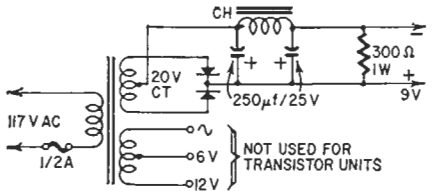


Fig. 2—Fanon PSA power supply.

Fanon 1506 six-station master.

Fanon model 150 remote.

and driver, and a pair of FAN-12's are used in the class-B power output stage. Fig. 1 is the circuit of the 1506 master with 150 and 151 remotes. The connections to the master terminate in a cable with ten insulated leads and a shielded conductor. Terminal boxes (not shown) are available for connecting this cable to the interconnecting cables of the other stations.

Five slide switches on the 1506 select the remote(s) to be contacted. The mode switch is left in the STANDBY position when the system is not in use. This disconnects the battery from the positive return lead in the amplifier. To initiate a call from the master, the caller selects the remote or remotes by closing the corresponding slide switches and then throwing the mode switch to TALK. This applies power to the amplifier, connects the master's speaker–mike unit to the input, and the hot side of the slide switches to the amplifier's output. When the mode switch is released, it automatically returns to the LISTEN position so the remote(s) is connected to the input and the master's speaker to the amplifier's output. When the conversation is over, the party at the master turns off the system by flipping the switch to STANDBY.

A party at a 150 (or 1506) remote initiates a call by throwing the switch to TALK or DICTATE. One section of the switch connects the remote to the amplifier's input. The other section turns on the amplifier by completing the circuit between the positive side of the battery and the positive return through the white and gray cable leads and terminals 3 and 4 on the remote.

The system can be set up for nonprivate operation (master can monitor remotes at will) by connecting a jumper between terminals 1 and 2 on the master. If the setup is for private operation, any remote can be made nonprivate by leaving its switch in the DICTATE position. This is useful for baby sitting or other instances where it is necessary to monitor activities from a distance. A jumper is required between terminals 3 and 4 on any master that talks to a remote but is not used in an all-master system. (The mode switches on the master and remotes are spring-loaded to return to LISTEN when released from the TALK position and have positive detents to lock in the DICTATE and STANDBY positions.)

The Fanon type PSA power supply (Fig. 2) may be used in place of batteries to power a system with up to four masters. The supply cable terminates in snap type connectors matching the battery connector in the master unit. When this supply is used, terminals No. 5 on each master must be connected together through an additional lead in the cable.

The Portahorn

RCA's Portahorn model CRM-S1A is a transistorized public-address system, intercom, signaling device, automatic foghorn and boat horn for all marine craft ranging from large commercial vessels to small pleasure craft. It may be used with a hydrophone to locate underwater sounds from schools of fish, divers, etc.

The Portahorn operates from two self-contained batteries and may be used ashore by fire, police and emergency departments, airport personnel, construction, railroad, surveying and civil defense crews and others requiring a portable sound system with a range of up to 2 miles. Its 12-volt supply consists of two RCA VS009 6-volt batteries in series.

Battery drain is around 70 ma with zero signal input and approximately 500 ma for full output. Standard equipment consists of the electronic unit, batteries, an 8¼-inch-diameter 15-watt re-entrant type horn loudspeaker and a pushbutton reluctance type microphone with a 65-inch coiled cord. Weight with batteries is 13½ pounds.

The speaker is mounted on top of the cabinet in a fitting permitting 360° horizontal rotation and 90° vertical swing. The speaker may be removed, located at a remote point and connected to the amplifier through an extension cord.

Basically, the Portahorn consists of an audio amplifier driving the speaker, an audio oscillator to supply the horn tone and a multivibrator to key the oscillator to sound the foghorn at regular intervals.

A somewhat simplified schematic of the versatile Portahorn is shown in Fig. 3. There are two audio input jacks. The AUXILIARY jack works into the base circuit of the preamplifier and is for the hydrophone, radio, tape recorder, phonograph or telephone pickup coil. The

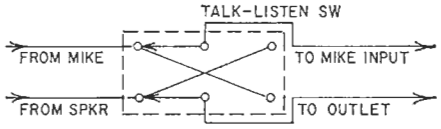
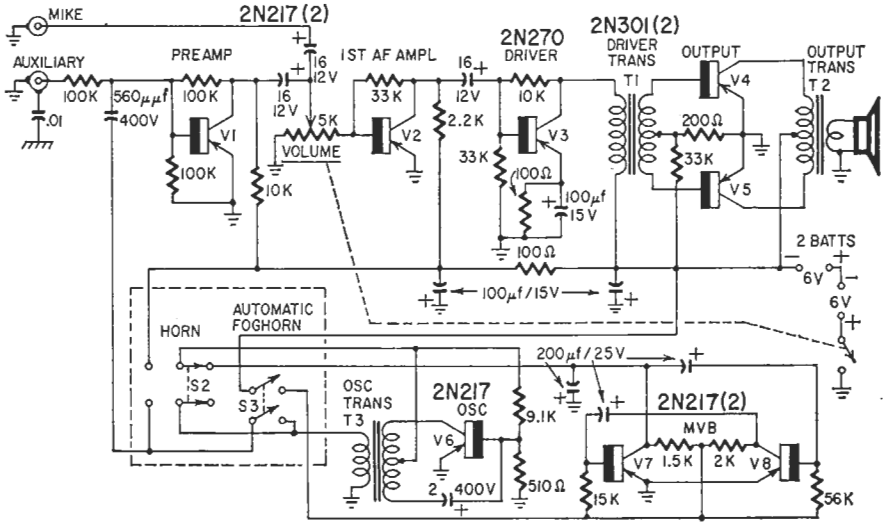


Fig. 4—Talk-listen switch for the Portahorn.

Fig. 3 (below)—RCA Portahorn.



MICROPHONE jack in the base circuit of the first af amplifier is for the mike supplied with the unit.

The 2N217 audio oscillator for the horn is a Hartley type operating in the range of 400 to 500 cycles and designed for high harmonic content to deliver a melodious, penetrating sound. The secondary of the oscillator transformer T3 is connected to sections of the HORN switch (S2) and AUTOMATIC FOGHORN switch (S3). S2 is a dpdt toggle switch shown in its normal position. When this switch is pressed for signalling, attracting attention or sounding a warning, T3's secondary is connected to the base of the preamplifier transistor and operating voltage is applied to the oscillator to sound the horn.

S3 is a dpst toggle switch that is normally open. When it is closed, the 1,500-ohm resistor in V7's collector circuit is put in series with the voltage supply to the oscillator. The transistors in the multivibrator conduct and cut off alternately. When V7 is cut off, the oscillator receives sufficient voltage to operate. When it is conducting, the voltage drop across the resistor is too great to allow the oscillator to operate and sound the foghorn. The mutivibrator is set so the foghorn sounds for 2 seconds and is off for 6 seconds.

The TALK–LISTEN switch (Fig. 4) converts the Portahorn into an intercom unit. In the TALK position, the instrument is used as a power megaphone, PA

RCA Portahorn

system, horn or foghorn. In the LISTEN position, the connections to the horn and reluctance microphone are reversed so the horn acts as a highly directional sensitive microphone and the mike acts as a reproducer used as an earpiece. END

(At this writing, RCA has taken the Portahorn off the market, but it will still be made and sold by Wightman Electronics, 9 West St., Easton, Md.—*Editor*)

low-cost starved-current Amplifier

Single-tube amplifier has cathode-follower output stage that delivers 1 mw

By PAUL S. LEDERER

IN 1950, a paper titled "Ultra-High Gain Direct-Coupled Amplifier Circuits" was presented by Dr. Walter K. Volkers at the IRE Convention in New York. The paper described how the amplification factor of a pentode may be greatly increased beyond conventional values by lowering the screen voltage below 10% of the plate supply voltage and by increasing the plate load resistance 10 or more times over conventional values. This type of operation results in extremely small plate currents, hence the descriptive term "starved-current" operation.

Based on this principle, a small amplifier was built some years ago (March, 1954, issue; page 45) using a 6AU6 as the "starved-current" amplifier and a 6V6 as power output tube. It performed well—it had a 92-db power gain and required 2-mv input for 100-mw output. However, its frequency response was limited—about 180 to 2,500 cycles.

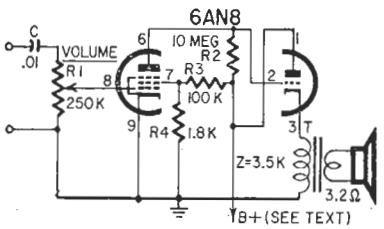
Further experiments produced another interesting starved-current audio amplifier with somewhat different characteristics. It uses even fewer parts and has a wider frequency response but lower gain. It uses a 6AN8 triode-pentode, with the triode acting as a cathode-follower power amplifier. In addition to the output transformer, only four resistors are required. In this amplifier a potentiometer volume control is substituted for one of the resistors and a dc blocking capacitor is added at the input. These features make the amplifier suitable for general experimentation.

With a plate supply of 140 volts, total current drawn is about 23 ma. With a 10-mv input (rms, 400 cycles) the power output into a 3.2-ohm speaker is a little less than 1 mw. This represents a power gain of 63 db. Frequency response is ±3 db from about 150 to 7,000 cycles and about 5 db down at 80 and 9,000 cycles.

The 1-mw power output certainly seems a far cry from high-fidelity amplifiers capable of putting out 20, 40 or even 100 watts. However, let's keep a few things in mind: These high-quality amplifiers are designed to give linear and distortion-free reproduction on transient sounds whose instantaneous power level may reach such values. The average level of power required is quite a bit lower. The actual power required depends on the size of the room, the efficiency of the speaker used and the personal tastes of the listener. In general, for listening at ordinary conversational level, about 200 mw seems to be sufficient. Furthermore, since the human ear responds logarithmically to sound amplitudes, a reduction of power output by a factor of 200 will seem to be about one-third the previous volume. Listening tests proved the output from a 5-inch PM speaker to be adequate with a 10-mv input. With 20-mv input, output is about 3 mw. The systems begin to overload near 30 mv—both tops and bottoms of the waves are clipped.

Since this amplifier is designed primarily for low input signals, no self-bias resistor was used. Contact potential between cathode and grid provides the necessary bias. With a 140-volt plate supply, the screen voltage is 2.6 and the total current drain is about 23 ma. This results in a triode plate dissipation of about 2.9 watts, a little greater than allowed by tube manufacturers' specifications.

Operation at a lower plate-supply voltage is possible too. With 110 volts at 10 ma, power output is about 0.4

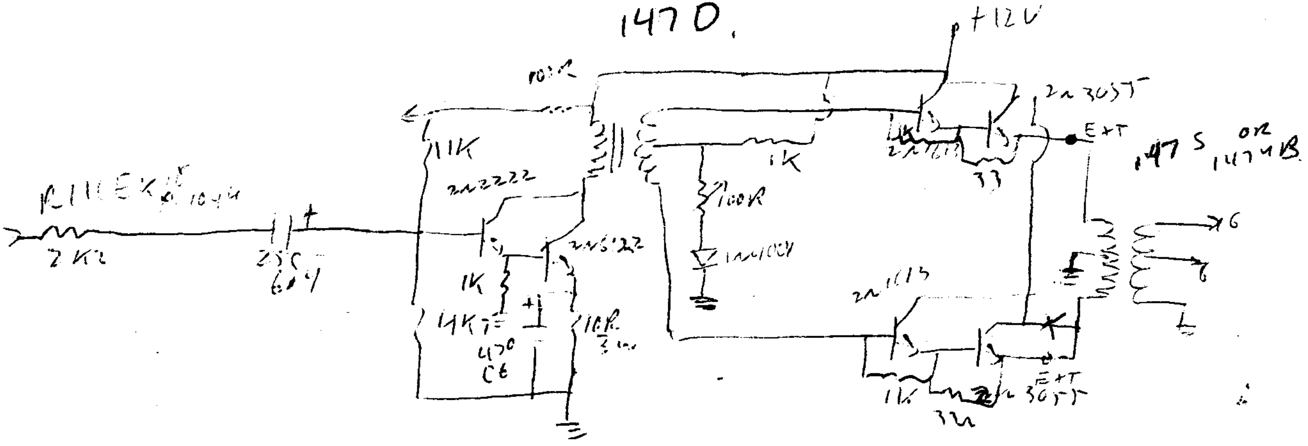


R1—pot, 250,000 ohms
R2—10 megohms, 1 watt
R3—100,000 ohms, 1 watt
R4—1,800 ohms, 1 watt
C—.01 μf, paper
T—universal output transformer
V—6AN8
Socket, 9-pin miniature for V
Chassis—3½ x 5 x 1 inch
Miscellaneous hardware

mw with 10-mv input. Plate dissipation is now about 1.9 watts. While building, the amplifier screen voltage was adjusted experimentally with a potentiometer (with 10 mv in and 140 volts B-plus) until the output voltage (as displayed on a scope) was greatest with least visible distortion and minimum plate supply current. This is not as complicated as it sounds. After a few tries, one gets the feel of the adjustments. When the optimum has been determined, replace the potentiometer with fixed resistors.

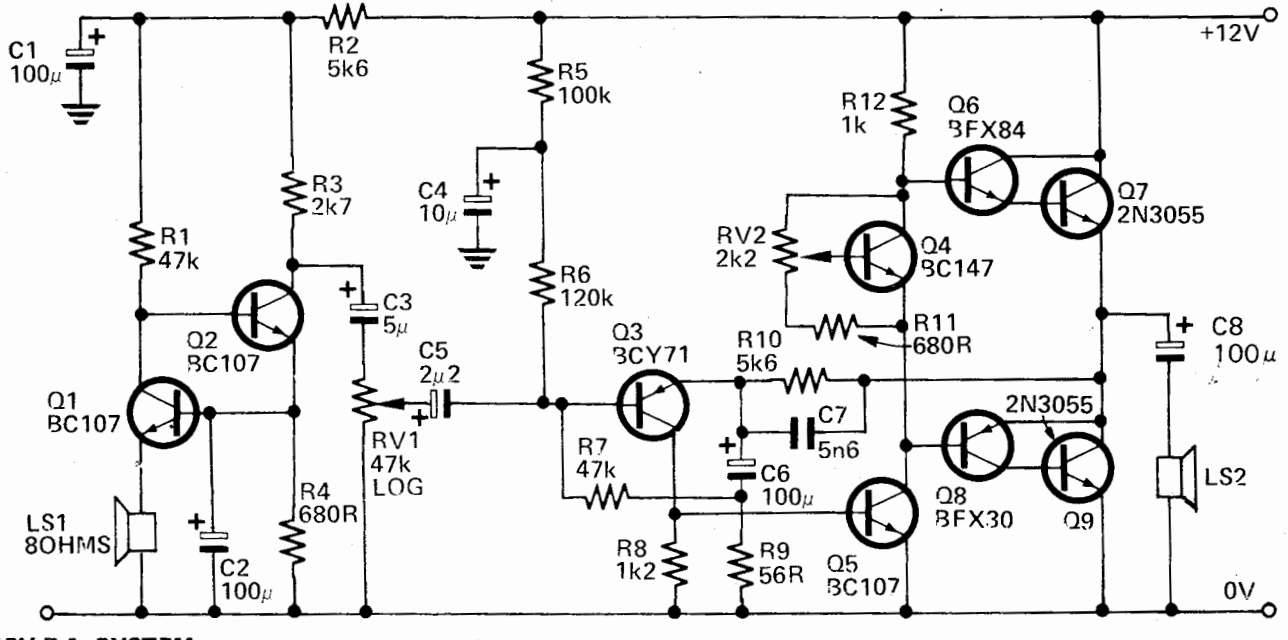
The whole amplifier is mounted on a 3½ x 5 x 1-inch aluminum chassis, but could be made even smaller. END

1470.



50w PA
AMP

RF
NOW
68K



12V P.A. SYSTEM

This circuit was originally built for use in a negative earth car. A miniature speaker, impedance immaterial, is connected in the emitter circuit of Q1, and acts as a microphone.

Q1 operates in the common base mode and a highly amplified signal appears at its collector. Q2, used in the common emitter mode, provides further amplification and the signal from its collector is fed via the blocking capacitor C3 to the volume control VR1.

Overall de-stabilisation is provided by obtaining Q1's base bias from the emitter of Q2.

The power amplifier is fairly conventional and fitted with a heavy duty output stage to enable a pair of 3Ω P.A. type horns to be driven in parallel. Under these conditions 8W is available. A single 3Ω unit can be driven to 4W.

Since the unit is intended for the reproduction of speech a wide bandwidth is not required and C7 is incorporated to roll off the response above 5kHz. C6 also provides a rapid roll off in the bass region. Q7 and Q9 should be fitted to a 5" x 4" finned heatsink and the body of Q4 should be thermally in contact with this.