should be adjusted so that the LED is illuminated when the thermistor temperature drops to 32° F (0° C); during warm weather, an ice cube can be held against *TDR1* to achieve the proper temperature for the adjustment.

Featured in Volume 4, Number 2 of the bimonthly periodical *Progress*, published by the Fairchild Camera and Instrument Corporation (Semiconductor Operations, 464 Ellis St., Mountain View, CA 94042), the bidirectional intercom circuit given in Fig. 2 permits two-way "hands-free" conversations. It is ideal for use, typically, as a door answerer by a housewife busy in a kitchen or laundry as well as in commercial and industrial applications where it may not be convenient for either party to operate a *Push-to-Talk* switch. Each of the two virtually identical units making up the system features a "privacy" switch (*S1* and *S2*) in addition to individual volume (*P2* and *P5*) and tone (*P3* and *P6*) controls. The system requires a dual ±12-volt dc source, which may consist of either batteries or a well-filtered and regulated power supply.

In operation, a unique arrangement prevents intra-unit acoustic feedback. In Unit A, audio signals developed by the crystal microphone are applied to npn transistor *Q1*, which serves simultaneously as a preamplifier and phase-splitter, producing both in-phase and 180° out-of-phase signals. The in-phase and out-of-phase signals are combined in balance control *P1*, where the in-phase signal is cancelled and only a portion of the out-of-phase signal is coupled on to the next stage. At the same time, however, the amplified out-of-phase signal is applied to Unit B through the connecting link, where it is coupled through a 10-μF dc blocking capacitor, balance control *P4*, and volume control *P5* to a medium power operational amplifier. The op amp then drives a standard 16-ohm PM loud-speaker. Unit B operates in a similar fashion, with its out-of-phase signal coupled back to Unit A over the same connecting link. Thus, in-phase signals within each amplifier unit which might otherwise cause acoustic feedback are cancelled internally, and continuous two-way conversations are practical.

Standard commercial components are used in the intercom's design. Except for the balance, volume and tone control potentiometers (P1, P2, P3, P4, P5 and P6), all resistors are familiar half- or quarter-watt units. The larger cap[illegible] are 25-volt electrolytics while the 0.005-μF capacitors used in the tone-control networks may be low-voltage ceramics, tubular paper or plastic film types. Only four active devices are used: transistors *Q1* and *Q2* (2N3695 and 2N3693, respectively) and two μA759 op amps. Privacy switches, *S1* and *S2*, are spst and may be any type. Conventional assembly and wiring techniques can be used for circuit construction. After installation, the balance controls (*P1* and *P4*) are adjusted to minimize acoustic feedback within each unit with the respective volume controls set at near maximum. Afterwards the volume and tone controls are operated as in any regular intercom system.

Intended primarily for use by photographers, the sensitive light meter circuit shown in Fig. 3 provides an analog readout proportional to the log value of light intensity and, therefore, can be calibrated directly in EV (Exposure Value) units. With ASA ratings of 100, the instrument's range is EV −3 to EV +18 on the 500-μA meter. The design is one of several for the 8007 FET-input operational amplifier described in Application Bulletin A005, published by Intersil, Inc. (10900 N. Tantau Ave., Cupertino, CA 95014). In addition to the 8007, the circuit uses a SBC 2020 silicon photodiode, an IT120 dual npn transistor, and a conventional 741 op amp. In operation, temperature compensation is provided by voltage divider *R1-R2*, which forms a gain block in conjunction with half of the dual transistor and the 741. Diode leakage errors are minimized by operating the photodiode at essentially zero voltage, while a log-gain characteristic is achieved by means of the transistor feedback element. The instrument requires a standard ±15-volt dual dc power source, with power supply connections to IC pins 7(+) and 4(−).

Featuring discrete devices and conventional IC's, the wide-range function generator in Fig. 4 offers serious experimenters more of a challenge than do simplified designs using special-purpose devices, such as the XR-2206. It is described by Robert C. Dobkin in Application Note AN-115, published by the National Semiconductor Corporation (2900 Semiconductor Drive, Santa Clara, CA 95051). The instrument is capable of supplying sine, square and triangular waveforms at ampli-

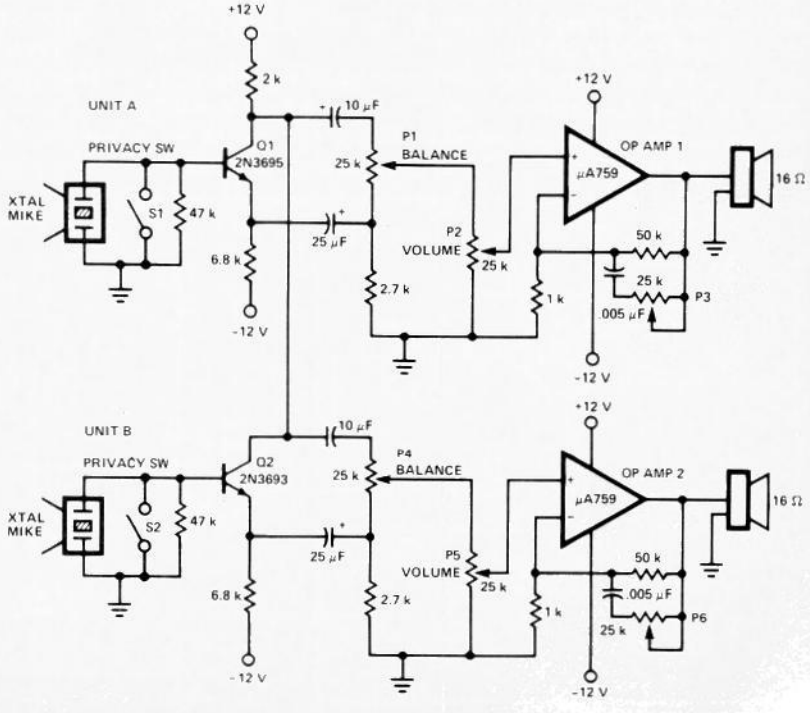


*Fig. 2. Fairchild's bidirectional intercom system permits two-way "hands-free" conversations. Each of the two units has a privacy switch in addition to individual volume and tone controls.*