OPERATING INSTRUCTIONS FOR SM-2 STEREOMICROPHONE
AND ASSOCIATED COMPONENTS
(Temporary)

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A) GENERAL

1.) Connect the Stereomicrophone SM-2 to its associated Power Supply NSM by means of the supplied Microphone Cable SC 1a or SC 2a. Engage the corresponding 12-pin cable connectors with the proper 12-pin socket on the power supply and microphone base respectively.

2.) The female cable connector of Microphone Cable SC 2a is equipped with a flexible coupling. Normally, this coupling is supplied with a 1/2" internal thread. On special request, it will be supplied with 5/8-27 internal thread to fit the American standard microphone stand. By means of this flexible coupling, the microphone can be adjusted to face in the desired direction.

3.) Microphone Cables SC 1a and SC 2a are normally supplied in 30 ft. length, but operation with cables of up to 120 ft. is permissible. Properly constructed extension cables are available in several sizes.

4.) On unpacking the Power Supply NSM, make certain that the proper supply voltage (in most cases 110 VAC) has been strapped. The strap is visible through a small window at the bottom of the power supply's side. The proper fuse for 110 VAC is .08 amp., for 220 VAC .05 amp.

5.) The two audio outputs of the SM-2 Microphone end in a 5-pin male receptacle on the NSM Power Supply. When observing the contacts from the plug side, the left two contacts are the output of the upper microphone element, while the right two belong with the lower element. The center contact is ground. The phasing of these contacts is uniform from microphone to microphone, as is the case with all NEUMANN microphones. The phasing is carried through all extension cables and must carefully be observed in connecting the microphone outputs to preamplifier or console inputs and throughout the recording channel. (See paragraph B for directions on testing for proper phasing.)

6.) The microphone is delivered with the mating plug for the audio output. Either a 4-conductor shielded cable or two 2-conductor, separately shielded cables may be used.

7.) The microphone may be operated unterminated. An effective termination of less than 5 times the source impedance of either 50 or 200 ohms (depending on which impedance has been supplied) will increase non-linear distortion at higher output levels. Microphones whose output transformers have been connected for 50 ohms may be identified by a red dot at the plug-end of the microphone.

8.) It is possible to ground the Power Supply. A screw terminal is provided for that purpose on the plug-end of the power supply. When this terminal is grounded, the entire microphone system is grounded.

9.) The Power Supply is equipped with a 2-pole AC receptacle. A mating plug is supplied with the power supply.

10.) When the microphone, microphone cable and power supply are interconnected, may the power switch be turned on. Proper functioning of the power supply will be indicated by a pilot lamp.

11.) It is recommended that the SM-2 microphone not be subjected to prolonged exposure to extreme humidity conditions. High temperatures as may be found in motion picture or TV lighting, will not injure the microphone.

12.) The desired directional characteristic of the two microphone elements of the SM-2 microphone are obtained by adjusting the two 9-position switches located on the power supply. A directional arrow adjacent to each switch indicates which microphone element is affected by each switch.

13.) The upper element of the SM-2 microphone may be turned to the left (counter-clockwise) through an arc of 180 degrees and to the right through an arc of 90 degrees by inserting a coin in the slit located on top of the microphone.

B) OPERATING INSTRUCTIONS

1.) If the microphone is to be used strictly as a double microphone without regard to its stereo potential, then connection to console inputs and preamplifiers is conventional as in all other NEUMANN condenser microphones, like U-47, M-49, etc. The advantage to be gained from this application is the ability to set each microphone element for a different polar characteristic, without the disturbing interference effect caused by differences in time of arrival between the two elements.

2.) In order to record according to the INTENSITY, for instance the "M-S" system of stereophony, several approaches are possible. The following is one approach:

The SM-2 microphone is positioned with its lower microphone element directed at the sound source (the "NEUMANN" label side). At the same time, this lower element is switched to the cardioid position by means of the correct switch located on the power supply. This lower microphone element feeds the MID-CHANNEL, which, by itself, represents a normal, monaural recording channel. This shows that stereo recordings made with the SM-2 microphone will simultaneously produce a normal, unmixed monaural recording.

For use as a stereo microphone the output of the upper element is required. Set the polar characteristic of the upper element for figure "8" and rotate the element 90 degrees counterclockwise. (See A-13). This element will now supply the SIDE-CHANNEL. Should more than one microphone be required for a given recording task, then all mid-channels and all side-channels must be mixed independently and brought to a separate sub-master fader. (The addition to either channel of a single microphone for purposes of boosting individual instruments or groups has been found unsatisfactory in some instances.) The mid-channel sub-master will then control the basic sound level, while the side-channel sub-master will effectively control the "spread" or "base" of the stereo recording.

3.) The conversion of the "M" (Mid) channel and "S" (Side) channel into the stereophonic left and right channel is accomplished by connecting the two audio outputs of the SM-2 microphone once series-aiding, and once series-bucking. This is done by means of two audio transformers to be connected as shown in Fig.1. This conversion may take place anywhere along the recording or reproduction chain. Fig.2a shows the converter inserted in the playback channel of the tape recorder. This means that the two tracks of the tape recording will contain the "M" and "S" signals. If it is desired to produce conventional left and right channels on the tape recording, then the converter must be inserted ahead of the tape recorder (see Fig.2b).

4.) To determine whether the phasing of the entire system is correct, the following procedure may be used:

Connect a galvanometer (or a multimeter set for the lowest DC voltage) in turn to the circuit points marked a, b, c, d (Fig.2). Set all microphone elements to the non-directional characteristic. Now switch each microphone element in turn to the bi-directional (figure 8) polar characteristic. The entire "M" and "S" channel system is correctly phased when in this switching, the meter shows an initial needle deflection always in the same direction, at each of the points a and b. The right and left channel system is correctly phased if the switch to figure 8 (as indicated above) in the lower (M) capsule produces an equal initial meter deflection at points c and d, and if switching the upper (S) capsule as indicated, produces an initial meter deflection at point c equal to that of the next previous test, and an opposite deflection at point d. After this test procedure, restore the polar characteristic switches to their proper positions.

5.) To set recording levels with the SM-2 microphone, the "M" channel is to be brought up to within a few db of normal monaural level. Then advance the "S" channel level until satisfactory room dimension is reached.

The system is correctly balanced when a listener located on the central axis between the two reproducing loudspeakers correctly identifies the left-most originating sound as emanating from the left loudspeaker, and the right-most originating sound as emanating from the right speaker. Should the "S" channel be opened too wide, the effect heard will be one of a reduction of "base"; i.e., the left and right-most sounds will again seem to wander toward the center. It will be found that vocalists need a longer "base-line", therefore less level from the "S" channel; this prevents small sideways movements from causing the sound to "jump" from one speaker to the other.

6.) After conversion of the "M" and "S" channels into right and left channel, the insertion of another converter will reproduce the original "M" and "S" signals. This is in sharp contrast to signals originally recorded in a Left-Right system. Should you only require the "M" (or monaural) channel, it is only necessary to mix the left and right channels. The result will be the TRUE MID CHANNEL. This means that stereo tapes produced according to Fig.2b, may be played back with a full-track playback head, and produce not a mixture of left and right-hand microphone, but rather the original "M" channel; the centrally recorded cardioid microphone element. It is, of course, imperative that phasing be at all times observed.

C) TESTING AND MAINTENANCE

1.) In order to preserve the electroacoustical properties of this high quality double microphone, care should be exercised in its handling. The SM-2 microphone, with its 4-membrane system, should be covered with the polyvinyl cover whenever not in use, and should be reinserted into its case when not used for longer periods of time.

2.) The head-capsule, containing the two microphone elements, may be unplugged from the amplifier tube by advancing the three set-screws at the base of the capsule as far as they will go. (Clockwise). The case covering the double preamplifier may likewise be removed by advancing the three set-screws at the base of the case. The user is cautioned against attempting this himself. For repair, the microphone should be returned to the official service station or directly to the manufacturer.

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FIGURE 1: Connection of „Sum-and-Difference Transformer System"

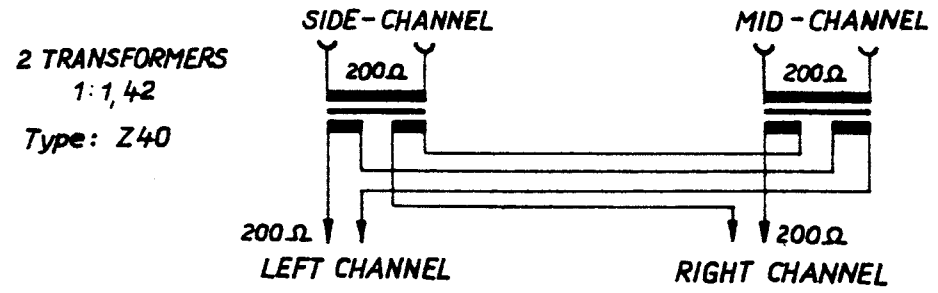

FIGURE 2: Block diagram for M-S stereo recording with MINIATURE STEREO CONDENSER MICROPHONE SM2

a) Mid- and Side Channel recorded separately

b) Conversion into right and left channel takes place already before recording