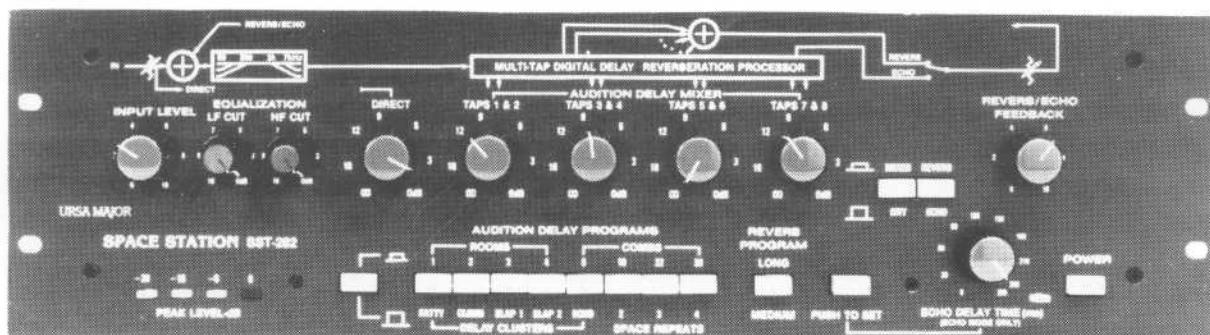




# SPACE STATION™

## SST-282



### Owner's Manual

# SPACE STATION™

## SPECIFICATIONS

Input Active differential input, 10K ohms High pin, 20K ohms Low pin, XLR-3 connector. Sensitivity at 1kHz for 0dB LED is 0dBm minimum.

Outputs Single-ended from op-amp, source resistance 47 ohms, minimum load resistance for +18dBm is 600 ohms, XLR-3 connectors.

### Specifications for Delay-Only Mode

Measured from input to output, any single Audition Delay Tap.

Frequency Response 20-7kHz, ref. 1kHz at -3dB re 0 LED: +1/-4dB  
20-6kHz, ref. 1kHz at -3dB re 0 LED: +1/-1dB

Dynamic Range 80db minimum, 20-20kHz noise bandwidth.

Total Distortion and Noise 0.1% typical, 0.2% max at 1kHz, just below 0dB LED threshold, including quantizing noise.

Preemphasis/Deemphasis none.

Delay Settings 16 programs of 8 delay tap times, pre-programmed to 1ms resolution over range of 1 to 255ms.

Sampling Rate 16kHz nominal.

### Specifications for Reverberation Mode

Decay Time Zero to 3.5 sec maximum at 500Hz, 1/3rd octave pink noise, with HF and LF Equalization set flat, Long reverb program, and Room 4 delay program.

Equalization +0/-10dB, shelving at 20Hz  
+0/-10dB, shelving at 7kHz

### General Specifications

Size Standard relay rack, 19 x 5-1/4 x 9" (48.3 x 13.9 x 22.9cm), excluding rear protrusion of connectors. Weight approximately 10lbs (4.5kg)

Power 115/230VAC, 50/60Hz, 30 watts nominal. Detachable international power cord. Regulated supplies retain regulation down to 95VAC for international use. 100/200VAC unit available on special order.

Environment 10-40 degrees C operating, 0-70 degrees C storage; RH up to 95% non-condensing.

# SPACE STATION™ SST-282

## WHAT IT IS AND HOW IT WORKS

The SPACE STATION is an advanced signal processor using time delay techniques to transform a mono source into a new, stereo, output signal. It is as different from earlier delay units as the complex reverberant sound of a room is from a single repeat of a sound slapping off a wall. Where traditional DDL's have only one or two taps, the SPACE STATION has many ---eight are used only for listening, and are called Audition Delay Taps, while others are used to synthesize reverberation and echo. The SST-282 can be compared to a special multi-head tape recorder, operating with a loop of tape 255mS long. The tape corresponds to the SST-282's digital memory, and the multiple playback heads to its multiple taps. The eight Audition Delay Taps are placed along this imaginary piece of tape to a resolution of one mS, and can be repositioned at will to any of 16 pre-programmed patterns. You have continuous control over another tap, the Echo tap, which can be set from 1 to 255mS and fed back to the input to create the traditional effects of tape loops. Two programs of Reverberation Tap delay times can be selected as well. Proprietary internal programming randomizes these taps so that they can be stably fed back to produce reverberation. The equalized sum of these taps appears at a pot (REVERB/ECHO FEEDBACK) where it can be adjusted to create any decay time from zero to about 3.5 seconds.

An important part of the SPACE STATION's fundamental concept is contained in the two groups of delay taps, one for auditioning and the other for reverberation. They operate independently of each other; that is, the Audition Delay Taps set up a way of hearing the contents of the memory, while the Reverberation or Echo Taps when fed back determine the kind of reverberant sound existing in the memory. Each acts independently so that endless varieties of sound can be created. For example, a sound approximating normal room reverberation may be set up by feedback, and then auditioned with any one of the 16 programs to sound like rooms, like a slap, an echo, or even a reverberating comb filter. Or, a comb-like reverberation effect can be set up by feedback, and then auditioned in a room. another comb, or as echo, slap, etc.

Even more versatility derives from the built-in mixer, where Audition Taps may be mixed in any desired ratio to emphasize earlier reflections, to delay the onset of reverb, etc. The possibilities are many, yet the front panel layout is spacious, uncluttered, and intuitive, due in part to the flow chart screened on the panel above the controls. The control functions were carefully chosen to balance adjustability, with its endless freedom, against pre-programming, with its convenience. For example, consider the advantage of not having to enter eight delay time values for each program, values you either guess or look up somewhere. Then realize that all the EQ, mixing, and feedback functions are self-contained--you don't have to tie up large sections of a console, or untangle a patch-bay.

### SOME DESIGN INSIGHTS -- BUT NOT TOO MANY

The SPACE STATION was designed by an engineer with a broad knowledge of both analog and digital technologies, who could choose and successfully use each to its best advantage. So, memory is digital, since with good A-D conversion, noise, distortion, and dynamic range will be excellent, with no degradation as a function of delay time. Also, with RAM memory, access is fast and to very fine resolution, permitting many taps and the randomizing algorithm. A-D and D-A were a challenge: how to accomplish, at a modest cost, the high speed A-D and the many D-A's required each sampling period? A special set of converters had to be designed, proprietary to URSA MAJOR, that met the speed requirement and permitted a full 80+dB dynamic range and total distortion and noise better than 0.2% at maximum signal level -- and with no analog companding.

Perhaps the most arcane and interesting technology in the SPACE STATION is hidden in the techniques used to randomize the reverberation delay taps. We consider it highly proprietary, so little more will be said. But any worker in the field who has ever tried to create reverberation by fed-back delays knows that this is no mean trick.

### SETTING THE UNIT UP FOR OPERATION

UNPACKING: As soon as you receive the carton containing your SPACE STATION SST-282, inspect it carefully for signs of shipping damage. Then, open the carton and check the unit for damage. Report any shipping damage to the carrier immediately, and file a claim. Although, in most cases, we insure our shipments, it is the consignee's responsibility to initiate a claim for shipping damage. Save the carton and all packing material in case return to the factory is ever necessary.

POWER: The SPACE STATION operates on 115/230VAC, 50/60Hz. A sticker on the rear panel indicates how your unit was set at the factory.

If the unit was not received directly from URSA MAJOR, or if there is any question about the actual setting of the internal voltage selector switch, remove the bottom cover (10 screws) and check the switch setting before connecting the unit to 230VAC. The 3-wire plug furnished with the U. S. units is an important safety feature: do not cheat the ground pin. There is an internal line fuse, 3AG SLO BLO, 3/4A (115V) or 3/8A (230V). A spare fuse is packed with each exported unit.

INSTALLATION: You can either rack or table mount the SPACE STATION (height is 5-1/4", and depth about 8" without connectors). If you use it on a table, fasten the four feet provided to the bottom cover (in the corners) by peeling the paper off the mounting surface. The feet will increase the height of the unit, and should not be used if the SPACE STATION will be rack mounted. Maintain adequate clearance for air flow at the sides and top of the unit. It is not recommended that you mount the SPACE STATION above high-power, hot components, such as power amplifiers.

#### INPUT AND OUTPUT CONNECTIONS

The input of the SPACE STATION is a 3-pin female XLR connector, with pin 1 ground, pin 3 high, and pin 2 low. The input is balanced, into a differential op amp input with 10K resistance for pin 2 and 20K for pin 3 (each in series with 4.7uF). The maximum input signal is 7Vrms, while the source impedance should be 600ohms or less. Input wiring options are listed below:

Unbalanced- Signal to pin 3, pin 2 grounded: Sensitivity 0dBm, output in-phase.

Signal to pin 3, pin 2 floating: Sens. +6dBm, output in-phase.

Signal to pin 2, pin 3 grounded or floating: Sens. 0dBm, output out-of-phase.

Balanced- Signal to pin 3 high, 2 low: Sens. 0dBm, output in-phase.

Signal to pin 2 high, 3 low: Sens. 0dBm, output out-of-phase.

The output are two 3-pin male XLR's, with pins 1 and 2 ground, and pin 3 hot. (On early units, pin 2 was hot, pin 3 open, and pin 1 ground - check the back panel designation if in doubt). The output drive is from an op amp (Signetics 5534) with good slew and current drive capability, protected by a series 47 ohm resistor and 22uF capacitor. It will drive at least +18dBm into a 600ohm load (minimum recommended). The nominal 1kHz output level from a single tap set to full clockwise at the mixer is +6dBm.

## CONTROLS AND FEATURES

INPUT CONTROLS: The INPUT LEVEL control adjusts gain so that a wide range of source levels can be connected. Changes in this control don't upset the mixing ratios. A four LED PEAK LEVEL indicator shows signal levels at 0 (overload), -6, -15, and -30dB in the digital domain, and is a true peak sense-and-hold-circuit. It permits easy and secure setting of the proper operating level.

Normal operation results in frequent lighting of the green -15 LED, and occasional lighting of the yellow -6 LED, and only rare flashes of the red 0 LED. The indicator examines the output of the A-D to determine signal level, catching level increases as brief as 62 $\mu$ S and holding them for about 100mS so that they will be visible. As long as the 0 LED doesn't light, no digital overload has occurred. Further, signal operating levels in the various analog circuits (mixer, filters, etc.) have been carefully set so that they will not overload regardless of the number of taps summed, delays chosen, or signal frequencies and phases. So, the single indicator will safely maintain undistorted operation throughout the unit. (However, input signals at the XLR in excess of about 20V p-p will result in overload of the input stage, and should be avoided).

EQUALIZATION: A simple shelving equalizer is placed in the circuit so that high and/or low frequencies applied to the processor from the source, or from feedback, can be attenuated to simulate rooms with more absorbent walls, or smaller volumes. It changes the relative decay time at high and low frequencies.

The two equalizer controls, HF Cut and LF Cut, act on any signal going into the Digital Processor; i. e., they act on the Direct signal coming from the INPUT LEVEL control, and on any feedback signals mixed via the REVERB/ECHO FEEDBACK control. With no signals fed-back, any sound going into and through the Digital Processor is simply equalized once, but with feedback each successive pass through the unit is re-equalized. This is useful because it gives a means of adjusting the decay time of high and low frequencies relative to the midband (about 500Hz). For all intents and purposes, these EQ controls are variable corner 6dB/octave filters.

AUDITION DELAY TAPS AND MIXER: The Delay Processor has one input, fed from a mixer where direct and fed-back signals are combined, but it has many outputs, or taps. Eight of these taps are called Audition Delay Taps because their sole function is for mixing into the final signal that is returned to the console. These 8 taps are never recirculated and have no role in reverberation or echo feedback effects;

thus they can be adjusted independently from any feedback adjustments. The 8 taps are paired, and each pair (1&2, 3&4, etc.) is returned to a dual audio pot in the AUDIO DELAY MIXER. The odd number taps are mixed together and sent to the left output channel, while the even number taps go to the right output channel. In addition, the Direct signal is fed to the DIRECT pot, which adjusts the level of the signal appearing in the L and R mixes. (The Direct signal goes to both L and R mixers, a mono center-feed in effect.) By balancing the relative setting of the DIRECT control and the four AUDITION DELAY MIXER controls, any ratio from completely dry to completely "wet" output signal can be mixed. As an aid to checking the change in sound quality that the delayed, processed signals produce, a DRY/MIXED pushbutton chooses between Direct only (DRY) and Direct plus the Audition Delay Taps as mixed by the controls. In other words, with this button out (DRY), only the source can be heard, and with it in both source and delays can be heard. NB: with the DIRECT pot fully off and the button in the DRY position, there will be no audio out of the SPACE STATION. This can be disconcerting.....

The Audition Delay Taps are set to various time delays by the 9 left-most pushbuttons. With the left button in, the effects, or programs, shown above the 8 buttons are accessible, while with it out the 8 shown below are selected. Within each family, there are 3 to 5 programs similar in effect and application. In virtually all programs, the lower number taps have the shorter delay times, and the times increase progressively from Taps 1 to 8. There is always a delay differential between odd and even taps of a given pair, sometimes left shorter, sometimes right shorter. These differentials and the exact times have been carefully chosen to yield the best sounds and most powerful effects. Altogether, these 9 buttons give instant access to 128 three-digit delay settings, from 1 to 255mS.

AUDITION DELAY PROGRAMS: The AUDITION DELAY PROGRAMS are the families of effects referred to above. Each is a set of eight time delay values set into the operating registers from PROM memory to produce the eight Audition Delays needed to create each effect. For any chosen effect, any or all of the AUDITION DELAY MIXER controls may be turned up. You can achieve effects as simple as one or two delays for doubling, or as complex as 8 delays for comb filtering. Furthermore, the relative loudness of the 8 delay signals can be set to exactly balance early versus late arrivals in reverberation simulation. The following are brief descriptions of the four families of effects. There will be further discussion of them under the EFFECTS heading of this manual.

Rooms 1, 2, 3, & 4: These four programs use semi-randomly chosen delays spaced to sound like the early reflections of rooms. The maximum delay time in each program appears at the last taps, 7 and 8, and ranges from about 70mS in Room 1 to 255mS in Room 4. The

smaller rooms are appropriate for auditioning with the Medium Reverb Program and shorter decay times, while the two larger rooms provide a more spacious sound and would normally be used with the Long Reverb Program and greater feedback. In the smaller rooms, the taps are closely spaced so that when all are auditioned equally, the gaps are filled in well and no disturbing echo is heard, as would occur with a single tap at the longest delay time. Like all the Audition Delay Programs, the Rooms can also be used without feedback to modify sounds by simply adding pure delay, or multiple delays. This is a good set of programs for general enhancement, or for creating multiple, abrupt-ending echoes.

Combs 6, 10, 22, and 38: The four Comb programs are for special effect signal modification by comb filtering. Comb filters are created when a signal and one or more delayed versions of itself are combined. The result is called a comb because there are periodic nulls and peaks spread across the spectrum, placed at frequencies related to the reciprocal of the delay time. Because the delay times and tap gains are precise in the SPACE STATION, the nulls produced are very deep; and, because there are four taps plus the Direct signal to combine for each output channel, the complexity of the resultant sound is much greater than with traditional DDL's. Furthermore, the left and right delays are interlaced so that they may be externally summed to yield combs of closer spacing and still more complex and varied sound. And when the Echo mode is used to create fed-back comb effects also, these can be auditioned through one of the Comb programs to make things even more interesting. Comb filters make good sci-fi machine-like voices, or tune percussive sounds, or place a sharp bite and edge on instruments like guitar and harp.

Delay Clusters - Fatty, Cloud, Slap 1, Slap 2, and Echo: As with other aspects of the SPACE STATION, these effects are so new we had to invent names for them. This family of programs uses delay taps spaced closely together, in clusters on the time axis. The clusters occur at progressively later times as you move from Fatty to Echo. Fatty, with all its taps placed under about 40mS, has no audible separation from the source, but is an excellent loudness enhancing effect that's great with almost any source. (Comb filtering isn't a problem with these programs due to randomizing choice of times; moreover, the 7kHz delay response reduces any tendency to comb at higher frequencies.) In Cloud, the cluster is later, almost with a gap, while Slap 1 and Slap 2 are delayed enough to be heard as real slap echo - - except, of course, with eight delay taps for greater fatness and loudness intensification. Echo produces a single repeat of the source at about 250mS, again with eight delays for more punch.

Space Repeats 2, 3, and 4: These three programs provide for 2, 3, or 4 repetitions of a sound, with even spacing in time from 0 to 255mS,



and with L-R, L-center-R, or L-R-L-R motion, respectively. All eight taps are used, even with the two-repeat program, to provide extra punch at each hit. Space Repeats are excellent with percussive sound, or sharp transients, since these tend to reveal the spacial movement of time and syncopation best. Of course, Space Repeats may be used with any echo or reverberant effect to cause the decaying signal to ricochet in stereo space as it dies out.

FEEDBACK CONTROLS: The SPACE STATION uses special dedicated taps just for fed-back effects, such as reverb, echo, or resonance. These signals are not accessible for auditioning directly, but their effect is heard when they are fed back to the input mixer and re-enter the delay unit. Recirculating these taps creates effects from smooth reverberation with decay times from 0 to 3.5 seconds, to long, repeating echoes lasting over 8 seconds, to resonance effects of very short duration but high-Q filter spectral characteristics. For reverberation, a large number of specially randomized taps are summed and equalized before application to the REVERB/ECHO FEEDBACK control. Echo requires only a single tap for feedback, and this tap is selected for feedback when the REVERB/ECHO pushbutton is in the out position.

The ECHO DELAY TIME control, in conjunction with the PUSH TO SET button, sets the time delay of the echo tap. To reset this delay time, turn the control to the desired setting and depress the PUSH TO SET button momentarily. The new value will be latched in while the button is depressed and retained after it is released. To fine tune a short delay time for resonance effects, hold the button in while slowly turning the ECHO DELAY TIME control until the desired sound is heard, and then release the button. (The PUSH TO SET button was chosen to eliminate noise resulting from indecision in the circuits that interpret the control setting. You may hear some noise while turning the control, or even when it's stationary if near the decision threshold, but never when it is released.)

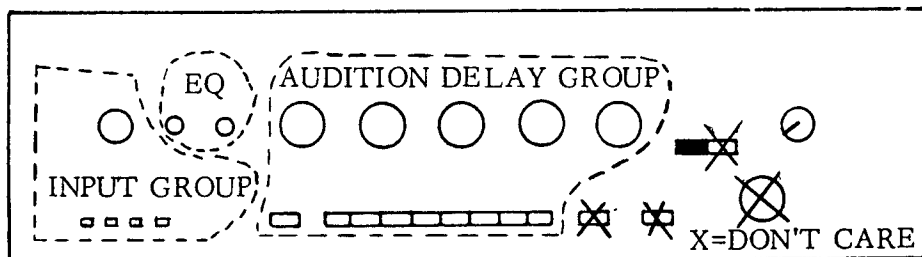
The REVERB PROGRAM button selects two similar programs of delay times for the many reverberation taps. The MEDIUM program may sound very similar to the LONG program, but it does have some differences. A MEDIUM program provides for normal build-up and smooth decay of reverberation regardless of the Audition Delay Program chosen, while the LONG program gives a slower build-up and a longer decay time, as in a larger acoustic space. The decay of reverberation in the LONG program can be heard to have a slight "bumpiness" due to the use of many long delay times.

Regardless of the mode chosen (ECHO or REVERB), the REVERB/ECHO FEEDBACK control determines the decay time continuously from zero to a maximum (depending on the Echo Delay Time or Reverb Program chosen, upon the EQ settings, and the spectral nature of the source material).

## EFFECTS

The SPACE STATION is capable of a range of effects so broad that the best that can be done in a manual is to indicate the basic types, explain the controls and range of settings pertinent to them, and give panel settings for some specific effects. The three basic effects are Pure Delay (no feedback), Reverb, and Echo. Within each of these basic types, the variation in sound modification can be so great as to produce completely different subjective effects, but the operating principles are the same.

PURE DELAY: Figure 1 shows the relevant controls, by groups, and the controls not used (X = "Don't Care"). In this family of effects, we are simply adding delayed versions of the input signal to itself. We have choice over the time delay settings, the number of discrete delayed versions added, and the relative amplitude of the delay signals and the source. We can also equalize the delayed signals (as a group, not individually). Much of what is said here about mixing the Audition Taps, and the characteristics of the various Audition Delay Programs, is common to all effects, and can be referred to later. Just remember that the Audition settings determine the way we hear the contents of the memory, while the feedback controls determine the decay of the memory with time.



CONTROLS FOR PURE DELAY EFFECTS  
FIGURE 1

The Audition Delay Taps are set to times from as short as 6mS to as long as 255mS. The delay times used in each program of a particular family increase, in general, from left to right. Thus in ROOM 1, Taps 1 & 2 have the shortest delay times and 7 & 8 the longest; and in ROOM 4, the delay times are still the shortest at Taps 1 & 2, but all 8 time delays are longer than the corresponding times of ROOM 1, 2, or 3. This distribution of delay times within the taps and families is also true in COMBS and DELAY CLUSTERS. In the SPACE REPEAT families, the delay times range from about 64mS to 256mS in each program, but are chosen to repeat the source evenly in time and space and do not increase from Tap 1 through Tap 8 in a simple manner.

ROOMS can be used as pure delay programs for doubling when a semi-random spread of delay times is desired. The larger ROOMS, 3 and 4, have long enough time delays to disturb intelligibility when used with vocals, but will be fine with other sources such as harp, piano, guitar synthesizer, etc., where the later discrete delays can provide an interesting syncopation, beat fill-in, or spacial shift. Attenuate the longer taps more than the early ones for a more natural sound with the reverb programs, and for greater intelligibility with vocals. Try using greatest gain with the longest Taps in ROOM 4, and progressively less gain down to Taps 1 & 2, to get an effect like backwards tape - - pseudo-time reversal.

COMBS are special effect delay programs that evenly space the 4 delay times in each channel at a constant time delay (6, 10, 22, and 38mS apart). Mix all taps together at equal level to get the deepest nulls and sharpest cancellations in these COMB filter programs. The effect of the COMB filters is most audible on sources with a broad spectral content, such as percussion instruments, transients, noise, spoken voice, etc. Like flanging, COMB filtering tends to get lost on pure, single-line, voices or instruments.

DELAY CLUSTERS are primarily for doubling, slap, and echo effects. All these effects can be done with one or two taps chosen from the ROOM programs, but with the DELAY CLUSTER programs, all 8 taps are bunched so close together that the sound is perceived as a new, fatter, louder event, stretched out and with added body.

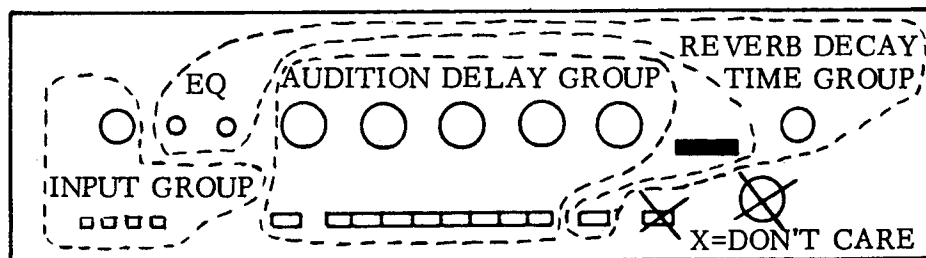
FATTY places all the delays below the Haas fusion limit so that no separation is heard from the original source, but the sound is perceived as louder and richer. Careful selection of delay times minimize COMB filter effects in these closely spaced clusters, so that they may even be used with vocals.

In CLOUD the cluster is a little more delayed, so that the time delay is just audible with transients, but not with more fluid sources.

SPACE REPEATS are a special family of 3 programs which give even repetitions of the source 2, 3, or 4 times, all between zero and 255mS time delay. If all eight taps are mixed together at equal level, a spacial bouncing occurs due to time delay (not amplitude) difference using the Haas effect. In SPACE REPEAT 2, the Direct will appear panned center, the first repeat left, and the second repeat right. In 3, the movement would be center, left, right, left; while in SPACE REPEAT 4 the movement is center, left, right, left, and right. Use SPACE REPEATS with percussive sounds, plucked instruments, and transients.

REVERBERATION: Figure 2 shows the relevant and non-relevant controls for adjusting reverberant effects. Natural room-like reverber-

ation calls for auditioning via one of the ROOM programs to achieve a smooth, random pattern of early arrivals and reverberant decay. For ROOMS 3 and 4, be sure to use progressively less gain at the later taps: 1 & 2 at -3dB, 3 & 4 at -6dB, 5 & 6 at -9dB, and Taps 7 & 8 at -12dB. This reduces the confusion that would result from long, late-arriving reflections. For the largest room, use the LONG Reverb Program and ROOM 4, with the REVERB/ECHO FEEDBACK Control full clockwise. The EQ controls may be used to shorten the high frequency decay time, as in cathedrals or rooms with absorbent walls, while the low frequency decay time can be shortened to simulate hard-walled rooms, plate reverberators, etc. Small rooms call for a choice of ROOM 1 or 2 and a lower setting of the FEEDBACK control. Tiny rooms can be created with CLOUD or FATTY and low settings of the FEEDBACK control.



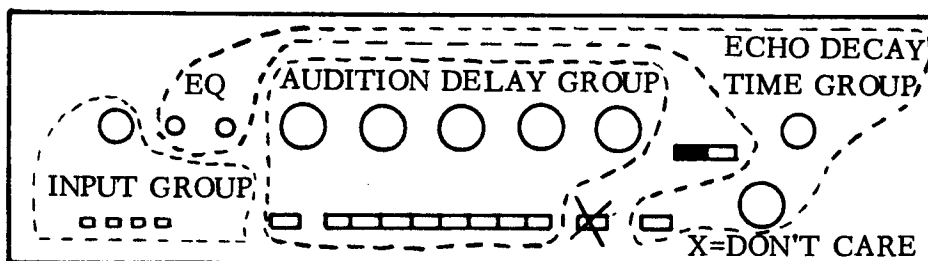
CONTROLS FOR REVERB EFFECTS  
FIGURE 2

For special effect reverberation, try the COMB Audition Delay Programs: although the same reverberant process is going on in the Digital Processor, listening to it with COMB-filter-ears results in a completely new and different form of reverberation. Other unique forms of reverb result from auditioning with a DELAY CLUSTER program, such as SLAP 2 or ECHO. Using the LONG Reverb Program and ECHO Audition Delay Program creates reverb that isn't heard until after a 1/4 second gap, and then decays slowly and lumpily.

While not strictly reverb (so called "hard-reverb", as created with few taps), an interesting reverberant effect can be attained with the ECHO mode and a 255mS ECHO DELAY TIME setting. With the FEEDBACK Control at full clockwise, this will yield a very long decay time, and will sound surprisingly smooth if auditioned through ROOM 4 or SPACE REPEAT 4. Use it for special cases where the longest decay time is needed. Rolling off both HF and LF EQ results in a progressively telephone-like quality as the sound decays.

ECHO: The term "echo" really describes a mode of operation that results from feeding back only one tap, not from the perception of

a decaying "hello, hello, hello..." kind of echo (although that can be created, too). This family of effects includes feedback of short time delays that give resonant filter frequency responses with high Q factors. Delay times less than about 30mS result in filters as opposed to echo effects, and a smooth transition occurs from one to the other as the ECHO DELAY TIME control is advanced from about 20mS to 255mS. Echo effects are controlled by the knobs and buttons outlined in Figure 3.



CONTROLS FOR ECHO EFFECTS  
FIGURE 3

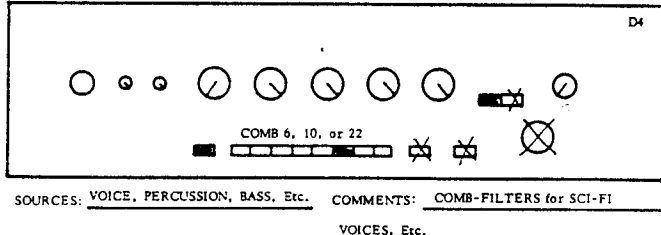
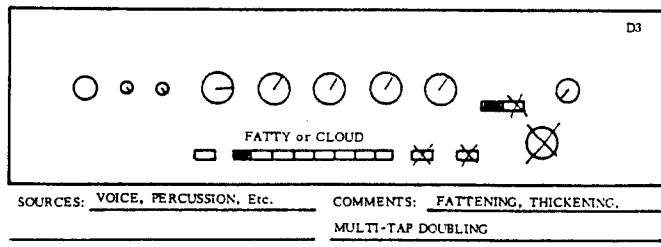
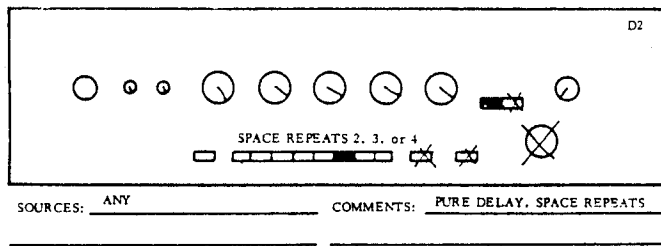
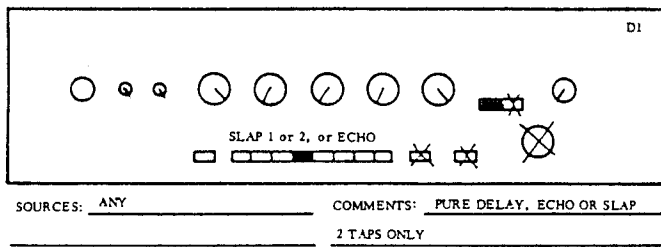
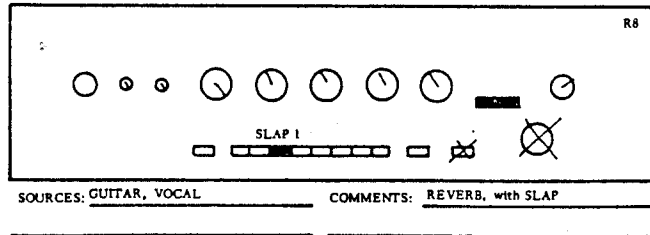
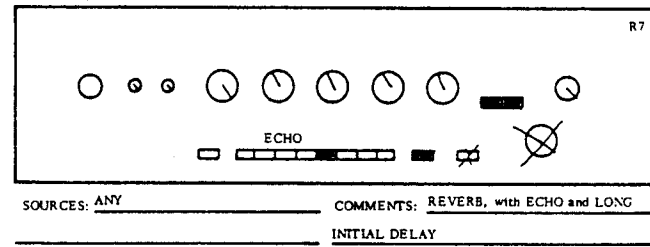
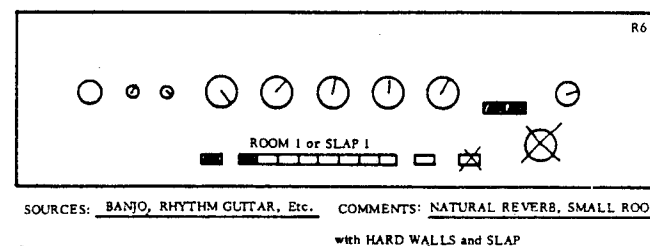
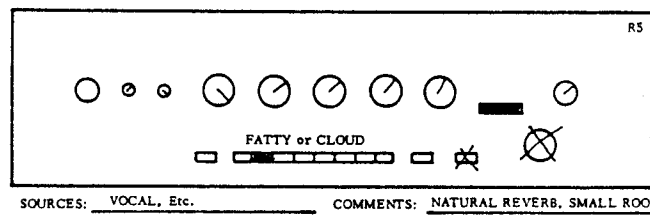
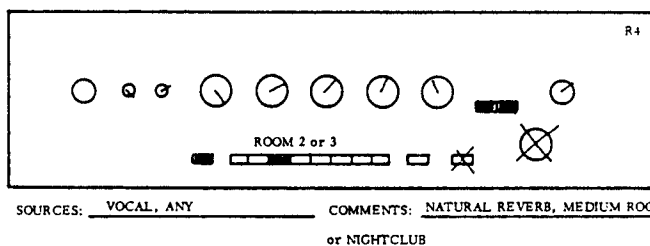
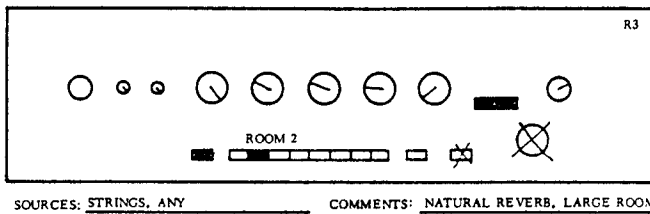
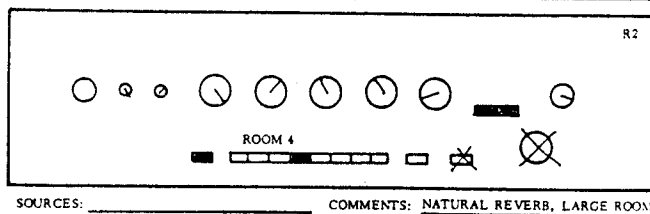
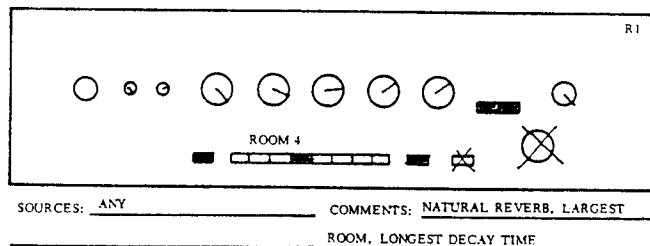
The echo mode provides an interesting example of the interplay of feedback and audition parameters. Consider feedback of the single Echo tap set to less than 30mS delay time. This results in a cardboard tube filter effect beginning almost immediately after the Direct signal enters memory. If this is auditioned with the ECHO or SPACE REPEAT programs, there will be a delay long enough to produce an echo: there's a delay and then the cardboard tube effect is heard (once, fattened in ECHO; 2, 3, or 4 times in SPACE REPEAT). The inverse occurs if a long delay time is set on the ECHO tap and fed back, and then auditioned by a COMB program. The COMB program produces a comb filter using very short Audition Delay Taps, whereas the single, long, fed-back delay produces the discrete decaying echoes, each of which is heard through the comb filter.

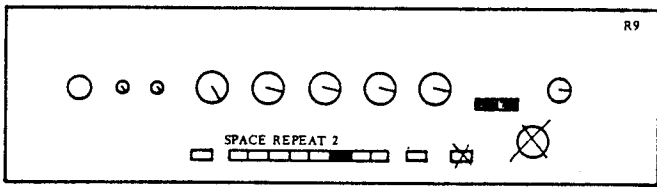
#### EXAMPLES OF EFFECTS AND CONTROL PANEL SETTINGS

Let the examples of effects that follow serve as starting points for your experimentation with the SST-282. Remember that significant changes occur with any of the examples when changes of the mixing, feedback, echo delay, or Audition Delay Program settings are made. Also, choice of a suitable source is important in achieving a desired effect. In general, the primarily time-domain effects (delays over 30mS or so) are best revealed by material with transient events, while the frequency domain effects from Combs or cardboard tube respond best to broad-band signals.

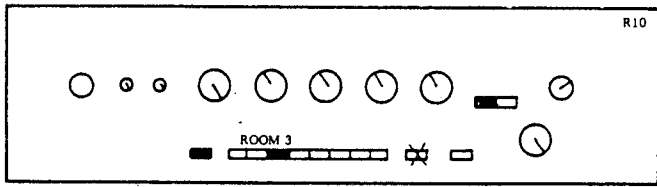
# INDEX TO DIAGRAMS AND EFFECTS

DIAGRAM #	EFFECT
D1	PURE DELAY, ECHO OR SLAP
D2	PURE DELAY, SPACE REPEATS
D3	FATTENING, THICKENING, MULTI-TAP DOUBLING
D4	COMB-FILTERS for SCI-FI
R1	NATURAL REVERB, LARGEST ROOM, LONGEST DECAY TIME
R2	NATURAL REVERB, LARGE ROOM
R3	NATURAL REVERB, LARGE ROOM, INTIMATE SEAT
R4	NATURAL REVERB, MEDIUM ROOM or NIGHTCLUB
R5	NATURAL REVERB, SMALL ROOM
R6	NATURAL REVERB, SMALL ROOM with HARD WALLS and SLAP
R7	REVERB, with ECHO and LONG INITIAL DELAY
R8	REVERB, with SLAP
R9	REVERB with RICHOCHET REFLEC- TIONS - IMAGE SHIMMERS AND SWIMS IN SPACE
R10	"HARD REVERB"
R11	REVERB THROUGH A COMB FILTER
E1	ECHO PLUS SPACE REPEATS
E2	ECHO PLUS RESONANCE
E3	FATTENED ECHO, LONG DECAY TIME
E4	RESONANCE AND SPACE REPEATS
E5	RESONANCE AND COMB FILTER
E6	RESONANCE AND FATTY -- BASE EXTENDER
E7	RESONANCE AND ROOM 4 -- TIME EXTENDER

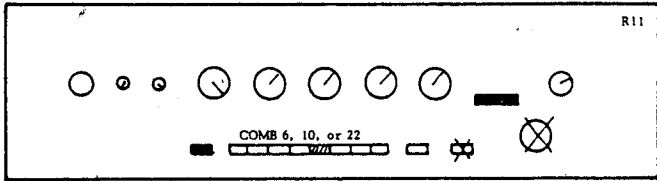




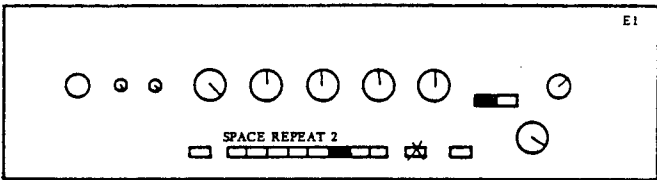
SOURCES: SYNTHESIZER, FENDER PIANO COMMENTS: REVERB with RICHOCHET REFLECTIONS-- IMAGE SHIMMERS AND SWIMS IN



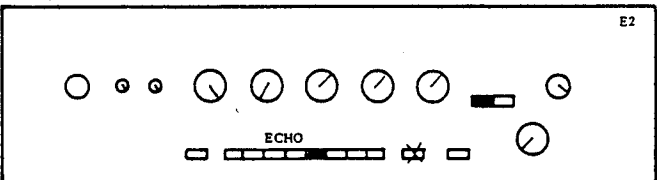
SOURCES: PIANO, FLUTE, OTHER PURE TONE SOURCES COMMENTS: "HARD" REVERB



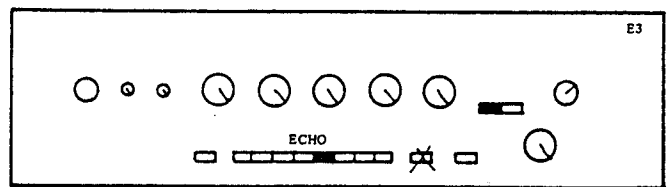
SOURCES: CONGA, OTHER PERCUSSION INSTRUMENTS COMMENTS: REVERB THROUGH A COMB FILTER



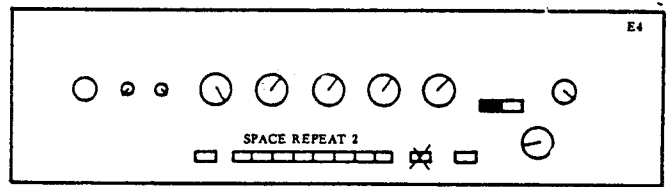
SOURCES: \_\_\_\_\_ COMMENTS: ECHO PLUS SPACE REPEATS



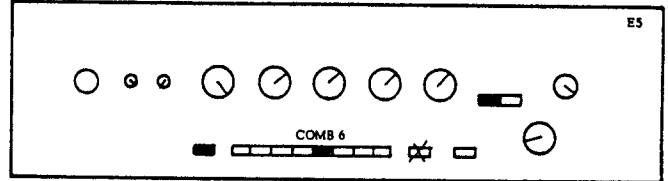
SOURCES: SIMPLE PERCUSSION--WOOD BLOCK, SNARE, Etc. COMMENTS: ECHO PLUS RESONANCE



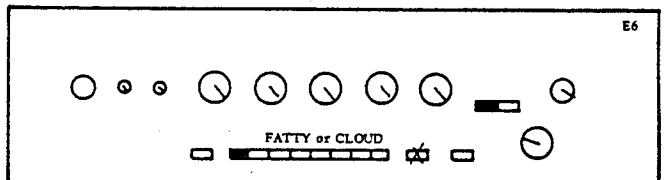
SOURCES: GUITAR, ANY COMMENTS: FATTENED ECHO, LONG DECAY TIME



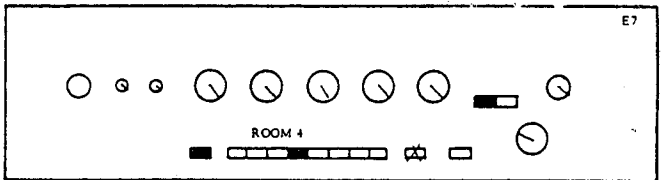
SOURCES: CONGA, WOOD BLOCK, OTHER PERCUSSION COMMENTS: RESONANCE AND SPACE REPEATS



SOURCES: CONGA, ETC. COMMENTS: RESONANCE AND COMB FILTER



SOURCES: QUIRO, PERCUSSION, ETC. COMMENTS: RESONANCE AND FATTY-- BASS EXTENDER--tune for optimum results



SOURCES: COWBELL, QUIRO, PERCUSSION COMMENTS: RESONANCE AND ROOM 4-- TIME EXTENDER

For your record-keeping convenience, a pad of blank front-panel diagrams is packed with each SPACE STATION SST-282.

## WARRANTY INFORMATION

LIMITED WARRANTY: URSA MAJOR, Inc. warrants each SPACE STATION SST-282 to be free from defects in material and workmanship under normal use and service for one year. This warranty begins on the date of delivery to the purchaser or his authorized agent or carrier. During the warranty period, we will repair, or at our option, replace at no charge, components that prove to be defective, provided the equipment is returned, shipping prepaid, to the factory or a designated service facility.

This warranty is null and void under any of the following conditions:

- a. Abuse, neglect, alteration, or repair by unauthorized personnel.
- b. Damage caused by improper use, or operation from an incorrect power source.
- c. Damage caused by accident, act of God, war, or civil insurrection.

URSA MAJOR, Inc. shall not be responsible for any loss or damage, direct or consequential, resulting from machine failure or the inability of the product to perform. URSA MAJOR, Inc. shall not be responsible for any damage or loss during shipment to or from the factory or its designated service facility.

This warranty is in lieu of all other warranties, express or implied, and URSA MAJOR, Inc. does not assume nor authorize anyone to make any warranty or assume any liability not strictly in accordance with the above.

URSA MAJOR, Inc. reserves the right to make changes or improvements in the design of the machine without obligation to make such changes or improvements in purchaser's machine.

No equipment may be returned under this warranty without prior written authorization from URSA MAJOR, Inc. Authorized return shipments must be prepaid and should be insured. The machine should be returned carefully packed in the original carton and packing material. If these are not available, new ones may be procured from URSA MAJOR, Inc.

For your protection and our information, please return the Warranty Registration to URSA MAJOR, Inc. when you purchase your SPACE STATION. If there is no copy of the Warranty Registration in your unit's shipping carton, please ask your dealer for one.