session VI: Artist development. Jerry Jaffe of Polygram records opened with the observation, "If artists build up a sufficient following in an area they can pay out". But he added, "The complete dependence on radio has killed the record industry". Others stressed the necessity of artist touring to promote records.

Kari Estrin of Black Sheep (Dog) Productions observed that a manager must be a creative person who assists artists through stressing personal focus and goals. She outlined the use of graphics, free publicity, promotions, giveaways, and up-to-date mailing lists for successful artists development.

Jerry Jaffe added, "Radio is resistant to something new, yet the biggest records are for something that creates its own niche".

Lloyd Remick of Zane Management pointed out, "Most tours don't make money unless you are a superstar. A new group can't travel over a thousand miles because no one will pay the costs". In answer to an audience question, Mr. Renick stated that a manager usually charges 15% to 25% to "enhance the artist", while an agent charges 10% to get bookings. He emphasized that the roles of manager and agent are different and should not be confused.

Session VII: Distribution. Clay Pasternak of Action records urged all record manufacturers to include packing slips and invoices in all shipments and to send statements of account on a regular basis. He reminded the manufacturers, "Shipped does not mean sold". Distributors are reluctant to pay for records that are still in the warehouse or sitting in bins in retail outlets.

Robin Cohn emphasized the importance of album covers and packaging for sales.

Duncan Browne of Rounder Records urged labels to provide "as much information as possible as far in advance as possible" on new releases and immediate information on records deleted.

Richard Ferris of Square Deal Records recommended packing records extremely well with a separate packing list in every box, and not to use an LP or EP numbers with more than 6 digits. For shipments over 100 pounds, he suggested Deferred Air Rate - it

can be as low cost as trucking. Be certain that the company label, title, and numbering on the spine of the record is easily readable when stacked. Richard also warned against direct artist sales at concerts for less than list price since this undercuts retail stores and is self-defeating. Joan Pelton of Alcazar added that artists should not sell below list via mail order.

The panel concluded that cassette sales were increasing and distributors were willing to handle cassettes.

Session VIII: Video. The final session was devoted to the growing influence of video clips of rock artists on cable TV and its relation to the recording industry. Various cable companies - local, regional, and satellite are open to promotional video clips of commercial quality, for which they do not pay. Most discussed was MTV Cable, a subsidiary of Warner-Amex, which programs rock music on cable video in four million homes. Jazz and country music cable channels are also planned. Video audition tapes are submitted in 3/4" format, while broadcast tapes must be in the standard one inch broadcast format.

All in all, the NAIRD Convention revealed rapid change in the independent record industry - less reliance on commercial radio, more reliance on non-profit radio, cable video, and artist promotion. The convention, which also included evening social events and the "INDIE" Awards Banquet, was excellently organized by Sunny Richman of Richman Brothers Records, Philadelphia. Next year's convention is planned for Chicago.

Gil Trythall is synthesist, producer, and stock boy of Pandora/Synthe Records, his own label at Box 2281, Westover, WV 26505. His most recent release is Luxikon II/Echospace.

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The SSM 2011

Microphone Preamp/Level Detector

By: Ron Dow

(Editor's note: Over the past few years, Solid State Micro Technology for Music and Curtis Electromusical Specialities have been addressing the need for cost-effective, reliable synthesizer ICs. However, the world of music comprises a lot more than synthesizers, and now SSMT has introduced the SSM2011, an ultra low noise microphone preamp/level detector which directly addresses the recording and high quality audio systems market.)

The 2011 is an ultra low noise preamplifier which excels in high quality audio applications (such as low impedance balanced mic amplification). The input stage uses optimized biasing and geometries to yield a 2.4 nV per root Hz equivalent input noise, and a 110 dB common mode rejection ratio over a +5V input range. A single compensation capacitor provides a 200 MHz gain-bandwidth product (Gain=1000) and a 200 kHz full power bandwidth at Gain=10. The level detector section consists of a precision rectifier, two internally biased comparators, and two LED drivers. One LED output lights at 3 dB below a 5V peak output level, while the other lights only when the signal is within +10 dB of nominal output level.

Figure 1 shows a typical connection for a low noise mic preamp. The circuit is self-explanatory, however, one tip is that it's good practice to include ferrite beads on the input lines (pins 10 and 13). The compensation cap is optional, and eliminates slight peaking at low gains.

Note that for a gain of 10 (20 dB), $R_{in} = 15k$. Change R_{in} to 1.5k for a gain of 100 (40 dB), and 150 Ohm for a gain of 1000 (60 dB). R_{in} should be a metal film, 1% tolerance resistor.

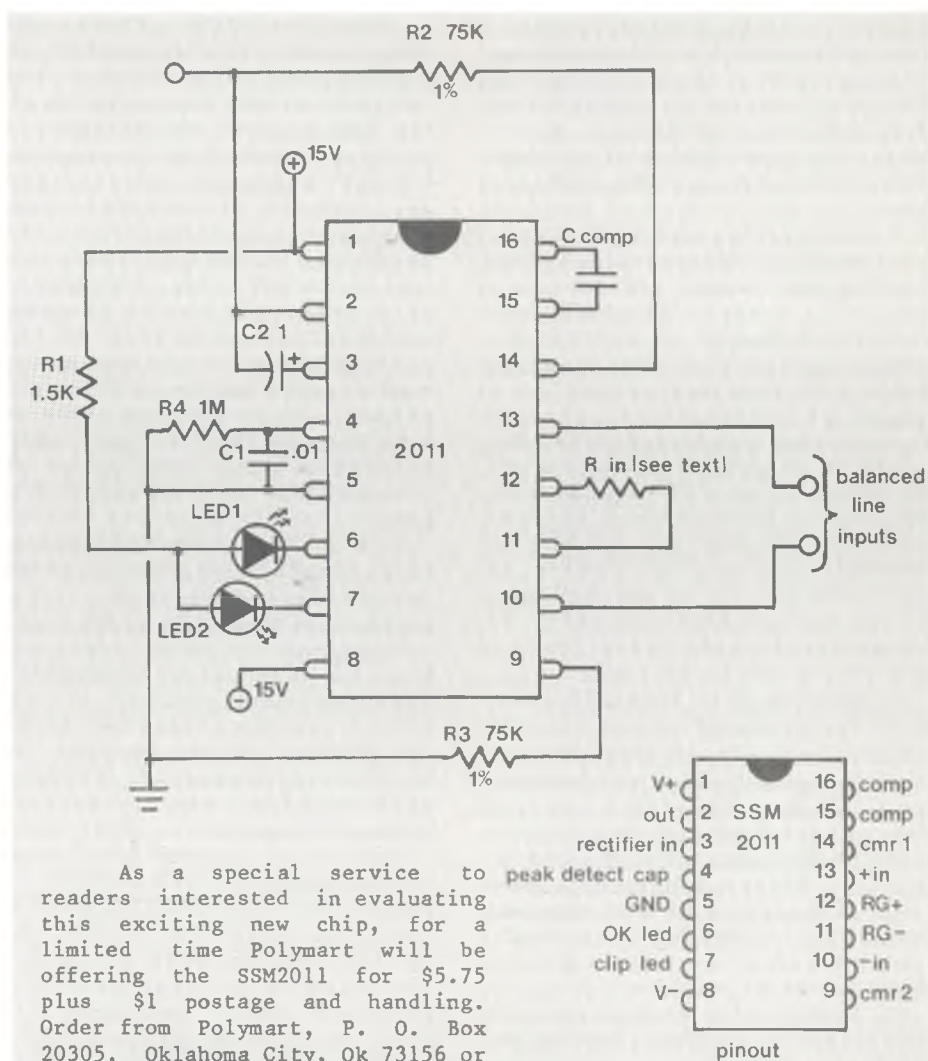


figure 1

SSM2011 MIC PREAMP PARTS LIST

R1	1.5k	LED1	Green (active) LED
R2*, R3*	75k	LED2	Red (overload) LED
R4	1M	IC1	SSM2011
R_{in}^*	see text		
C1	0.01 μ F		
C2	1 μ F @ 15V		
Ccomp	3 - 5 pF (see text)		

*Use 1% tolerance, metal film resistors.

Simulated Stereo: Problems and Solutions

Continued from page 26

true with my phase shifter. This explained why my mono signal was okay whenever I switched on the flanger; one channel was being inverted 180 degrees by the Echoplex, while the other channel was being inverted by various amounts (but more than 90 degrees) by the flanger. Therefore, both channels were more in phase than out of phase with each other.

What can be done about this phasing problem? For the most part, I could care less what the mono output sounds like, as long as I get the stereo sound I want. In fact, the signal inversion from my Echoplex may be responsible for the particular sound I get with my setup. But, if I were making a recording which I thought would be played back in mono (say, AM radio), then I would be concerned. The solution is to arrange the effects devices more carefully, or patch a module such as figure 1 in one of the signal chains to alter the phase if required.

This stereo technique may not be new or startling, but a lot of musicians have been interested in my setup, and hopefully the above discussion has also shed some light on the problems of using devices where phase integrity is not guaranteed.

re-view

Continued from page 14

This is serious stuff, formidable in both lyric and music. One track is even entitled "Suffer Bomb Disease" in Japanese, a testament to the guilt all humans should feel for the demonstration of nuclear weapons on civilian targets. If you're not afraid of music which demands complete attention, then you already have This Heat's first record and you'll want their second, too.

Eraserhead Soundtrack (IRS 70027). David Lynch, director of "The Elephant Man", did this

totally strange movie in 1976 which has become a cult favorite. If you've seen it you know the synthesizer soundtrack of hissing and rumbling perfectly matches the claustrophobic, dream-like atmosphere. If you haven't seen it it'll probably sound like so much noise. Now if someone would just release "The Last Wave" soundtrack...

Michael William Gilbert In the Dreamtime (POL NMS .02). The title comes from Peter Weir's 1978 movie, "The Last Wave", a riveting story about an English lawyer called upon to defend some Australian Aborigines. He ends up getting all caught up in their tribal rituals, including the belief that a separate existence links us all "in the dreamtime". This is just the sort of imagery Gilbert's music evokes, with its mixture of East Coast avant-garde, straight-ahead jazz, and ethnic influences from around the world.

Barry Truax Sonic Landscapes (Melbourne 4033); **Androgyne** (Melbourne 4042/43). Operatic singer, French horn, tape manipulations and computer synthesis combined with great reserve. Introspectively hits all the high points of the old school.

Electronic Music by Canadian Composers (Volume 1, Melbourne 4024; Volume 2, Melbourne 4027). With Truax (see above), these records adequately represent the breadth and depth of tape music coming out of Canada, possibly the world leader in non-keyboard electronics.

Phillip Perkins Neighborhood with a View (Fun 1002). Tape manipulations of sounds recorded around Perkin's apartment. Tends towards drones of mechanical noise.

Bulent Arel/Daria Semegen Music for String Quartet and Tape, etc. (Opus One 59). Four self-consciously modern pieces by two leading composers of the self-consciously modern school.

Harley Toberman Thoughts in Time (Production EFX Library 106). "A grabbag of tunes recorded in the wee hours with old friends", some up to 18 years ago. Toberman on keys (electronic and acoustic) with several old friends on occasional other instruments. It'll represent him well at his next high-school reunion.

Kit Watkins Labyrinth (Azimuth 1001). Imagine National Health without vocals and you've got a good approximation of the solo album by Happy the Man's keyboardist. Tight, fast, dazzling, etc.

Sir Horatio Abracadabra/Sommadub (Mix 1T, single). A 12" 45 of "dub" style remixed reggae. Heard at 33 (by accident) it sounds like Eno meets Jah Bunny.

Scientist Scientist Meets the Space Invaders (Greensleeves 19). The most extreme of the "dub" artists, Scientist completely fillets and flambes his source tracks. Disconcerting. Disorienting.

Chuck Larrieu Beacon Star (cassette). The quintessential home-produced electronic music. Side 1 is fairly upbeat, mostly echoing percussive patches and side 2 is a bit more reflective, drones and quiet tunes. Both are like home cooking: the finest ingredients blended with loving care, nutrition more important than packaging. \$5 postpaid from PO Box 294, Corte Madera, CA 94925.

John P. Lamar Dreams and Nightmares (cassette). With charming honesty, a 4 track and a couple of small synthesizers, Lamar plays two classical transcriptions, some semi-classical originals and several more-abstract tone pieces. Neither the performance nor the program notes are particularly polished, leading to an unusually vivid experience. \$7.50 postpaid from JPL Sound, PO Box 215, Caldwell, NJ 07006.

Bruce Moody Fresh Out! (Mood Music, e.p.). I suppose I really shouldn't review this, since Moody is a rock guitarist who looks and sounds like he's aiming for mass acceptance. But what the Hell.

Godley & Creme Snack Attack (Atlantic 19341 - known as "Ismism" overseas). Meaningless rapping over synthesizer sample and hold. To be honest, it's a bit more than that - but it's certainly not the production masterpiece their first 3 albums were.

Kitaro Silk Road (Kuckuck 051/052). Two big black pills of cosmic muzak: ascending and descending scales on keyboard synthesizers. Could be beneficial to insomniacs.

Continued on page 37

Ambience in Electronic Music

By: Don Arney

One of the few things which has annoyed me over the years about electronic music is that performers will spend hundreds of hours perfecting voices, patches, effects, etc. - and spend many more hours in the recording process to perfectly capture the essence of their compositions - yet completely disregard the use of ambience as an effective compositional and performance tool.

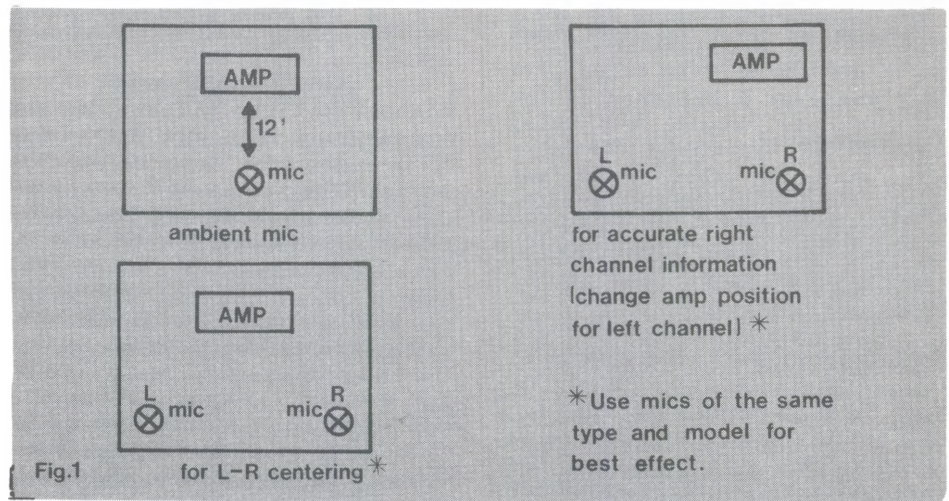
Ambience involves creating spatial dynamics in a recording, or in other words, giving the listener enough of the proper auditory stimulation to create an acoustic vista from which the music emanates. The ideal is to make the listener forget that any transducers (speakers, headphones, whatever) are between the music and the listener.

In almost any performance, leaving out this acoustic information results in a dry, emotionless quality that soon has the listener in the throes of acute psycho-acoustic fatigue. Try to imagine E. Power Biggs recording in an anechoic chamber with the St. Mark's organ. Rather drab, isn't it, despite the dynamics of the performance?

With this concept in mind, here are a few hints to help improve the listenability of your recordings.

Panning. The most obvious and common way to create an audio panorama is with the "panpot" on your mixing console for left/right/center information, although some people forget that there are more than those three positions (L/R/center) to which this knob can be adjusted! The major drawback to the use of the panpot for left-right positioning is that the ear depends mainly on phase information, not upon level, for detection of the location of a sound. So, while a sound could be coming from the right speaker, the ear may not be able to accurately pinpoint the image.

Reverb. Reverb creates the illusion of a large hall or auditorium. I feel that most of you know what reverb is and what it can do, so I won't dwell on the subject except to say that signal



processors can work well with reverb. For example, adding about 80 ms of delay before the reverb gives a nice "pre-delay" effect which is very popular. Adding EQ after the reverb can also alter the character of the sound for specific applications.

Room ambience. The major reason that electronic music sounds lifeless to the average listener is that the synthesizer is usually taken direct to the mixing console, thus maintaining the frequency response and tonal qualities that the average musical amplifier cannot handle. Of necessity, this bypasses the use of microphones which would record not only the amplifier, but also, some of the room characteristics.

If, however, you take not only a direct feed to the console, but also a "live" mic placed in the room with an amplifier, you will capture the best of both worlds: the clarity of the direct line and the ambience of the microphone. Left and right information also can be manipulated with the use of a matched pair of microphones placed in the room. Figure 1 shows some examples which make effective use of this technique.

Digital/Analog delays. Digital and analog delays can create unbelievable acoustic sensations when set, and used, properly. A lot of musicians tend to get in the rut of merely using delay lines as an effect, such as for echo, flanging, and so on, thus

totally disregarding some of the more subtle nuances. One of my favorite tricks is to pan the unaltered source either left or right and have the delayed signal only panned 90 - 180 degrees opposite the dry signal. The delay times you use make a significant difference in the effect of spatial depth; the longer the delay time, the wider the apparent "stage" that you create. Try mixing dry and delayed signals at different levels and you will find some interesting spatial effects.

Combining the above techniques. Of course, the most awesome effects come from combining all of the above techniques. You could try taking a direct signal and panning towards the left (or right) side and using a microphone in a room with an amplifier, panning it more towards the center, while delaying the signal 50 to 70 milliseconds and panning this signal towards the right (or left). Adding the right amount of reverb behind all of this can give the illusion of tremendous stage depth and width.

In summing up this article, I would say that including these spatial cues in your recorded work will give life to an otherwise listless listening experience. One last word: after you have made a recording in this manner, try listening back on a system equipped with a Carver Sonic Hologram Generator™. The results are staggering!

re-view

Continued from page 35

Prince **Dirty Mind** (Warner Bros. 3478); **Controversy** (Warner Bros. 3601). Much has been made of Prince's electronic keyboard work lately, but it is his guitar and falsetto singing which dominate these fast dance tracks with sexually-liberated lyrics. The productions are so clean it prompts me to turn them up farther than anything since Brand X's first record, and Prince plays all the instruments himself. Amazing.

Gowen/Miller/Sinclair/Tomkins **Before a Word is Said** (Europa 2007). The "Canterbury" musicians are close-knit group of about a dozen musicians who, between them, account for most of the tastiest English jazz on record. This permutation, unfortunately the last recorded work of keyboardist Alan Gowen before succumbing to leukemia last year, highlights the smooth bass work of Richard Sinclair, the just-so guitar of Phil Miller and of course the pitch-bending minimoog of Gowen - gone but not forgotten.

Dave Stewart and Barbara Gaskin **It's My Party/Waiting in the Wings** (Platinum 001; 12" single). Former Hatfield and Northette do a fairly straightforward rendition of the old Leslie Gore standby on side 1, except that all instrumental parts are played on a Prophet 5. The flip side is a Stewart original in much the same vein, and on both Stewart pushes himself and the Prophet into harder sounds than either is known for.

Laurie Anderson **Big Science** (Warner Bros. 3674). Warner picked up Anderson's single "O Superman" after it became a huge hit in Europe, and now has decided that she is America's Next Big Thing. Rarely do I agree with the corporate mentality, but for once I hope they're right. Anderson's restrained, enormously imaginative songs might be too weird for middle American to grasp, but there's still a sizeable potential audience which cuts across all boundaries except appreciation for talent. Oberhiem OBXa synthesizer, Farfisa organ, and assorted violins, bagpipes, marimbas, and

horns accompany her cryptic vocals and tapework.

Codona **Codona** (ECM 1-1132); **Codona 2** (ECM 1-1177). Codona is the trio made up of the names and unconventional talents of Collin Walcott, Don Cherry, and Nana Vasconcelos. Playing a variety of unusual acoustic instruments, their music ranges from Jon Hassel-like dreamrones to bursts of pure sound experimentation. Honorary electronic music albums.

Moebius & Beerbohm **Strange Music** (Sky 071). Mobi has always been the strange half of the duo Cluster, but at least his collaborations with Roedelius, with Conrad Plank and with Brian Eno have resembled music. This album is almost pure noise, apparently caused by fuzz guitar, fuzz bass, and/or fuzz electronics. He is backed by a simple bass and drum patterns similar to his Plank collaborations, but the tracks run too long and present too little. I don't know who this Beerbohm chap is, but I think he's a bad influence.

Beethoven/Bowen/Mueller/Bestor **Oboe Music** (Orion 82432). Composer Charles Bestor sent us this album, but it is mostly a showcase for oboist Charles Lehrer. Starting with, of course, Ludwig Van, the pieces get progressively more modern until Bestor's duet for oboe plus tape. Let's see, that would be 1958 I believe.

Steve Winwood **Arc of a Diver** (Island 9576). Though a major release by a long-established rocker, **Arc** is distinguished by having been recorded at home with all the instruments, including lots of synthesizers, played by Winwood. Puts synthesizers and home recording in sort of a different light.

Kraftwerk **Computer World** (Warner Bros. HS-3549). After the success of their fourth album, Kraftwerk unfortunately started trying to duplicate the success of "Autobahn" by duplicating everything else about the album. Several reviewers have called **Computer World** an improvement over the intervening four albums, so I took a chance on it. There is some unusual disembodied electronic talking throughout, but the tracks are still too drawn-out and bereft of inspiration for my taste. And when are they going to get tired of pretending to be robots? You just can't trust reviewers.

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1	Preamplifier (less XLR and VU)	\$22.95	\$20.65
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24	Tube Sound Fuzz	\$24.95	\$20.65
25	Envelope Follower	\$26.95	\$24.25
26	Spuller (less optional parts)	\$14.95	\$13.45
27	Noise Gate	\$32.95	\$29.65

ADD \$3.00 POSTAGE AND HANDLING WITH YOUR ORDER.

These are kits of parts and circuit board only, to allow maximum flexibility in their application no cases or enclosure are included. Instructions for the assembly of each item are part of the book **Electronics Projects For Musicians** (\$14.95 plus \$1.00 postage) and are not duplicated with the kit.

CHARGE TO VISA OR MC TOLL-FREE
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ARIES: Keyboards - \$125 each, VC phasor, ADSR, dual LFO, S/H, clock, noise, balanced modulator, lag, inverter - \$350. OBERHEIM: expander modules - \$350 each, analog sequencer - \$200. STRIDER digital sequencer - \$200. YAMAHA CS-60 \$950. Write R. Owens, 170 Kenner Ave., Nashville, TN 37205

FOR SALE: 8700 Computer with PS-87, CS-87, and MUS prom; Assembled and tested by PAIA: \$185.00. Also available EKx-3, Quash, 8785 DAC, and Phlanger: Make offer for each. Doug Chandler, P.O. Box 365, Albemarle, NC 28001, (704) 982-9552

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Part

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We offer a complete project kit which includes etched and drilled circuit boards, electronic components, pots, switches, etc. NOT INCLUDED is pos/neg 15V power supply, wire, enclosure, and knobs. We recommend that you send for a reprint of the original article as it appeared in Guitar Player Magazine before you decide to order. The project is not for beginners.

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SPECIAL NOTICE

For those of you interested in the "SNARE +" DRUM VOICE KIT: Enclosures and Rack Mount Panels will be available in early December. The units will be screened (legended), punched, and ready for control mounting!

Please read below for more info.

"SNARE +"

Drum Voice Project Kit

For complete information on this unit see Thomas Henry's "Practical Circuitry" column. We offer a project kit consisting of all parts and components, etched, drilled, and legended circuit board, pots, switches, etc. NOT INCLUDED with this project kit is the power supply, enclosure, wire, or knobs.

NOTE: Enclosures and rack mount panels are being made! (See above.) Once available, you will be able to order either one separately. Ordering info will be included with the project kit.

SNARE + project kit29.95
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TL062CP	A	.99
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TL072CP	A	.96
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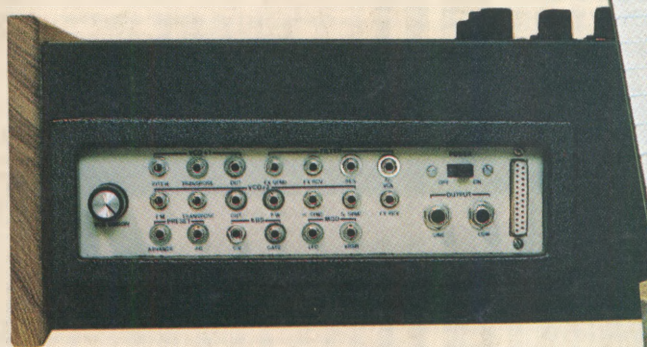
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PROTEUS I™

PROGRAMMABLE PRESET
LEAD SYNTHESIZER

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We had a lot of ambitious goals in mind when we began designing the Proteus I synthesizer.

We wanted, first of all, to provide a quality piece of equipment that would offer wide range precision and quiet, pure performance. So we designed Proteus around the world recognized Curtis Electromusic Chip Set to realize Oscillators and Filter with 12 octave range, transient generator segments out to 30 seconds long, exceptionally low noise and clean sound. Qualities you need for serious production work.

We wanted it to be easy to use on stage or in the studio. A keyboard that would let you get just the sound you wanted RIGHT NOW, without a lot of knob twiddling and switch throwing. So we gave Proteus 16 presets and simple controls that let you quickly and easily step from one preset to another or instantly switch between presets.

We knew you wouldn't want you to be locked into factory canned presets so we added an easy programming facility that let's you play with the sound and develop just the tone color, texture and feeling that you're after before saving the setting of every knob and switch with the push of a single button. And Proteus's internal memory keep-alive battery means that the preset will still be there even after months of power-down storage.

We knew that any normalization plan, no matter how clever and well planned, must in subtle ways define and restrict the kinds of sounds that a synthesizer can make. So after spending months developing and refining an exceptionally versatile normalization plan, we added the most liberal collection of patch over hardware points that you'll find on any synthesizer. The patch bay lets you integrate external processing elements into Proteus's signal path. Or interface to a wide variety of analog controllers like sequencers and function generators. Or

use optional footswitches to control preset functions. Or respond tomorrow to needs that you can't even imagine today.

We wanted Proteus to have a computer port that would set the standard for versatility and ease of use. While the interfacing provisions of some synthesizers are "tacked on", forcing you to choose between keyboard or computer control (but not both) and forget about front panel controls completely. The Proteus interface doesn't put the computer between you and your music. It puts the computer where it belongs, at your side to help when you want it to store or retrieve presets or keyboard sequences and completely out of the way when you don't want it. There aren't even any switches to throw, to use the computer, just plug it in.

We wanted to design a piece of equipment that despite its high-tech complexity would be easy to assemble and service, so we broke assembly down into small easily digested chunks with simple tests along the way that lets you monitor your progress and go from step to step with complete confidence.

To get the full details on the power and versatility of PROTEUS, send for your PROTEUS Using/Assembly Manual today and you'll also receive Craig Anderton's 20 minute demonstration cassette, [the cassette alone is worth the price] \$10 refundable on kit purchase.

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