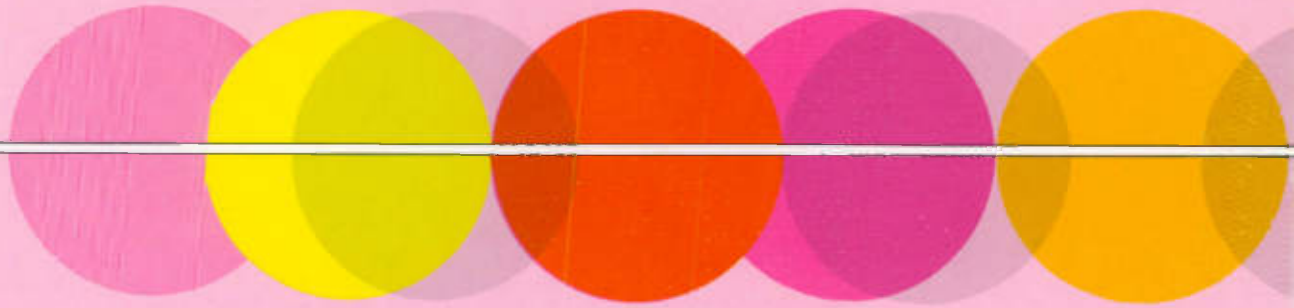
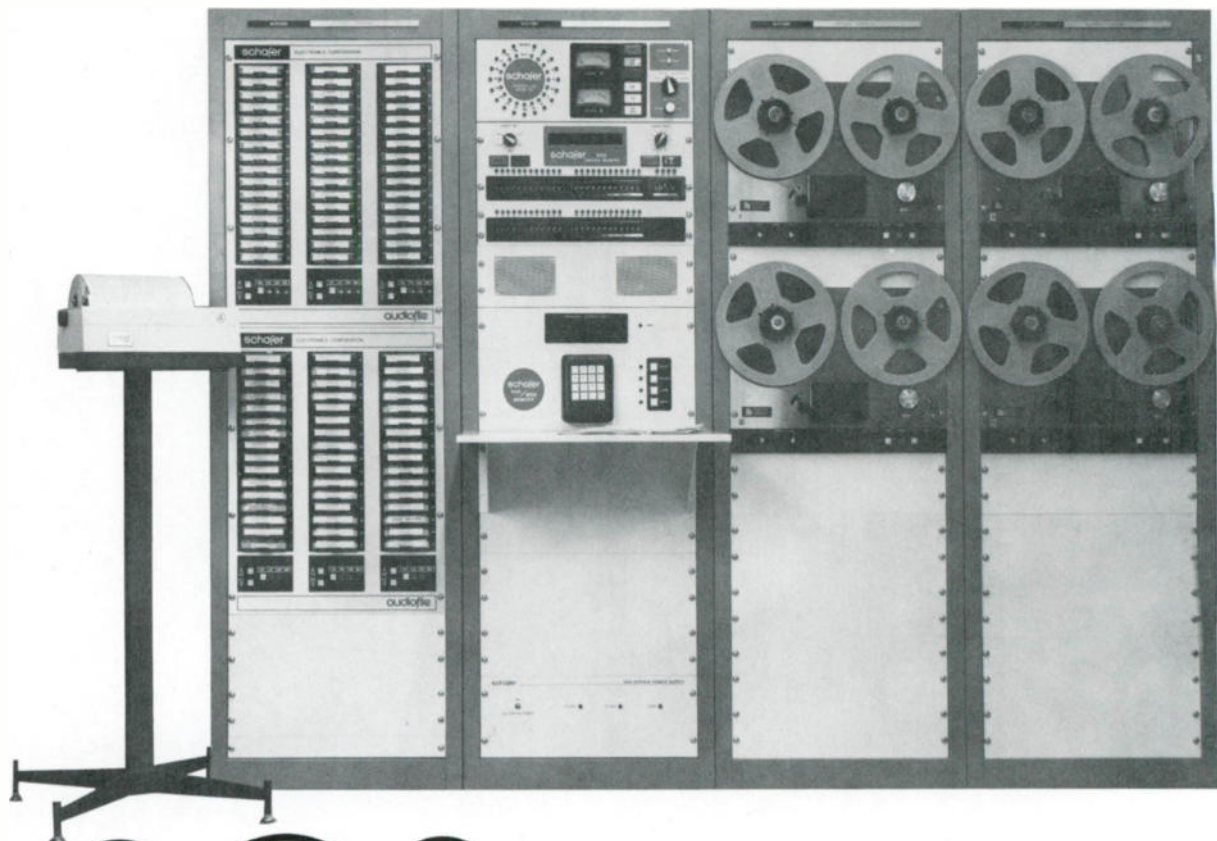


**The sequence memory system**

**902**





# 902

## The Sequence Memory

The Schafer 902 Switch Memory is the easiest to operate of any automation system today. Using all solid-state switching and audio circuits, the 902 offers unequalled reliability and fast, quiet switching. Sequential programming of up to 48 events without repetition is standard with the 902 Switch Memory, and may be expanded at any time to 72, 96, 120, or 144 events with optional rows of 24-event switches.

The 902 Switch Memory may be programmed in groups of 12, 24, or 48 events, representing quarter-hour, half-hour, or one hour formats. Resets are activated by the 902 digital clock, and are selectable on the front panel. Audio sources may also be inserted into a basic format on a time basis by the 902 digital clock. Resets or audio sources can be programmed to be automatically readied by the digital clock at :13, :28, :43 or :58 past each hour, as desired.

## 902 Random Access Memory

### FEATURES

- Control and advance cueing of up to 9 random access sources
- DC powered Memory with 60-minute fail-safe battery backup
- All electronic design. No relays or switches.
- Simple 16-key keyboard entry
- LINK command for controlled clusters of program material
- JUMP pushbutton for skipping sections of memory
- SKIP pushbutton for skipping one event in memory

The Schafer Random Access Memory is a 1000 step keyboard-entry storage device for programming commercials, music, and other program materials from up to 9 Schafer AUDIOFILES, or other random access devices.

The Schafer Random Access Memory is designed to be used in conjunction with the 902 Switch Memory, and when added to the Switch Memory provides pre-programming capability

for commercials, PSA's, and other changing events for 24 hours or more in advance. The 902 Switch Memory stores and programs the basic music format, so the Random Access Memory may be used efficiently for programming traffic functions without any chance of disturbing the basic music format.

For stations with heavy commercial loads, or desiring longer periods of time before reprogramming, the Schafer Random Access Memory may be ordered with 2000 events.

## 902 Time Gate

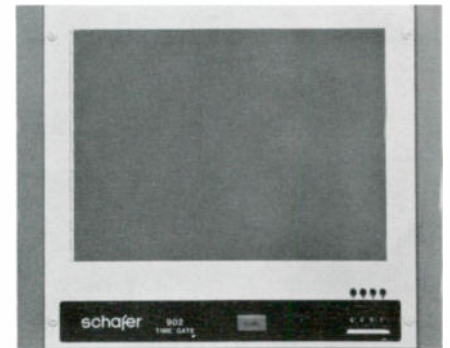
### FEATURES

- Ten recyclable exact-time functions
- May be used to automatically start and stop the 902 system
- Fill-music deadroll and fade-out capability at exact times built-in for joining Networks
- Ten external commands available to activate station equipment at specific times.

The Schafer 902 Time Gate may be optionally added to any 902 Switch Memory for joining Network, or any of 10 other exact-time functions.

Network join cycles including back-timing of music fill or fade-out of on-air programming may be programmed to repeat hourly, or programmed only for specific hours, as desired. The 902 Time Gate may also be used to automatically start or stop the entire system at specific times.

For stations with heavy Network commitments, the 902 Time Gate is also available with twenty exact time program functions, allowing more varied Network join and leave times.



### AUDIO MONITOR AND SWITCHER

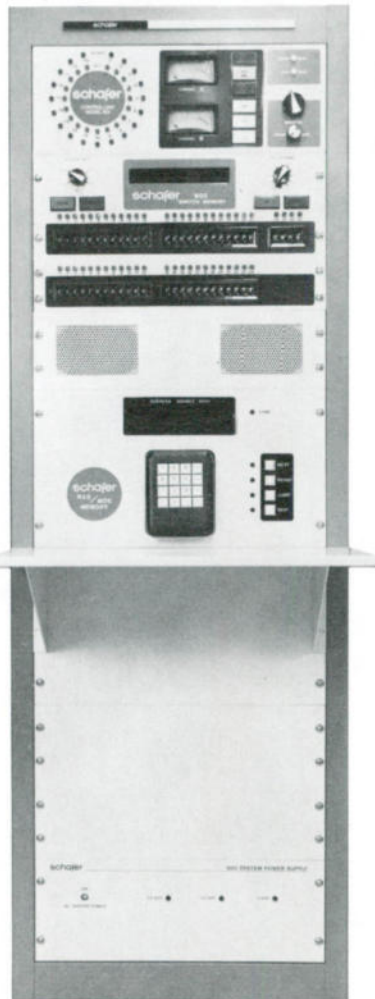
Solid-state audio and control switching for up to 19 channels, 9 of which may be random access. Monitor panel includes stereo VU meters, stereo monitor/cue level control, four position monitor input switch, mono-check phase check pushbutton, start, stop and step now pushbuttons. Source on-air and source next lights are also provided on the monitor panel.

### 902 SWITCH MEMORY

Contains 48 selectable thumbwheel switches for sequentially programming any format, four time insertion or time reset switches, system digital clock, format advance and reset pushbuttons, instant access set and cancel pushbuttons, and exception switch for any of ten sources. Printed circuit logic and clock control cards are located behind the front panel on plug-in chassis.

### 902 RANDOM ACCESS MEMORY (Optional)

Contains LED display of event number, source and tray number and link command, plus 16-key keyboard for entry. Next, Keyboard active, Jump and Skip pushbuttons are also located on this panel. Plug-in printed circuit boards for logic and display, plus electronics for random-access of multiple cartridge machines are located behind the hinged front panel.



## 902 COMPONENTS

### CUE SPEAKER CHASSIS

Contains stereo monitor/cue speakers, plus stereo monitor/cue amplifier, system line output, and external speaker terminals. With Random Access Memory option, the 902 Cue Speaker Chassis also contains crystal control for digital clock on plug-in printed circuit board, plus 60 minute battery backup for Random Access Memory and digital clock.

### SYSTEM POWER SUPPLY

Fully regulated and filtered AC with five switchable outlets and two unswitched outlets. AC may be turned on or off to all tape decks with one switch on the front panel. DC voltages are fully IC regulated, and require only two fuses. The power supply is virtually short-circuit-proof and provides +5, +12, and +24 Volts.

# SPECIFICATIONS

## AUDIO MONITOR AND SWITCHER

**MAIN CONTROLS** — Start, Stop, Step Now, Mono Check

**AUDIO MONITOR** — stereo VU meters and stereo cue speakers with speaker level control switchable through monitor switch to Cue, Line, Clock, and Network

**INDICATOR LIGHTS** — Source playing (19 green lights); Next to play (19 amber lights); Start (green pushbutton); Step Now (yellow pushbutton); Stop (red pushbutton); Line (white); Cue (white); Mono Check (white pushbutton); Silence Sense (white); Auto Pulse (white)

**AUDIO CHANNELS** — up to 19, including 9 random access

**INPUTS** — All with closed loop control

**REEL-TO-REEL TAPE** — 25 Hz sensing with adjustable stop delay and lockout; Roll-fill on preselected source; Fade, 1-4 sec. on preselected sources

**CARTRIDGE TAPE** — 150 Hz contact sensing and logging capability standard

**STUDIO/NETWORK** — Silence Sense defeat: On-air light output

**AUDIO CLOCK** — Cartridge or reel-to-reel

**AUDIO CHARACTERISTICS** —

**FREQUENCY RESPONSE:** 40-15,000 Hz  $\pm$  2 DB including 25 Hz filtering

**DISTORTION** — less than 1% at +8 DBM

**LINE OUTPUT** — 600 OHMS, stereo, at +4 DBM, balanced (0 to +8 DBM output, user adjustable)

**SIGNAL TO NOISE** — 60 DB or more below +4 DBM, (not including audio source noise)

**MONITOR SPEAKER OUTPUT** — 2 watts

**SILENCE SENSE** — 3 seconds at -21 DBM (user adjustable 1 to 10 seconds at -20 to -45 DBM)

## 902 SWITCH MEMORY

**AUDIO SOURCES**

10 selectable (up to 19 with Random Access Memory option)

**EVENTS**

48 sequential, standard (72, 96, 120, or 144 optional)

**CLOCK INSERTION**

:13, :28, :43, and :58 after each hour

**DIGITAL CLOCK**

Displays hours, minutes and seconds

60 Hz. line time base standard (crystal controlled, standard with Random Access Memory option)

## FRONT PANEL CONTROLS

**CLOCK SET** — Used to set digital clock

**EXCEPTION** — May be used to program one additional event before format reset

**ADVANCE** — Manually advances through sequence of events programmed on thumbwheel switches

**RESET** — Resets sequence of events to first thumbwheel switch position

**SET** — Arms system for instant access

**CANCEL** — Cancels instant access

**MEMORY SWITCHES** — Selects sequence of Events to be played; includes S (skip), R (reset), and audio sources 1-10 on each thumbwheel switch

## INDICATOR LIGHTS

48 sequence-lights — shows source next-to-play

4 clock insertion lights — shows when instant access has been manually activated, or individual source has been activated by digital clock

## RANDOM ACCESS MEMORY

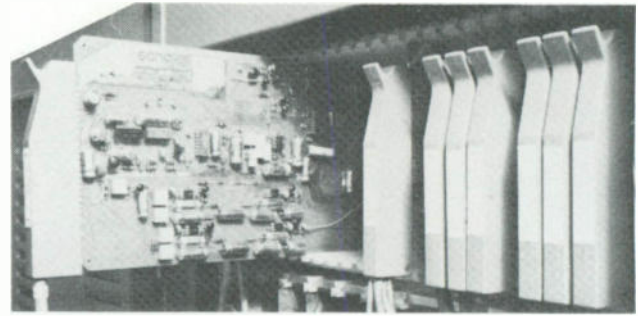
**AUDIO SOURCES** — Control of up to 9 random access and 10 sequential (total 19)

**EVENTS** — 1000 sequential, standard (additional 1000 optional)

## FRONT PANEL CONTROLS

**NEXT** — Shows next event scheduled to play

**JUMP** — Changes next event scheduled to play to new address when pushed simultaneously with the NEXT button



Interface cards plug-in from the rear making expansion and servicing simple and convenient.

**KEYBOARD** — Activates keyboard for entry

**SKIP** — Advances Memory one step and updates the random access source that was not aired. Used to skip one programmed event

## KEYBOARD CONTROLS

**CLEAR** — Changes display to show "0000"

**ENTER** — Enters new command into Memory

**ADVANCE** — Advances display one step

**ENTER/ADV** — Enters new command into Memory and advances display one step

## DISPLAY INDICATORS

**ADDRESS CODE** — Shows sequence number

**SOURCE** — Indicates which audio source is in, or being entered in Memory

**SPOT** — Indicates random access source tray number

**LINK** — When lit, shows that program materials in Memory are tied together in a cluster. When not lit, shows that cluster is complete, or that only a single command was entered.

## GENERAL

**Power:**

105-125V, 60 Hz., AC. 20 Amp. service (including tape decks) recommended

**Size:**

Audio/Monitor Chassis: 19"W x 7"H x 17"D (48cm x 18cm x 43cm)

902 Switch Memory: 19"W x 10½"H x 17"D (48cm x 27cm x 43cm)

Random Access Memory: 19"W x 10½"H x 17"D (48cm x 27cm x 43cm)

902 Time Gate: 19"W x 17½"H x 5"D (48cm x 45cm x 13cm)

Power Supply: same as Audio/Monitor Chassis

Cue Speaker Chassis: 19"W x 5¼"H x 12"D (48cm x 13cm x 30cm)

## OPTIONS

Random Access Memory with 1000 or 2000 events

902 Time Gate for Network join and control of 10 external sources

Remote Control with Start, Step Now, Stop, Advance and Reset pushbuttons

Schafer English Logging with cleartext descriptions of each event, and discrepancy notations

Schafer remote clock driver. Drives up to 30 station digital or standard clocks. Requires crystal control.

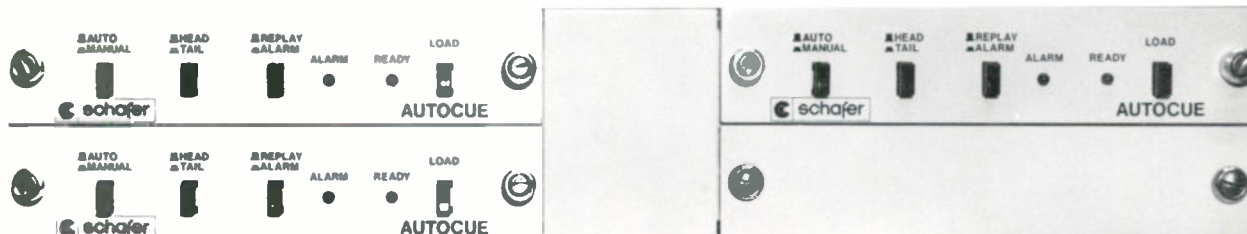


## Schafer Electronics Corporation

75 Castilian Drive, Santa Barbara Research Park  
Goleta, California 93017 (805) 968-0755

# AUTOUCUE

## Automatic Tape Replay/Alarm System



### FEATURES

- Automatically cues tape from *heads* or *tails* position
- May automatically rewind or fast-forward tape onto storage reel after last music selection, and trigger operator alarm
- May automatically recue tape to play over after last music selection
- Works with most tape decks and most automation systems
- All components on easy access plug-in printed circuit boards



The Schaffer AUTOUCUE is the perfect solution for automated stations who play the same reel of tape over and over each day, or for those who wish to take minimum time in changing tapes. The AUTOUCUE will alert the operator on duty that a tape has run out and needs to be changed, or will automatically rewind and recue a tape to be played over again.

The Schaffer AUTOUCUE handles tape gently, yet functions quickly. It does not use the tape transport braking system until the tape is ready to be put in the play mode. All cueing, up to that time, is done by automatically alternating the fast-forward and rewind circuits so that there is never a chance of stretching or breaking tapes. Tape recue time is also minimized.

Several modes of operation are standard on the Schaffer AUTOUCUE:

**REPLAY** - rewinds and recues tape after the last selection.

**ALARM** - winds tape onto proper reel with *heads out* or *tails out* (as selected on the front panel) and provides a contact closure to trigger an alarm device (not included).

**LOAD** - automatically loads new tape from *heads* or *tails* position and cues to first selection.

**READY** - indicator lamp illuminates to show that AUTOUCUE is cued-up, or playing.

**ALARM** - indicator lamp shows that the alarm has been triggered (reset by pushing AUTO/MANUAL or LOAD button momentarily).

**AUTO/MANUAL** - designates AUTOUCUE enabled (AUTOMATIC) or disabled (MANUAL). Due to the pulsed nature of the AUTOUCUE circuits, manual tape deck controls may usually interrupt AUTOUCUE operation.

Up to four AUTOUCUE units (one per tape deck) including power supply mount in a standard 19" rack, taking only 3½" of rack space.

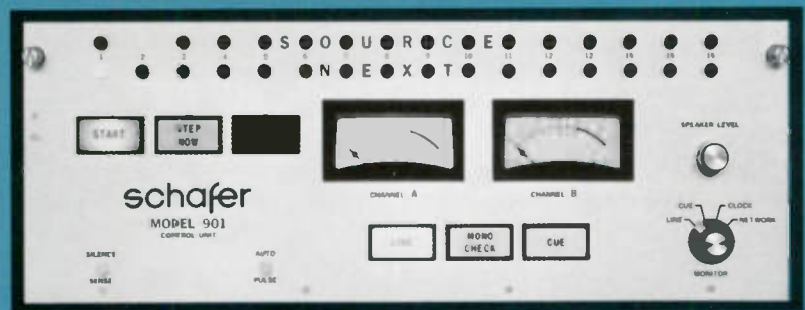


### Schafer Electronics Corporation

75 Castilian Drive, Santa Barbara Research Park  
Goleta, California 93017 (805) 968-0755



# Schafer 900 Series Broadcast Automation Systems



NOW, EVERY RADIO STATION, REGARDLESS OF SIZE, CAN HAVE THE CLEAN SOUND, THE VERSATILITY, FLEXIBILITY & ECONOMY OF THE MOST SOPHISTICATED AUTOMATION SYSTEM AVAILABLE TODAY. THAT'S BECAUSE THE 900 SERIES COMES IN SO MANY MODULAR CONFIGURATIONS, FROM A MINIMUM AUTOMATION SYSTEM TO A TOTAL 24 HOUR AM OR FM SYSTEM. BROADCASTERS CAN EXPAND AS NEEDED WITH SIMPLE, MODULAR UNITS. LOOK INTO IT.

# Schafer 900 series system components

A typical 900 Series system consists of reel to reel and cartridge playback decks. The number of each depends upon the "walk away" time desired for an individual station. The system is controlled by entering program events into memory through switches, or keyboard, or automatically from cassette.

Information and instructions can be entered at any time. Commercials and/or music can be played from random access or sequential playback sources. A 900 Series system will cue all random access devices in advance by searching the time file for up to 6 hours ahead of what is "now playing."

The literally endless format file for music, and the capability of continual automatic resetting by sequence or by time, plus the tremendous time event storage of commercials, ID's, net joins, etc., makes the 900 Series truly an industry "first."

**901 Control Unit** This rack-mounted panel has complete control of all playback decks, audio distribution, VU

eters, monitoring of line, cue, audio clock and network. It will join the network on command, and it shows on a visual display which audio source is currently on the air and which is next to play.

Three memory units are available:

**902 Switch Memory Unit** The 902 is switch oriented and is designed for repetitive programming. Formats of 24 events in length or two formats of 12 events are offered. Formats may be reset at 15 or 30 minute intervals. The 902 is generally employed when only short periods of automatic programming are desired.

**903 Keyboard Memory Unit** (Illustration). The 903 is the choice when full automation and utmost flexibility are required. A broadcaster may start with a minimum system and add a 903 memory unit later with no interfacing problems whatsoever. The 903 Keyboard Memory features —

- A fast-access MOS memory arranged to provide one time slot for each minute of the day. This means complete scheduling flexibility of all time-oriented events. Any event can be programmed by entering the actual time the event is to be aired, rather than by step or sequence, for absolute simplicity of programming. A daily program is simply entered into the

memory from the keyboard, addressing by time, just as is done in a live operation.

- Random access cueing is included in the MOS memory time slot entry.
- Events may be programmed on a time or sequential basis . . . or a combination of both. Changes can be made only moments before airing.
- Cassette entry allows advance programming of events for any future day. This is accomplished on magnetic tape through the use of the 903 keyboard. Entries are stored in advance, changes and deletions may still be made through the keyboard.
- The next event is easily identified by simply pressing one button.
- The unprecedented unique design philosophy of the 903 provides for almost unlimited advance programming storage. For example, the memory stores 1440 time events, one for each minute of the day. Commercial events may be linked together and played together . . . always.
- Up to 96 sequential events — essentially for music — may also be stored. This file is virtually unending. When the end is reached it may be reset to any point within itself on a time or event basis.

## Some of the advantages of the Schafer 900 Series!

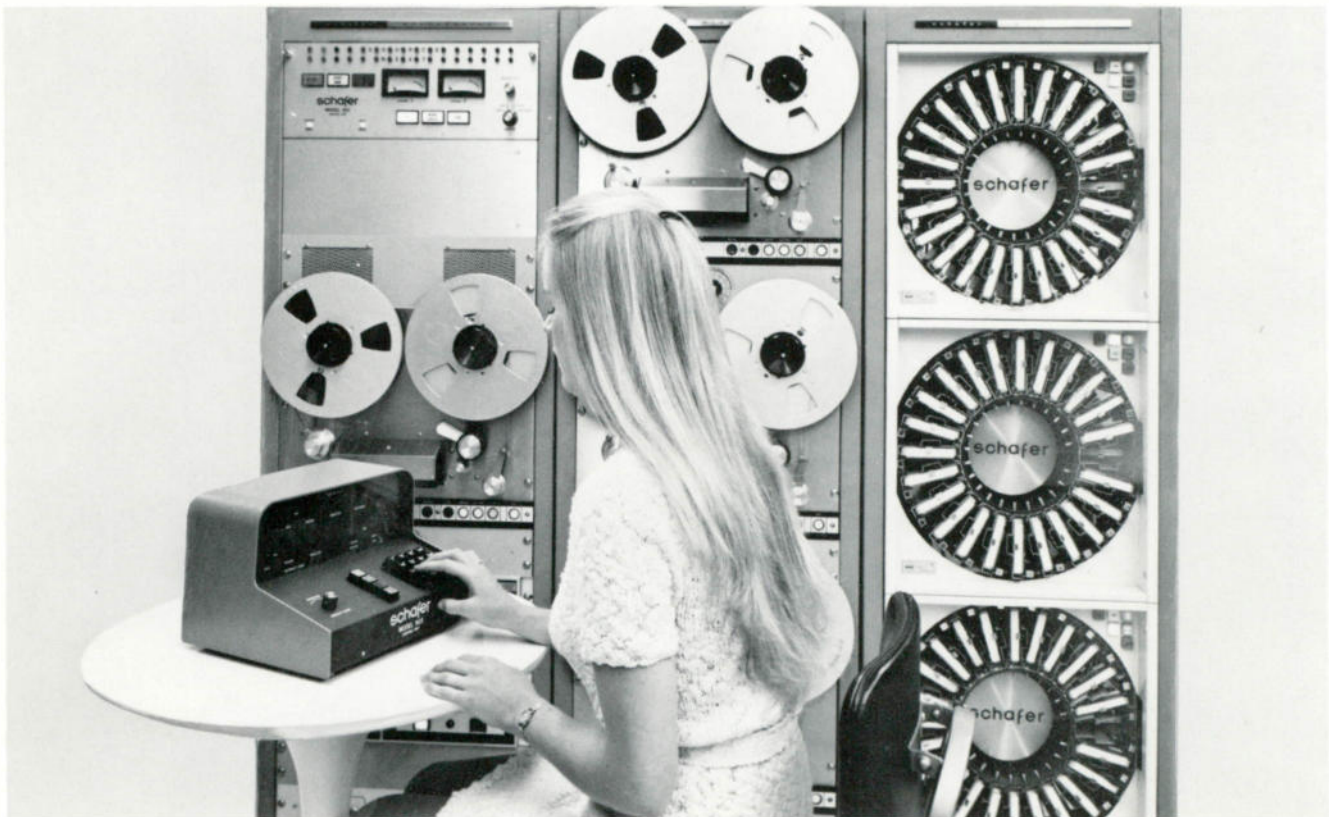
<b>Flexibility</b>	Complete freedom to program any desired format.
<b>Expandability</b>	Start with a minimum system; add on as you grow.
<b>Logging</b>	Verified logging in CLEAR (Conversational Language Easily Adapted to Radio) language is printed automatically.
<b>Consistent sound</b>	Schafer 900 Series systems produce your own sound as you want it heard . . . always.
<b>Better use of personnel</b>	Prime time personalities can be aired any time of day or night, and the system frees your staff for more creative work . . . production, writing, selling, etc. Efficient use of staff means greater economy . . . less overhead.





# Schafer does it again .....another broadcast automation "first"

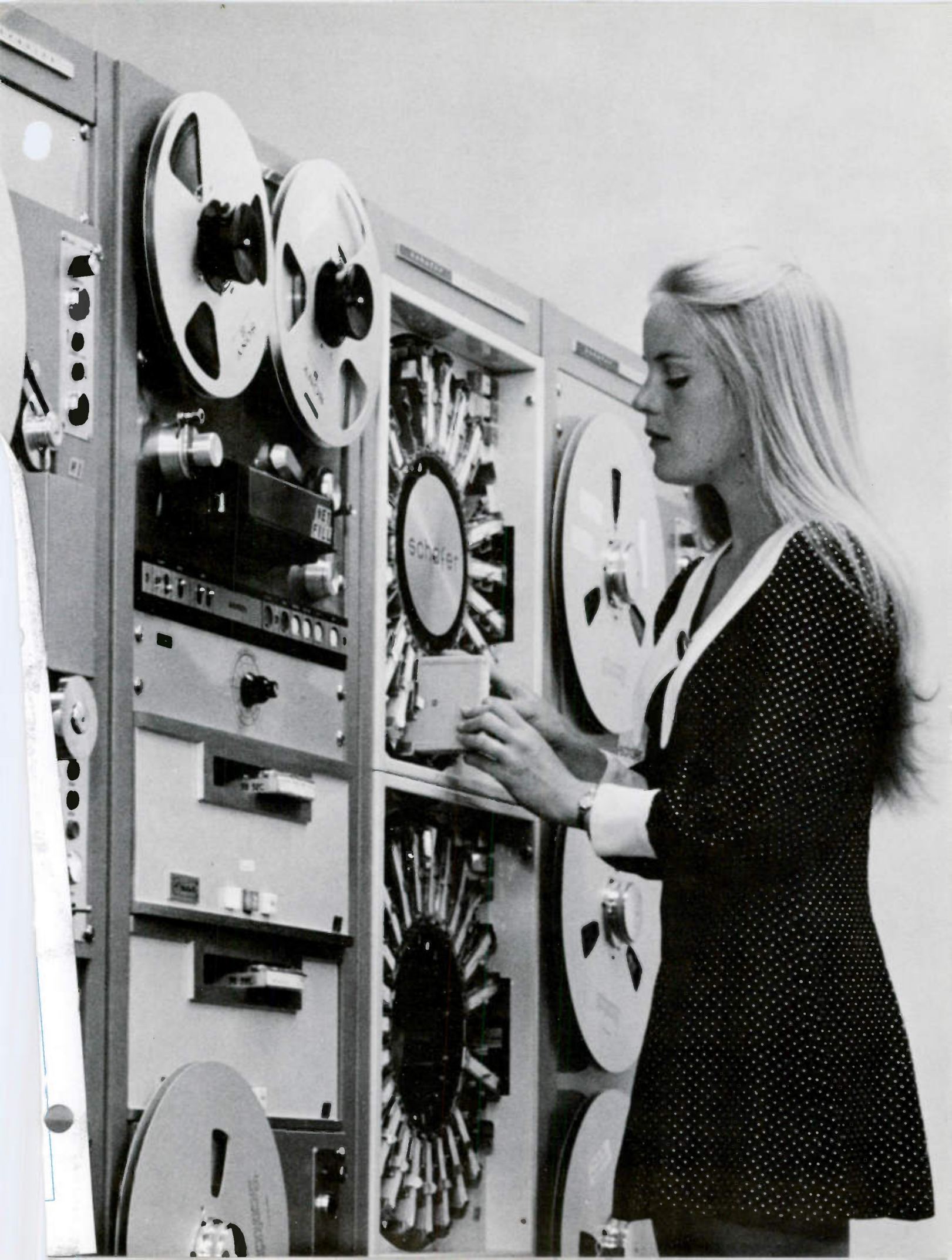
Schafer Electronics Corporation... the company that invented broadcast automation for the radio industry... proudly announces the Schafer 900 Series. If you're in the radio broadcasting business (AM, FM or AM/FM), you must consider the 900 Series. It's the first system that's truly right for every station... literally. That's because it comes in so many modular configurations... from ultra-small and inexpensive to overwhelming (in performance, not price). Yet, even the most basic 900 Series system represents a new high in versatility, and flexibility. For example, every programming event (1440 per day) may be entered and/or amended by time of day, rather than by step or sequence. This capability alone makes for unusual ease and simplicity in programming. The 900 Series is all new, all solid state. And it gives even the smallest station the clean sound, the efficiency and economy afforded by Schafer broadcast automation. Write or telephone for details. The "New" Schafer Electronics Corporation (new management, new facilities, new products) wants to meet you.



## **schafer**

Schafer Electronics Corporation Santa Barbara Research Park  
75 Castilian Drive Goleta, California 93017 (805) 968-0755

See and hear it at NAB booth #215...



■ The MOS shift register memory provides low system cost. Battery back-up prevents loss of programming if power fails (battery power keeps digital clock and memory alive for at least 1/2 hour... longer if more battery power is added). If a reload of program becomes necessary, it takes only 48 seconds for six hours of programming.

**904 Manual Control Unit** The 904 is a limited memory to allow partial automation programming in conjunction with live personality operation. It may be used to produce I.D.'s, PSA's, commercials and other events the FCC requires to be logged. Music and talk are produced live. The 904 can be used alone with the 901 or added for manual control with the 902 or 903.

## More 900 Series system features and advantages

**Closed loop control** If, for any reason, a playback is incapable of playing when called, this is sensed in 1/5 second and the next event scheduled

plays. Also, should a playback go out of play (such as tape breakage) the system will immediately go on to the next event.

**Silence Sense** If no audio from a playback deck is sensed, the system automatically goes on to the next event scheduled, after an adjustable delay.

**Cue** System can monitor any channel not on the air.

**Switch Tone Sensing** Individual 25Hz and 150Hz sensing allows multi-audio sources to be aired. Automatic cueing when loading new tapes is provided.

**Audio Clock** For time announcements, pre-recorded reel to reel, cartridge or cassette playback decks are provided.

**Temperature** Automatically sensed and pre-recorded temperature tape playback is automatically cued and is always ready to play when called for by control unit.

**Network Join** This is controlled on a real time basis. A choice of "fade-in" of network fill or "fade-out" of music is offered. Fill deck may be reel to reel or cartridge.

**Solid State** 900 Series components are all silicon DTL, TTL, MOS, linear

and special function integrated circuitry. Relays are only used in playback decks.

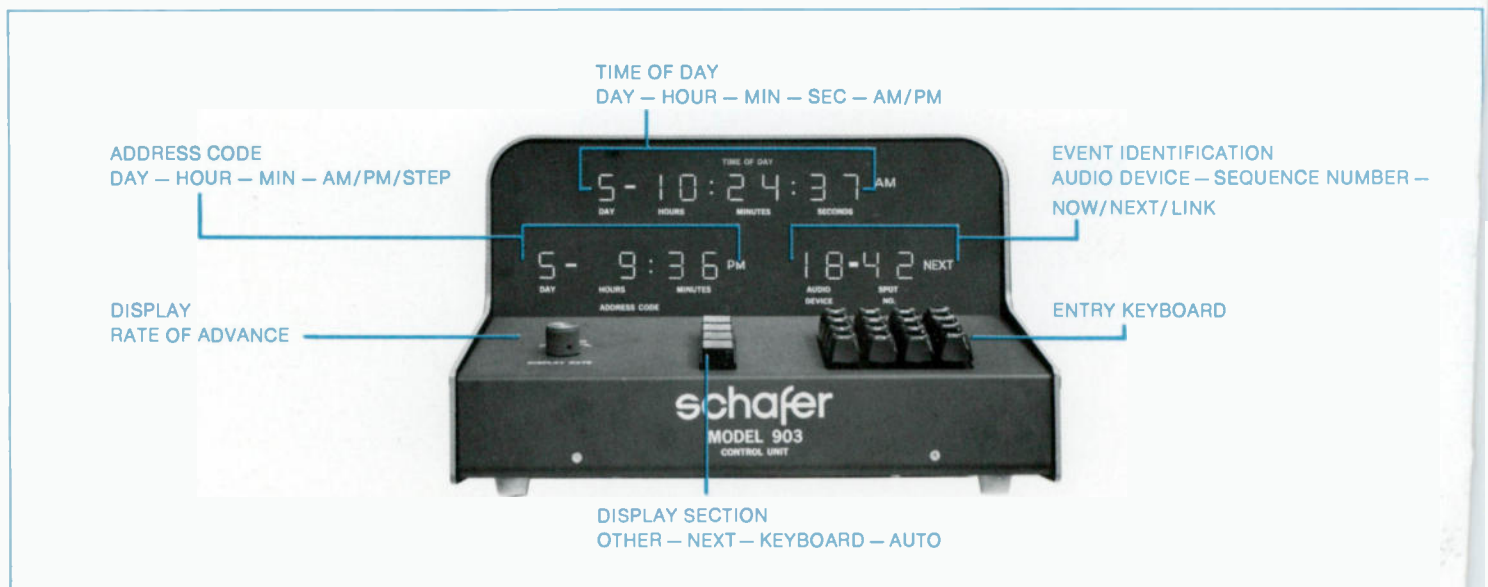
## A remarkable system

The automatic programming ability of a 900 Series System is truly surprising... reflecting a massive effort by the designers at Schafer. They are pioneers in broadcast automation. The flexibility that allows broadcasters to create a desired format is truly remarkable, especially when considering the cost of a minimum installation. When expansion is necessary, playbacks, cabling, and interface circuits are added. No broadcaster must buy unnecessary circuitry and equipment in anticipation of add-ons.

The cost of a Schafer 900 Series System is well below what one might expect for such performance. Simplicity and low cost were original design objectives.

For more detailed information, a demonstration or a personal call from one of our nationwide team of automation experts, please write or telephone immediately.

# The 903 Keyboard Memory Unit-new from Schafer!





SOUND SOURCE  
NEXT

START STOP

**schafer**  
MODEL 901

LEVEL A LEVEL B

NO HOLD OFF

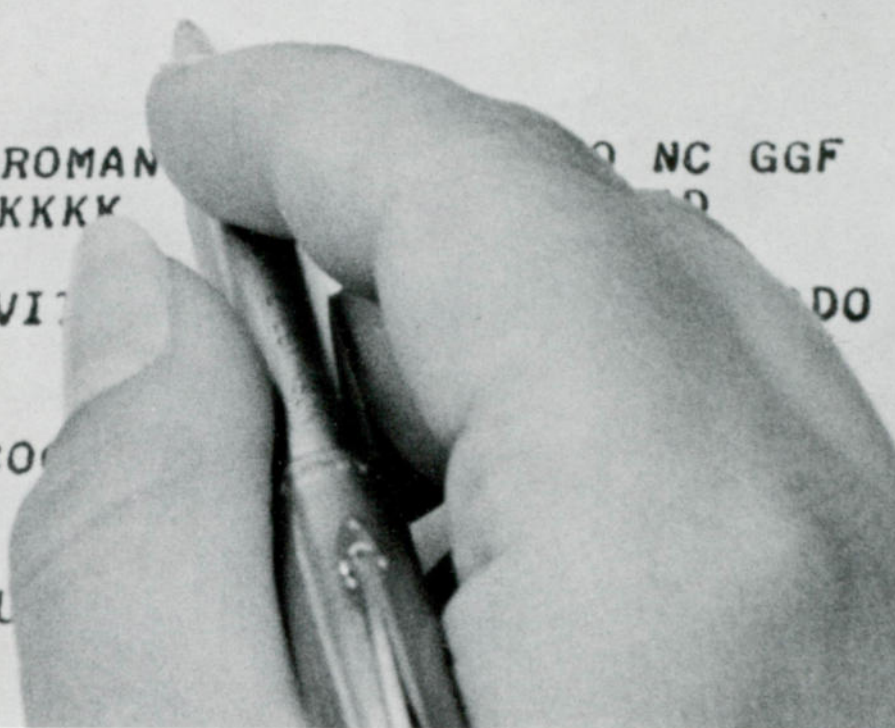
PERFORMANCE

5-10:24:37 AM  
HOUR MINUTES SECONDS

5-9:36 PM 18-42 NEXT  
HOUR MINUTES AUDIO SPOT  
POWER CODE DEVICE ID

**schafer**  
MODEL 903  
CONTROL UNIT

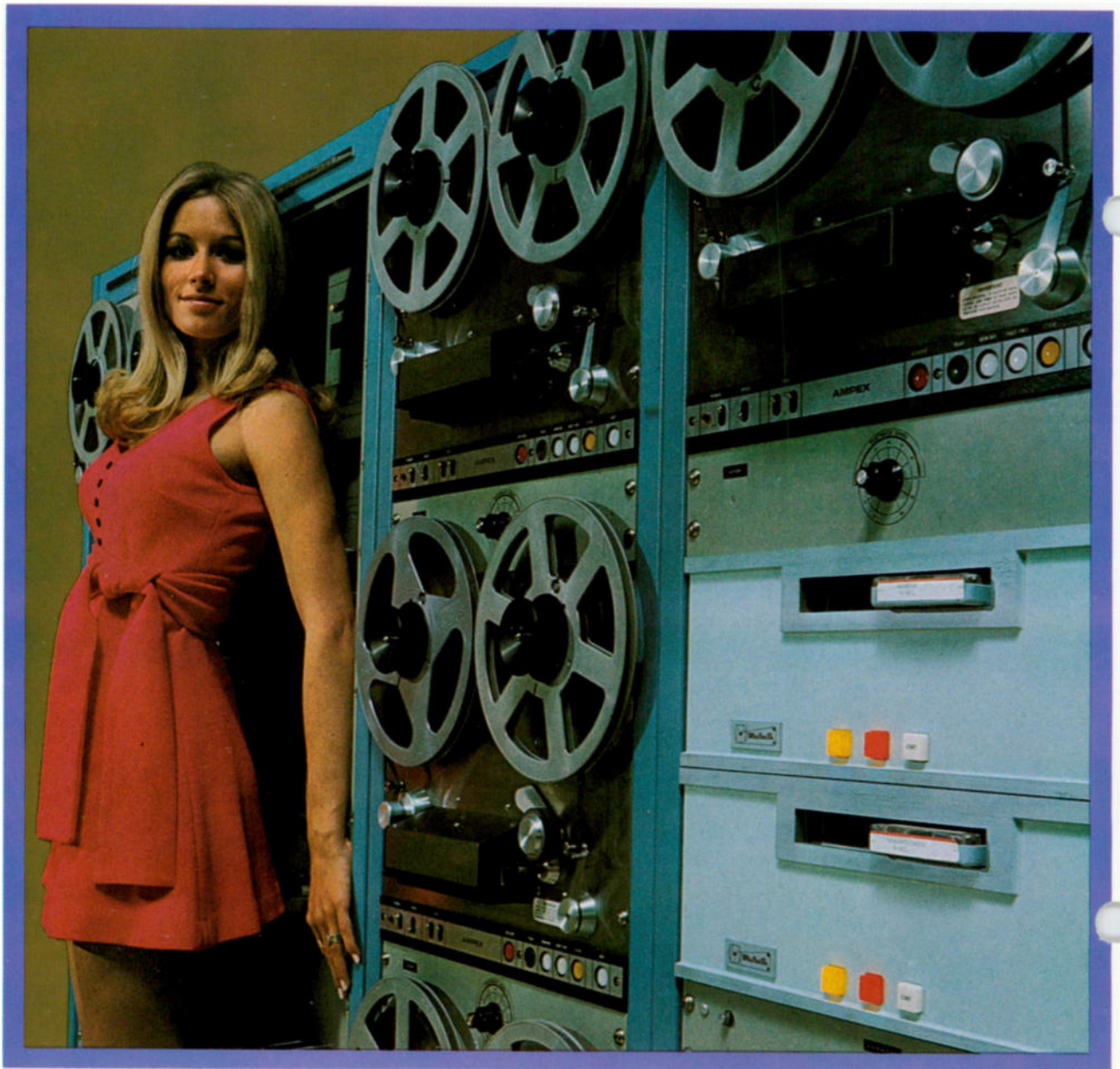
**Verified Encoded Logging** Every event is automatically logged in CLEAR language on a typewriter. The time and playback number appears on the log on command from the control unit. However, the identification of what actually plays is printed only as a result of the tape actually playing. Digital data previously encoded is read from the cartridge tape and printed on the log. The tape had to, in fact, play for it to appear on the log. Hence our term "Verified Encoded Logging."

A black and white photograph of a hand holding a pen, pointing at a typewriter log. The log contains several lines of text, including time, playback numbers, and program names. The hand is positioned in the foreground, with the pen tip pointing towards the text on the log.

01:44:25PM 08 COCA COLA :62 NC GGB  
01:45:29PM 01  
01:48:17PM 02  
01:51:10PM 07 CONTAC :58 NC BBDO  
01:52:10PM 06  
01:52:27PM 01  
01:54:43PM 02  
01:57:47PM 07 ROMAN O NC GGF  
01:58:38PM 05 KKKK D  
01:59:08PM 06  
01:59:27PM 08 VI DO  
01:59:58PM 01  
02:02:19PM 02  
02:05:31PM 07 CO  
02:06:35PM 06  
02:06:57PM 01  
02:09:25PM 07 DU  
02:10:22PM 02  
02:12:20PM 01

THE SCHAFER 800 BROADCAST AUTOMATION SYSTEM







# The Schafer 800

## Industry Standard for Broadcast Automation

C

Schafer Electronics became the leader in Broadcast Automation nearly 20 years ago when the first completely automated system was delivered to a radio station.

Schafer has maintained this lead ever since with a continuing parade of automation firsts. Today, the Schafer 800 system sets the standard for field-proven Broadcast Automation. More of these fine systems are operating day-in ear-out throughout the world than all other systems combined.

**The Ultimate In Flexibility.** With Schafer automation you perfectly capture the mood of the season—the community—the time of day—because you program by musical category. A sequence never has to be repeated. There is an almost infinite number of combinations to create an ever-continuing fresh live sound.

The Schafer 800 system plays exactly the music you choose. Hit Parade '70, Middle-Of-The-Road, Country-Western, Rock And Roll, Contemporary. Or any other kind you can think of.

There is never a pop. A click. A fade-out. Or deadly silence. The 800 system follows your schedule. It inserts commercials, IDs, time signals, personality tracks, and all types of music. It switches to the network. And back. It's perfect for FM. And for AM. For big cities. For small towns. For large stations. And for little ones.

"The 800's performance is both flawless and astonishing," said one of radio's most respected multiple station owners. And over 500 Schafer Broadcast Automation System users agree. From Los Angeles to New York. From Johannesburg to Guadalajara.

## The Brain



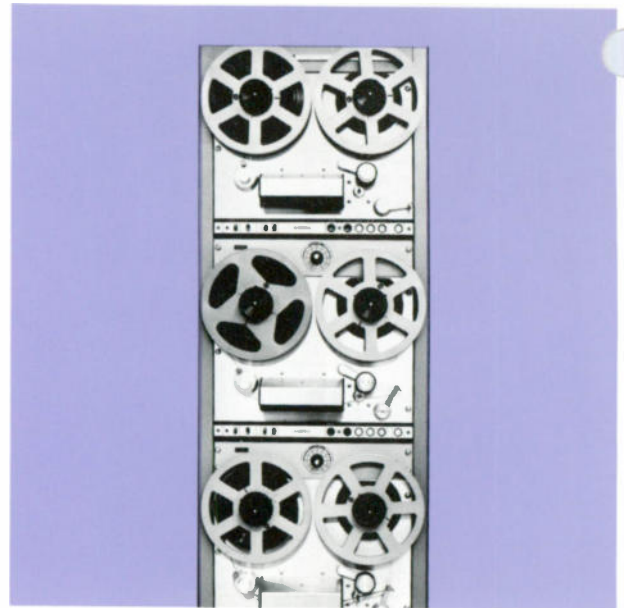
2

Nerve center of the 800 system is the CU-8T Control Unit—The Brain. All other system elements such as music machines, the audio clock, random access spot locators, cartridge machines, and network switching are controlled automatically by one marvelously versatile CU-8T.

Commands are flawlessly executed to provide the necessary timing and sequencing for hours of programming.

Formats can be changed repeatedly throughout the day, automatically. Legal station breaks, and commercials are assured by varying the number of musical selections in the sequence which eliminates the need for pre-timed material.

## Music Machines



A typical Schafer 800 system includes 4 or more music machines which are controlled by the CU-8T brain. This is why a Schafer Broadcast Automation System can provide music by category. A musical sequence never has to be repeated. The flexibility of the Schafer control unit and sub-control units provides an almost infinite number of combinations to create the fresh live sound associated with all Schafer systems. Thus, the 800 system is perfect for any type of musical format — Hit Parade '70, Middle-Of-The-Road, Jazz, Country-Western, Rock, Contemporary, etc..

Any standard stereo or monaural transport can be used in the 800 system — reversing or non-reversing. The standard transports are modified to include a time delay unit which allows the playback machine to run for a precise time (distance) after the selection is ended in order to by-pass any clicks, or pops which may have been introduced during recording. 25 Hz switching is used to assure tight cues and adjustable overlap. The beginning of a 25 Hz tone pre-starts the next event while the end of the 25 Hz signal switches off the current selection.

Schafer recommends at least 4 music machines since this assures a variety of musical programming and a reasonable unattended playing time. With 4 music machines the system will run unattended for six hours or longer. If station ID's, Mood Intro's, or other special material is required, additional decks can easily expand the system. The total number of playbacks in an 800 system depends on the length of time the system is to be left unattended and how much programming variety is desired.

Audio and control cables provide for instant connection to the CU-8T control unit.

## Random Access Spot Locator



The SA-100 Random Access Spot Locator used in the Schafer 800 system is a high quality tape recorder fitted with a special photocell assembly and associated circuitry which allows the transport to cue at high speed to the commercials or other bits of programming on the "spotter" tape.

Automatic cueing is accomplished by translating the setting of 50 pairs of ten-position switches into a particular location on the tape. The counting mechanism can cue the transport to any spot location from 00 to 99, thus providing complete random selection of up to 50 commercials recorded on the tape.

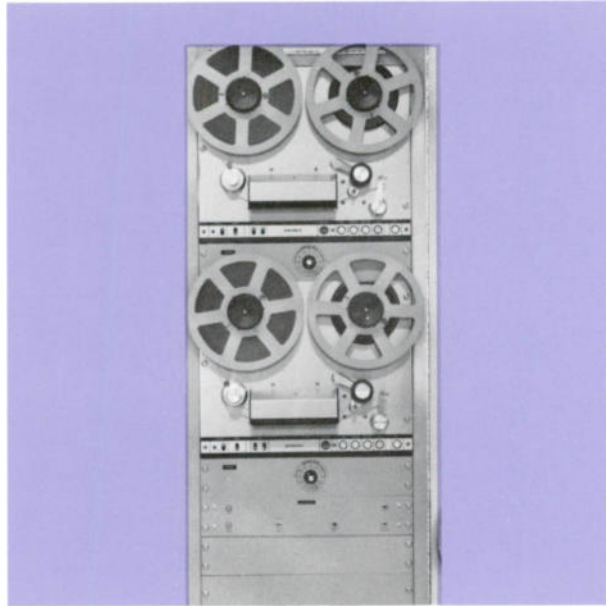
A typical spotter tape is divided into 100 windows. Thus, a 90 minute tape could be divided into 68 one-minute availabilities, 31 half-minute availabilities and one availability of approximately 5 minutes. Other combinations are available.

The Random Access Spot Locator is supplied with a remote control box so that new commercials can be recorded without having to remove the spotter tape from the transport.

It is very simple to pre-program the playing order of commercials using the digital switches in the SA-100 memory. For example, suppose that the first three commercials to be played on a particular Random Access Spot Locator are located in slots 28, 55 and 03, respectively on the spotter tape. All the operator has to do is set the top left hand pair of switches to 28, the pair beneath to 55 and the third set to 03.

When the spotter is first called on by the "brain" it will play spot number 28 and then cue to 55. It is possible to pre-select up to 50 commercials for each spotter in the system. Also, a second rack containing fifty additional pairs of switches can be supplied with each spotter, making it possible to pre-select up to 100 spots.

## Audio Clock

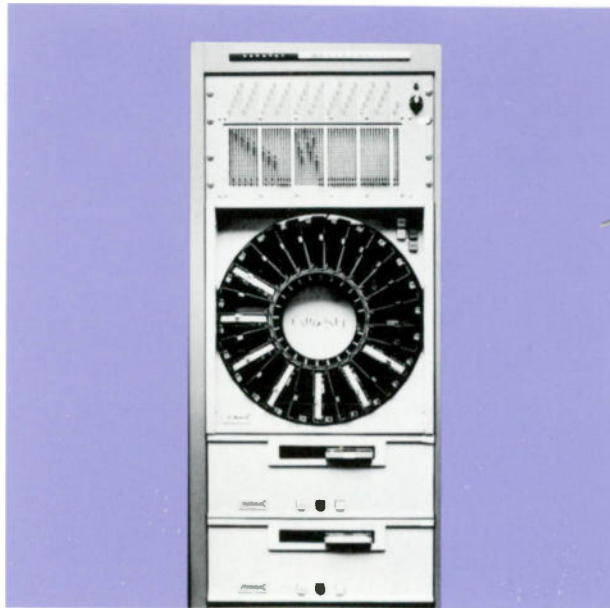


The TM-8T Audio Clock announces the time of day accurate to the nearest minute. It consists of two tape transports equipped with photocell assemblies and time-delay circuitry. One transport contains the even minute time signals while the other contains the odd minutes. These transports are alternately advanced to the next time increment at 30 seconds past the minute. Thus, the correct time signal is always cued, ready to play when called upon by the system control unit.

The transports can be uni-directional or bi-directional. The latter has the advantage of providing a perpetual clock because of the automatic reversing feature.

Customers can record the time signals themselves or can purchase time tapes from Schafer beautifully laid into harp, guitar or other musical instrument beds, one for every minute of the broadcast day.

The Audio Clock comes equipped with cables ready to plug into the Control Unit. There is sufficient room in the rack for an additional reproducer.



4

The 800 system provides complete random selection of any multiple tape cartridge device — or it can select single-play cartridge or cassette machines when called for in the CU-8T control unit format.

The Schafer M52C memory allows random selection of each of the 24 cartridges in a multi-cartridge device such as the Carousel. Each of the 52 slide switches in the memory has 24 positions plus OFF, making it possible to program each cartridge as many times as desired out of the total 52 plays. When the memory gets to position 52 it then resets back to position number one. The OFF position skips that particular switch and goes on to the next one without delay.

When cartridges are used in the 800 system the CU-8T control unit utilizes the 150 Hz auxiliary control tone to switch machines in a manner similar to the 25 Hz tone. This feature is standard with the CU-8T.



The 800 system can be programmed to join and leave the network at precise times during the day and night by using the ANP-800 in conjunction with the system control unit.

The ANP-800 consists of a digital clock, a tape transport for closing theme or fill music, and a switching panel which make it possible to set up any of 15 combinations of time to operate any of 10 functions. These combinations may be repeated hourly without the use of additional switches.

One of the features of the 800 system is that a musical selection never has to be faded or cut before it has finished playing.

This is accomplished by programming the ANP-800 to deadroll the fill music or closing theme so that the music ends in time to play the network adjacency commercial, the station ID, or whatever other events are scheduled. This is timed so that all of this is completed just prior to the time the system switches to the network. Thus, with no break in programming, the network is on the air. Normal local programming is resumed when commanded by the network switcher.

The Schafer 800 system can also be supplied with a telemetry control receiver (ABC-8/IFN-80) which reacts to the ABC network control signals and can be programmed to leave the network on a breakaway control tone to insert a local commercial.

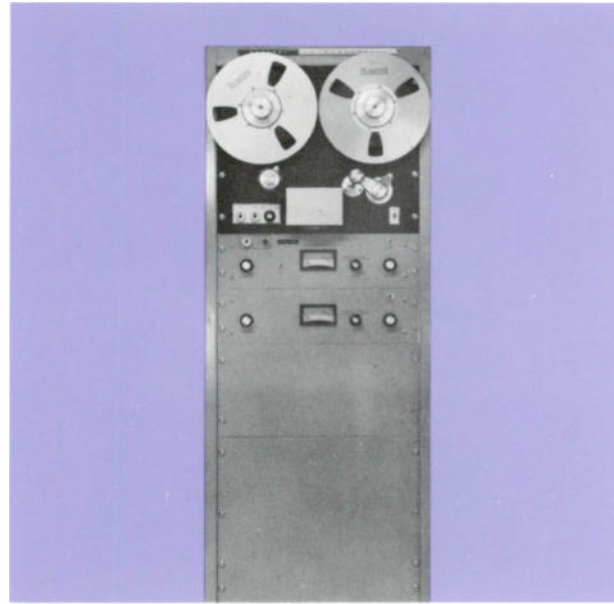
If the station chooses to cut away to the network automatically on a flash bulletin, the Schafer Telemetry receiver can be set up to immediately cut away from local programming and join the network. At the end of the flash bulletin, programming will revert back to the local sequence.

The station may elect to cut away for news bulletins of lower priority as well, or the station can use the news bulletin control tone to record the network news bulletin, and to sound an alarm so that someone at the station can evaluate the material to see whether it should be put on the air.



The TRU-8 Record Unit is used to record material to be aired by the 800 system. It may also be used as a playback unit, in or out of the system, and may be used to record material for any other use as well.

The 25 Hz oscillator and a sharp cutoff 25 Hz filter are built into the TRU-8 electronics. The 25 Hz filter removes all unwanted low frequencies from the material being recorded, yet the sharp cutoff filter design assures full range fidelity. A remote control unit is provided to allow remote control of all normal recorder functions, plus the special controls designed for recording into the 800 system.



The Schafer VLR is a professional quality tape recorder/reproducer which provides maximum intelligibility at extremely low tape speed, making it ideal for Broadcast Automation System logging.

The VLR (Voice Logger Recorder) incorporates a unique Schafer developed tape guidance system which allows operating speeds as low as ten inches per minute (1/6th inch per second). This is one forty-fifth (1/45) the tape speed of studio tape recorders.

The VLR was developed by Schafer to satisfy FCC program logging requirements in a most efficient and economical manner.

The VLR is designed and engineered to stringent standards of performance. Every VLR component and sub-assembly is precision manufactured and undergoes rigid test and inspection before shipment.

The two-channel VLR 332 can be used either to log a single station or it can simultaneously log an FM-AM operation.

## CU-8T Control Unit



6

The heart of the Schafer 800 Broadcast Automation System is the CU-8T which has been often imitated but never duplicated. Other systems still strive for the CU-8's reliability, simplicity and flexibility.

The CU-8T operates like a good disc jockey, playing all needed program elements, and adding more or less music to fill the time period perfectly. It will never pass essential items by — always airing station IDs within FCC tolerances — yet never fades any program element.

**Formatting:** The CU-8T may be furnished with from 24 to 144 thumbwheel switches, each switch having positions 1-10, S (skip) and R (reset). These switches may be divided into any number of groups with each group representing a time period in the format.

The clock in the CU-8T may be used to insert material from any of the ten inputs on a real time basis. However, it is usually set to reset to the top of a format. Reset (or insertion) is possible in  $1\frac{1}{4}$ -minute increments up to 60 minutes. The clock function may be manually set or cancelled at any time.

Formats or sequences may be changed at any time, even while the system is on the air, without disturbing the on-the-air programming.

**Sample Formats:** The Control Unit may be ordered in a number of configurations. Here are some typical formats

**CU-8T:** 24 program elements can make up  $1\frac{1}{4}$ ,  $2\frac{1}{2}$ , 5, 10, 15, 20, 30, 45 or 60 minutes with clock reset.

**CU-8T/48:** Wired 2 x 24, this configuration provides alternating formats. 24 program elements provide periods of  $1\frac{1}{4}$ ,  $2\frac{1}{2}$ , 5, 10, 15, 20, 30, 45 or 60 minutes each with clock reset to the alternate group.

**CU-8T/144:** Wired 12 x 12, this configuration provides twelve sequential formats. 12 program elements can make up 12 different periods of  $1\frac{1}{4}$ ,  $2\frac{1}{2}$ , 5, 10, 15, 20, 30, 45, or 60 minutes each with clock reset to the next sequential group.

Advance through the groups in multiple formats is normally sequential. However, the Schafer ANP-800 Automatic Network Programmer can be programmed to provide random selection of format groups. The Schafer ANP-800 digital clock makes it possible to switch to special format groups for certain periods of the broadcast day, then back to regular format groups at a pre-selected time.

**Input Expansion:** Any one of the ten CU-8T inputs may be expanded to ten inputs (nine additional inputs) with the CU-8S Sub-Control Unit. The CU-8S is especially useful in large systems since it can program all music inputs, spot inputs etc. independently of the CU-8T. Its insert-reset clock can provide a sub-format for its inputs which is independent of the main program format.

**CU-8T Switching:** At the start of a 25 Hz tone, the CU-8T starts the next event and switches audio on the air. During 25 Hz, two elements are on the air. After 25 Hz, the event just ended is switched off, and its deck is placed in the deadroll mode. The new event continues alone. These 25 Hz tones may be any length of overlaps, talk-overs or crossfades.

**All Clicks And Pops Are Bypassed:** A unique Schafer deadroll system bypasses all clicks and pops, even those which may be recorded when automation tapes are made-up. This means that program assembly is completely smooth and quiet.

**Silence Sensing:** Silence in the program channel (in both channels in a stereo system) causes the CU-8T to advance to the next event after a variable time delay. "Silence" is adjustable to match the type of music being programmed.

**Clock Exception Switches:** Any input can be excepted to prevent its particular program element from following certain other elements. If the clock reset function will cause an unwanted sequence of events, the CU-8T programs an additional event before resetting.

# CU-8T Control Unit Specifications

**Input Channels:** 10 stereo, expandable to 100 using CU-8S Sub-Control Unit.

**Number Of Events:** 24 to 144.

**Audio Output:** +4 or +8 VU, balanced or unbalanced, each channel terminated in standard XL connector.

**Signal To Noise:** 70db or better on each channel.

**Frequency Response:** 40 to 15,000 Hz  $\pm$  1db after 25 Hz filtering.

**25 Hz Filtering:** Standard 25 Hz tones are filtered 55db below program level, yet response is flat to 40db in both channels.

**Switching:** All switching performed at +4 or +8 level. Switching transients down at least 70db under any conditions.

**Distortion:** Less than 1%.

**Relays:** Automatic Electric telephone type, double-contact.

**Panel Controls:** Format Sequence Thumbwheel Selector Switches, Master Start, Master Stop, Advance, Reset, Panic (Emergency Advance), Clock Set, Clock Cancel, Clock Exception, On-air Digital Readout, Monitor Volume, Monitor A-B Selector, Monitor Input Selector.

**Remote Control Functions:** Master Start, Master Stop, Reset, Clock Set, Clock Cancel. (Remote Control indicator lights for all remoted functions.)

**Clock Exception Switches:** Ten, which permit format exceptions for each of ten inputs.

**VU Meter/Test Multimeter:** Switchable to left line VU, right line VU, 48-volt supply test, -27.5 volt supply test, 25 Hz test or Silence-Sense test.

**Cue/Monitor Amplifier/Speaker:** Built-in 5-watt amplifier and speaker with input selector. Monitors any input, left or right line output.

**Power Supply:** Solid state, fused, stable operation from no load to direct short circuit.

**25 Hz Sensing:** Continuous monitoring of program channel (left channel only in stereo systems). Attack time is 1/2 second. Sensitivity adjustable from 0 to -25db below program level. Sensitivity range of -24 -26 Hz.

**Silence Sensing:** Continuous monitoring of program channel (both channels in stereo system). Delay adjustable from 1/2 to 12 seconds. Threshold adjustable from 0 to 35db below program level.

**Program Timing:** Built-in clock allows format reset on real-time basis, or program insertion from any input. Clock accuracy:  $\pm$  10 seconds, correctable to  $\pm$  1/2 second with ANP-800 Network Programmer accessory.

**Power Requirements:** 105 to 125 volts 60 Hz. Special voltages and currents available on special order.

**Power Protection:** 15 ampere circuit breaker provides master on-off switching and protection for entire system except format clock which runs continuously.

**Modular Construction:** Plug-in relays and heavy-duty, hand-wired printed circuits allow quick replacement in the unlikely event of failure.

**Physical Size:** 22 1/4" wide, 17" deep, 66" high. Floor space required: 22 1/4" x 17" plus rear service allowance.

**Shipping Weight:** 250 pounds.

**Accessories:** ANP-800 Automatic Network Programmer. CU-8S Sub-Control Unit (1 x 24).

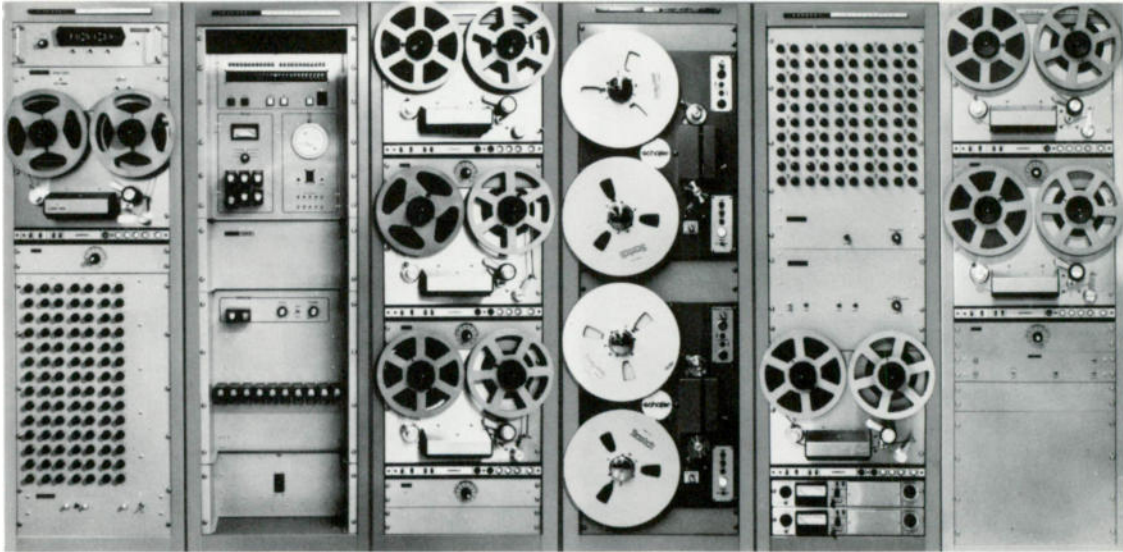
**Ordering Information:** Schafer Model CU-8T Control Unit, complete with RC-4 Rack Cabinet, Remote Control and 25-foot cable, power cable and plug.

## Ordering Options:

Model	Number of Event Switches	Format Options
CU-8T/24	24	1 x 24
CU-8T/48	48	1 x 48, 2 x 24, 4 x 12
CU-8T/96	96	1 x 96, 2 x 48, 4 x 24
CU-8T/144	144	1 x 144, 6 x 24, 12 x 12

Note: For /48, /96 and /144 models, the following panel control is added: "Format Advance."

## 15 Important Minutes In The Future Of Your Radio Station



**Network Switcher  
ANP**

**The Brain  
CU-8T**

**Music Machines  
M1 through M5**

**Random Access  
Spot Locator-S1**

**Audio Clock  
AC**

8

A brief 15 minutes spent listening to a Schafer Broadcast Automation System could well be the most important quarter hour in the future of your radio station — whether AM or FM. Here is a typical 15 minute programming sequence. The beautiful sound won't be there but it will give you a much better concept of the unique Schafer programming by category.

**M4:** It's 11:45 AM and since a new time period is starting, the Brain has reset the format back to position #1. Music Machine #4 is on the air. This is a "mood intro" or personality track which can create an atmosphere inspired by the season, the time of day, community events etc. It personalizes your station better than most live programming can.

**M1:** As the mood intro ends the Brain switches to Music Machine #1. This could be a show opener, an instrumental, a vocal or whatever your programming calls for.

**S1:** It's time for a commercial and the Random Access Spot Locator is smoothly and silently switched on the air. This particular commercial was already cued up, ready to play. The spotter memory instructed the transport to "search out" a particular address on the spotter tape. The sequence of 50 commercials was set up earlier merely by "dialing" the switches in the spotter memory. Availabilities can be changed in a matter of seconds and new commercials can be recorded while the system is on the air without having to remove the tape from the Random Access Spot Locator.

**M2:** The next event in this sequence calls for a vocal on Music Machine #2. Notice that when switching from one transport to another that no "pops," "clicks" or other extraneous noises ever get on the air. It's the things you *don't* hear in a Schafer system that set it apart from the rest.

**AC:** It's 11:53 AM and the Schafer Audio Clock announces the time, accurate to the nearest minute. The Schafer Audio Clock is much more than just that. Each time signal can be produced into a complete commercial, promo, or station ID... beautifully laid into harp, guitar or other musical beds — one for every minute of the broadcast day.

**M3:** Music continues with a bright instrumental on Music Machine #3 while at this very instant a network play fill tape begins to deadroll on the Automatic Network Switcher.

**ANP:** As the instrumental ends, the Brain fades-in the fill music or closing theme, which runs precisely the right length of time, following a Schafer policy of never having to fade out or cut a musical selection before it has finished playing.

**S1:** The network play-fill selection ends at exactly the right time for the network adjacency commercial which has already been automatically cued up on the Random Access Spot Locator.

**AC:** When the commercial ends, the Audio Clock goes on the air with the time signal and station ID.

**Network Line:** As the station ID concludes, and without a moment's break in programming, the system switches to the network. And when the network news is over the Schafer system will start a new time period — with programming exactly the way you want it.



# The Magic of Schafer-Land



The community becomes alive in the early evening and the sound of Schafer is sparkling, sophisticated. Later, as the community prepares to rest, the Schafer mood changes subtly, becomes soft and subdued. And as the dawn breaks, the Schafer sound is clean, crisp and as bright as the new day.

This is Schafer Broadcast Automation.

The system that allows you to capture any mood you wish; be it the time of day, the season, or the atmosphere of your community.

The system that permits you to program by musical category. With an infinite number of combinations to create an ever-continuing fresh live sound. Where a musical sequence never has to be repeated.

The system that works for you 24 hours a day — 7 days a week — year in and year out.

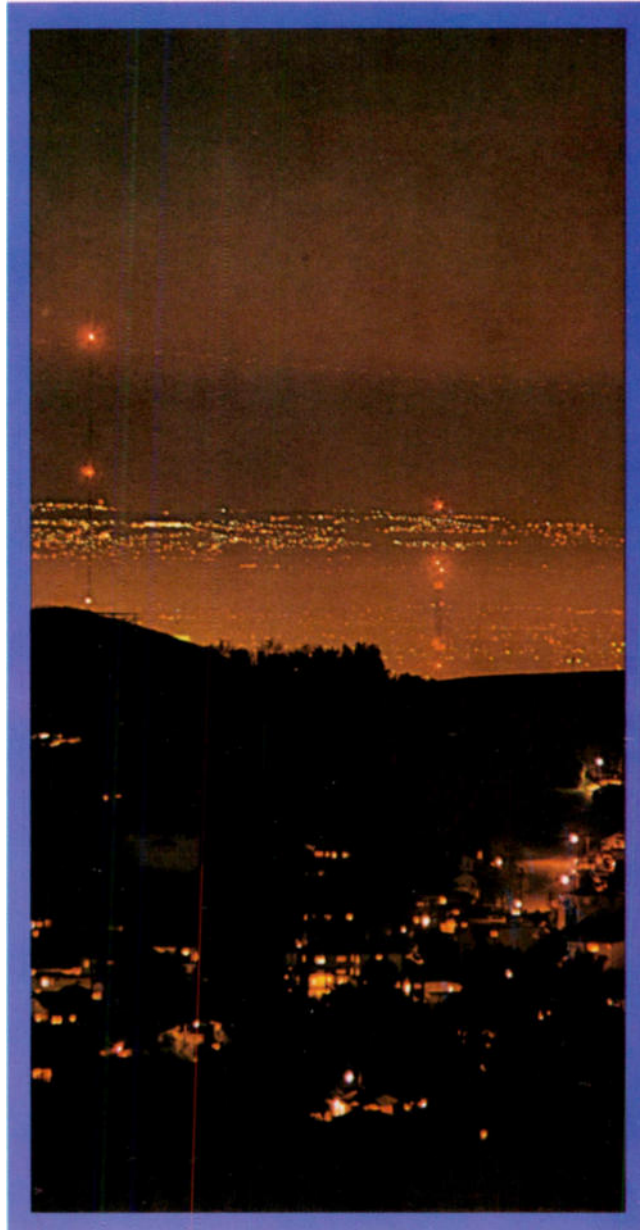
The system that is perfect for all types of formats; Hit Parade '70, Middle-Of-The-Road, Jazz, Classical, Country-Western, Rock and Roll, Contemporary.

The system that gives you more of the most valuable commodity of all: Time. Valuable extra hours for creative programming, profitable selling and more efficient station operation and management.

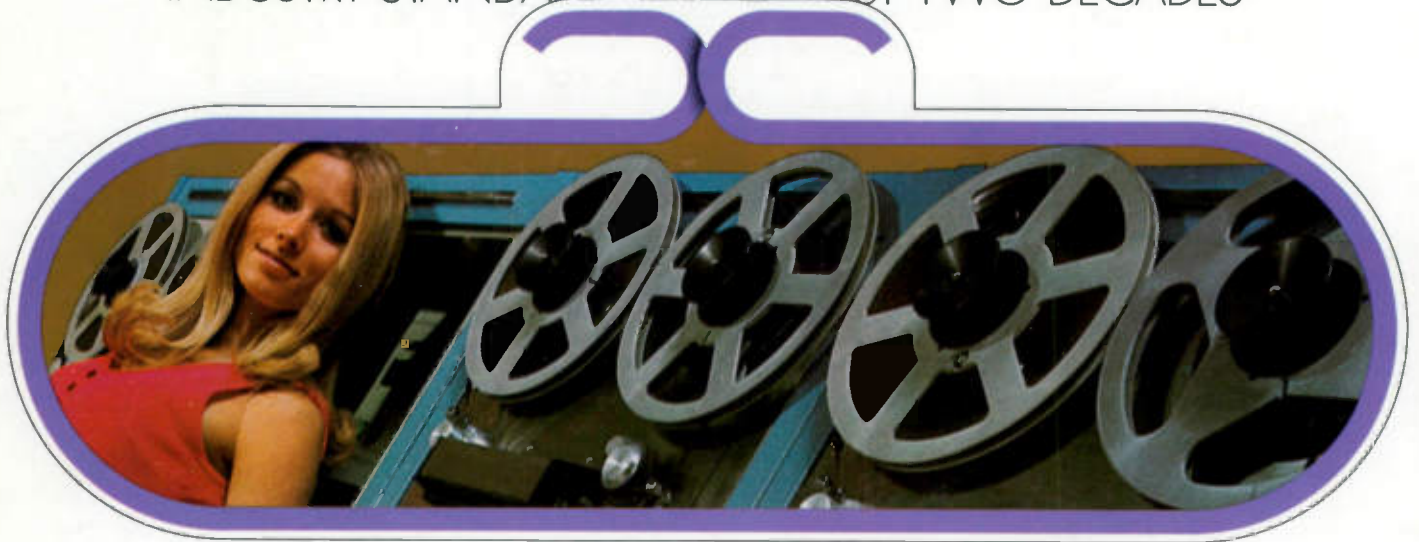
The system that works for you night and day. Day and Night. Reliably. Efficiently. Without making a mistake.

The system that is flexible, reliable, expandable and profitable. That's why Schafer has sold more Broadcast Automation Systems than all others combined.

That's the magic of Schafer-Land.



INDUSTRY STANDARD FOR THE PAST TWO DECADES

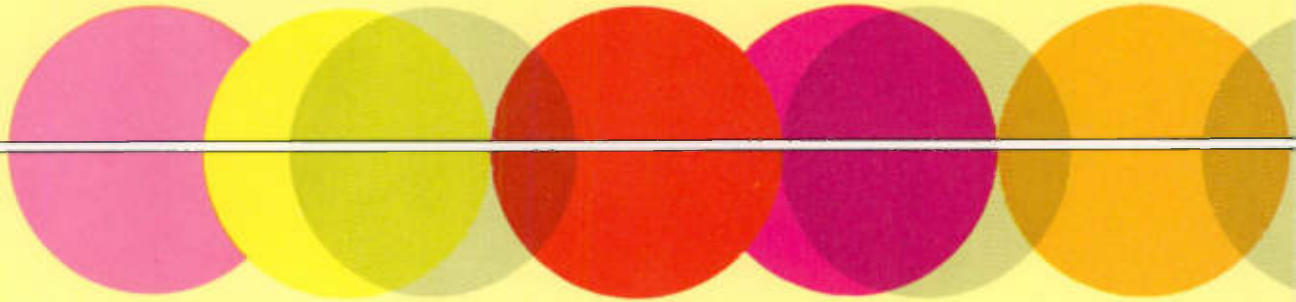


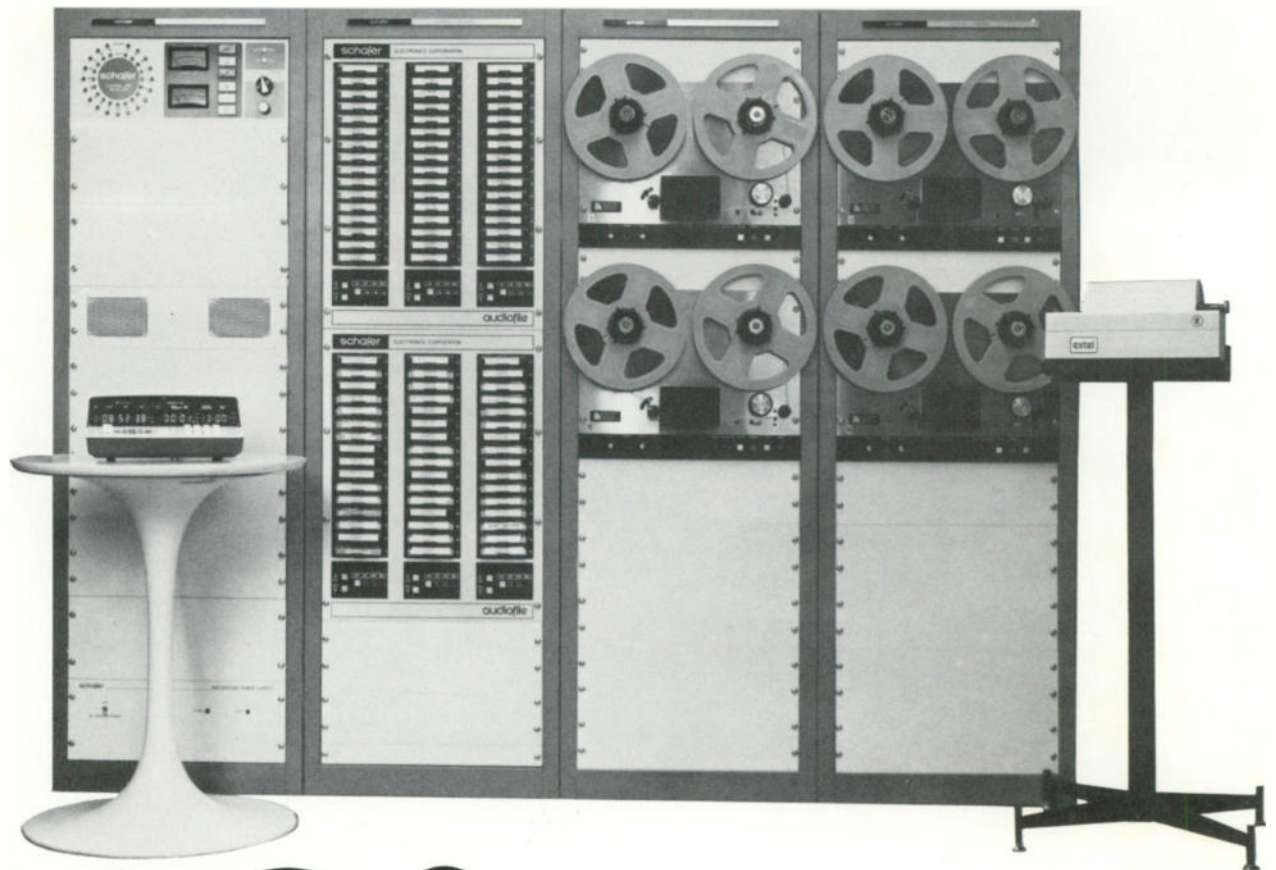
**schafer**

Schafer Electronics 9119 De Soto Avenue Chatsworth, California 91311 (213) 882-2000 A division of Applied Magnetics Corporation

**The 24 hour memory system**

**903**





# 903

## The 24 Hour Memory

### FEATURES

- 2048 event time-base micro-electronic memory
- Exclusive closed-loop circuit
- Network join capability built-in
- Programmable by time and sequence
- Crystal controlled digital clock
- Exclusive one-button commercial search
- Full stereo output and monitoring
- Link command for controlled clusters of events
- All solid-state audio and switching
- Automatic system start and stop
- Choice of studio or rack configurations

The Schafer 903 is a single-keyboard 2048 event microelectronic memory control system that will store events for the fastest-paced format up to 24 hours in advance. Versatility is the key to the 903. With its unique two-section memory, the 903 can be programmed for up to 600 recyclable events in the *format* section, and still provide 60 avails per hour for 24 hours in the *time* section. The Schafer 903 two section memory assures complete programming control by separating repetitive format elements from changing day-to-day traffic elements. The two sections of memory work together in the same way that the Program Director's *format clock* and the Traffic Director's *daily log* work together in a manual station. Both are separate, but combine to provide a properly balanced on-air presentation.

The 903 stores 600 recyclable format events which may be divided into as many sub-formats as desired, or programmed in straight-line fashion. There are virtually no limitations on the number of sub-formats that may be used. In addition, the 903 provides

twenty-four hours of time-related avails...60 per hour...for pre-programming commercials, PSA's, Network newscasts, and other time-oriented events.

Extending the capability of the Schafer 903 is simple, and may be accomplished with the optional Schafer list/load package using either a teleprinter with paper tape reader and punch, or magnetic cassette storage. A cathode ray tube unit with keyboard (CRT) used in combination with magnetic tape storage may also be used for preparing commercial schedules in advance. Either system will automatically load the 903 memory from a time command stored in the 903.

Three different remote control systems are optionally available with the 903. The first gives the user access to the system for bulletins without entering into the 903 memory, plus start, stop, and step now push-buttons. The second adds complete manual pushbutton access to any of the system's 19 audio sources. The

third is a complete system manual control including manual control, bulletin insert, pushbutton access to all audio channels, plus advance cueing for up to nine random access sources.

A four-way keyboard access lock and silence sense/closed loop alarm is also optionally available.



The 903 Designer Series is perfect for "live" newscasts or DJ inserts.

#### AUDIO MONITOR AND SWITCHER

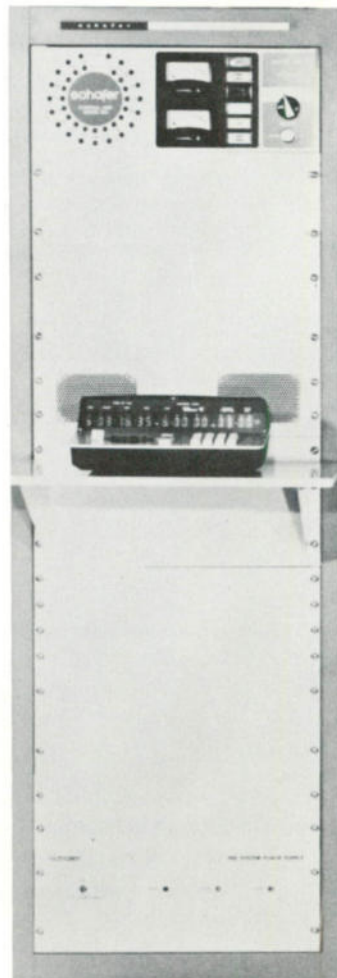
Solid-state audio and control switching for up to 19 channels, 9 of which may be random access. Monitor panel includes stereo VU meters, stereo monitor/cue level control, four position monitor input switch, mono-check phase check pushbutton, start, stop, and step now pushbuttons. Source on-air and source next lights are also provided on the monitor panel.

#### 903 MEMORY AND RANDOM ACCESS CHASSIS

Contains the 2048 event 903 memory, and associated plug-in printed circuit boards for logic and display control, plus electronics for random-access of multiple cartridge machines.

#### CUE SPEAKER CHASSIS

Contains crystal control for digital clock on plug-in printed circuit board, plus stereo monitor/cue amplifier, stereo speakers, system line output, and external speaker terminals. Battery for 60 minute backup in case of power failure is also contained in this chassis.



## 903 COMPONENTS

#### 903 KEYBOARD/DISPLAY TERMINAL

Contains digital clock with day, time, event, source/spot display. 16 key keyboard for entry, and four keyboard-mode controls are included. 15 feet of cable from display terminal to control rack is standard. Longer cable lengths are available, optionally.

#### SYSTEM POWER SUPPLY

Fully regulated and filtered AC with five switchable outlets and two unswitched outlets. AC may be turned on or off to all tape decks with one switch on the front panel. DC voltages are fully IC regulated, and require only two fuses. The power supply is virtually short-circuit-proof and provides +5, +12, and +24 Volts.

# SPECIFICATIONS

## AUDIO MONITOR AND SWITCHER

**MAIN CONTROLS** — Start, Stop, Step Now, Mono Check

**AUDIO MONITOR** — stereo VU meters and stereo cue speakers with speaker level control switchable through monitor switch to Cue, Line, Clock, and Network

**INDICATOR LIGHTS** — Source playing (19 green lights); Next to play (19 amber lights); Start (green pushbutton); Step Now (yellow pushbutton); Stop (red pushbutton); Line (white); Cue (white); Mono Check (white pushbutton); Silence Sense (white); Auto Pulse (white)

**AUDIO CHANNELS** — up to 19, including 9 random access

**INPUTS** — All with closed loop control

**REEL-TO-REEL TAPE** — 25 Hz sensing with adjustable stop delay and lockout; Roll-fill on preselected source; Fade, 1-4 sec. on preselected sources

**CARTRIDGE TAPE** — 150 Hz contact sensing and logging capability standard

**STUDIO/NETWORK** — Silence Sense defeat: On-air light output

**AUDIO CLOCK** — Cartridge or reel-to-reel

## AUDIO CHARACTERISTICS —

**FREQUENCY RESPONSE:** 40-15,000 Hz  $\pm 2$  DB including 25 Hz filtering

**DISTORTION** — less than 1% at +8 DBM

**LINE OUTPUT** — 600 OHMS, stereo, at +4 DBM, balanced (0 to +8 DBM output, user adjustable)

**SIGNAL TO NOISE** — 60 DB or more below +4 DBM, (not including audio source noise)

**MONITOR SPEAKER OUTPUT** — 2 watts

**SILENCE SENSE** — 3 seconds at -21 DBM (user adjustable 1 to 10 seconds at -20 to -45 DBM)

## 903 MEMORY

### TIME EVENTS

one event for every minute in 24-hours (1440 total)

### FORMAT EVENTS

600 standard

### SYSTEM FUNCTIONS

Format reset; Format group change; Update random sources; Roll fill; Fade; Step Now; 10 external; Start; Stop.

### KEYBOARD CONTROLS

**NEXT** — shows next event on display

**OTHER** — changes display to show other memory area

**KEYBOARD** — activates keyboard for entry

**AUTO** — scans through memory (display only)

**CLEAR** — changes display to show "0000"

**ENTER** — enters command into memory

**ADVANCE** — advances display one step

**ADVANCE COLUMN** — advances display to show random access sources.

### KEYBOARD INDICATORS

**TIME OF DAY** — digital clock (actual time)

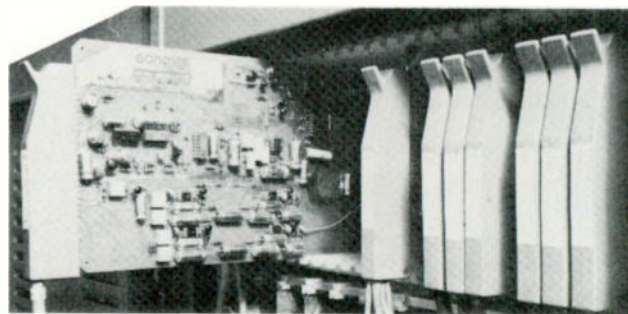
**ADDRESS CODE** — shows day, hour, and minute for Time file, or sequence number in Format file, as selected

**AM/PM/FOR** — indicates whether display is showing AM, PM, or Format

**SOURCE/FUNCTION** — Indicates which audio source is in, or being entered in, memory; or which non-audio command has been given (ex: system start, format change, system stop)

**SPOT/SEC** — indicates random access source tray number or exact second function to be performed

**NOW/NEXT/LINK** — shows whether audio source is to play next, or is linked in a cluster of events, or if a function is to be performed at a specific second.



Interface cards plug-in from the rear making expansion and servicing simple and convenient.

### SYSTEM TERMINAL

16-key keyboard with selectable display and digital clock standard.

### GENERAL

#### Power:

105-125V, 60 Hz., AC. 20 Amp. service (including tape decks) recommended

#### Size:

Audio/Monitor Chassis: 19"W x 7"H x 17"D (48cm x 18cm x 43cm)

903 Chassis: same as above

Random Access Chassis: same as above

Power Supply: same as above

Cue Speaker Chassis: 19"W x 5 1/4"H x 12"D (48cm x 13cm x 30cm)

Keyboard terminal: 13"W x 5"H x 11"D (33cm x 13cm x 28cm)

Keyboard cable: 15 feet (4.6 meters) standard, from terminal to control rack. Longer lengths on order.

### OPTIONS

Schafer English Logging with cleartext descriptions of each event, and discrepancy notations.

Schafer memory List/Load. Automatically lists events stored in memory or loads system memory from magnetic tape or punch paper tape, as ordered.

Schafer remote clock driver. Drives up to 30 digital or standard clocks from the 903 crystal controlled clock.

903 system remote controls



### Schafer Electronics Corporation

75 Castilian Drive, Santa Barbara Research Park  
Goleta, California 93017 (805) 968-0755.

# audiofile

## Modular Cart System



**schafer**

ELECTRONICS CORPORATION

00  
01  
02  
03  
04  
05  
06  
07  
08  
09  
10  
11  
12  
13  
14  
15

16  
17  
18  
19  
20  
21  
22  
23  
24  
25  
26  
27  
28  
29  
30  
31

32  
33  
34  
35  
36  
37  
38  
39  
40  
41  
42  
43  
44  
45  
46  
47

▲ □ TRAY STOP START MAN  
▼ □

▲ □ TRAY STOP START MAN  
▼ □

▲ □ TRAY STOP START MAN  
▼ □

audiofile

## FEATURES

- All electronic switching
- Three complete playback systems
- Unlimited overlap of audio from up to three cartridges
- Rugged aerospace construction
- End of secondary tone removes audio from line buss in each module
- Transformer balanced output with separate cue buss
- Quick, easy loading

The Schafer AUDIOFILE is an extremely flexible multiple cartridge playback system with compact design and the ability to play commercials, music selections, or other program elements with unlimited overlap of audio from up to three cartridges simultaneously. The standard 48-tray AUDIOFILE consists of three modules, each with trays for 16 NAB size "A" cartridges. Each module contains its own high quality synchronous motor, precision drive shaft, metal-face laminated head assembly, integrated circuit preamplifier, photoelectric positioner, audio switching electronics, and 150 Hz secondary tone sensor. The beginning of the 150 Hz tone starts the next event; the end of the 150 Hz tone removes audio from the line buss and transfers it to a separate cue buss.

The AUDIOFILE meets or exceeds NAB specifications, assuring the same exacting reproduction as the best single-play cartridge decks. Simple adjustments for azimuth, zenith, and head height are provided, as well as low and high frequency equalization for each module. A record head "dummy" and 3 tape guides are also standard in each playback module to minimize wow, flutter, and tape skew.

The AUDIOFILE is available in either stereo or mono, in configurations of 48, 32, or 16 trays. Remote control provisions for all front-panel functions are provided for use with automation, or in a studio operation.

## SPECIFICATIONS

### MECHANICAL:

**CAPACITY** — 48 trays, NAB type "A" cartridges (16 or 32 on special order)

**HEADS** — Metal face, laminated. NAB standard stereo or mono configuration, as ordered

**MOTORS** — Tape Drive: synchronous, with precision drive shaft. Support bearing always at pinch-roller location.

Tray: Continuous action high torque reversible.

**TAPE SPEED** — 7 ½ IPS, standard

**WOW AND FLUTTER** — 0.2% Maximum

**CUE TIME** — Maximum: 8 seconds. (end of cartridge to next ready)

**CONTROLS** — **UP**: Moves playback assembly up; **DOWN**: Moves playback assembly down; **TRAY**: Moves cartridge from storage to ready position, or from ready to storage position; **STOP**: stops cartridge; **START**: starts cartridge; **AUTO/MANUAL**: allows remote control from automation or front-panel control. In **MANUAL** position, audio is only on cue buss.

**START TIME** — 0.1 second

**STOP TIME** — 0.1 second

**REMOTE CONTROL** — all front-panel controls and indicators

**POWER REQUIREMENTS** —  
115 V AC  $\pm$  10%, 60 Hz., 100 watts  
(50 Hz. on special order)

**WEIGHT** — 48 tray, 100 pounds (46 Kg.)

**SIZE** — 19 inches wide, 24½ inches high,  
16 inches deep

### ELECTRICAL:

**FREQUENCY RESPONSE** —  
40 to 15,000 Hz, +1, -3 DB, line

**EQUALIZATION** — NAB Standard (CCIR on special order). Adjustable high and low frequency compensation.

**OUTPUT** —  
Line, 600 ohm, +4 dbm, transformer balanced  
Cue, 600 ohm, +4 dbm, transformer balanced  
(Line and Cue levels independently user-adjustable)

**DISTORTION** — Less than 1% at +4 dbm; less than 2% at +14 dbm.

**SIGNAL TO NOISE RATIO** — unweighted  
Mono, 45 db or more below program  
Stereo, 42 db or more below program

**SEPARATION** — More than 50 db at 400 Hz.

**CUE TONES** — NAB STANDARD: 1 Khz Primary tone; 150 HZ Secondary tone; 8 Khz Tertiary tone (optional). Also 4 Khz tone sensor for Schafer VEL logging.



### Schafer Electronics Corporation

75 Castilian Drive, Santa Barbara Research Park  
Goleta, California 93017 (805) 968-0755



# audiofile

## Modular Cart System



**schafer**

a Subsidiary of Cetec Corporation

**schafer**

ELECTRONICS CORPOFATION

00	AMERICAN AIRLINES	M/S
01	AMERICAN AIRLINES	M/S
02	AMERICAN AIRLINES	M/S
03	AMERICAN AIRLINES	M/S
04	ALTRON PHONES	M/S
05	AM BOLT	M/S
06	AM BOLT	M/S
07	AM BOLT	M/S
08	SAN FRANCISCO FEDERAL 12	M/S
09	SAN FRANCISCO FEDERAL 12	M/S
10	SOLKMAKER BIDDERS	M/S
11	TOYOTA 83	M/S
12	TOYOTA 82	M/S
13	SEARS (REPAIR MACHINES)	M/S
14	BARRETT STORES	M/S
15	WILSON (PBA)	M/S

TRAY STOP START MAN

▲ □

▼ □

16	AMERICAN AIRLINES	M/S
17	AMERICAN AIRLINES	M/S
18	AMERICAN AIRLINES	M/S
19	AMERICAN AIRLINES	M/S
20	AMERICAN AIRLINES	M/S
21	AMERICAN AIRLINES	M/S
22	AMERICAN AIRLINES	M/S
23	AMERICAN AIRLINES	M/S
24	AMERICAN AIRLINES	M/S
25	AMERICAN AIRLINES	M/S
26	AMERICAN AIRLINES	M/S
27	AMERICAN AIRLINES	M/S
28	AMERICAN AIRLINES	M/S
29	AMERICAN AIRLINES	M/S
30	AMERICAN AIRLINES	M/S
31	AMERICAN AIRLINES	M/S
32	AMERICAN AIRLINES	M/S

TRAY STOP START MAN

▲ □

▼ □

32	AMERICAN AIRLINES	M/S
33	AMERICAN AIRLINES	M/S
34	AMERICAN AIRLINES	M/S
35	AMERICAN AIRLINES	M/S
36	AMERICAN AIRLINES	M/S
37	AMERICAN AIRLINES	M/S
38	AMERICAN AIRLINES	M/S
39	AMERICAN AIRLINES	M/S
40	AMERICAN AIRLINES	M/S
41	AMERICAN AIRLINES	M/S
42	AMERICAN AIRLINES	M/S
43	AMERICAN AIRLINES	M/S
44	AMERICAN AIRLINES	M/S
45	AMERICAN AIRLINES	M/S
46	AMERICAN AIRLINES	M/S
47	AMERICAN AIRLINES	M/S

TRAY STOP START MAN

▲ □

▼ □

audiofile

## FEATURES

- All electronic switching
- Three complete playback systems
- Unlimited overlap of audio from up to three cartridges
- Rugged aerospace construction
- End of secondary tone removes audio from line buss in each module
- Transformer balanced output with separate cue buss
- Quick, easy loading

The Schafer AUDIOFILE is an extremely flexible multiple cartridge playback system with compact design and the ability to play commercials, music selections, or other program elements with unlimited overlap of audio from up to three cartridges simultaneously. The standard 48-tray AUDIOFILE consists of three modules, each with trays for 16 NAB size "A" cartridges. Each module contains its own high quality synchronous motor, precision drive shaft, metal-face laminated head assembly, integrated circuit preamplifier, photoelectric positioner, audio switching electronics, and 150 Hz secondary tone sensor. The beginning of the 150 Hz tone starts the next event; the end of the 150 Hz tone removes audio from the line buss and transfers it to a separate cue buss.

The AUDIOFILE meets or exceeds NAB specifications, assuring the same exacting reproduction as the best single-play cartridge decks. Simple adjustments for azimuth, zenith, and head height are provided, as well as low and high frequency equalization for each module. A record head "dummy" and 3 tape guides are also standard in each playback module to minimize wow, flutter, and tape skew.

The AUDIOFILE is available in either stereo or mono, in configurations of 48, 32, or 16 trays. Remote control provisions for all front-panel functions are provided for use with automation, or in a studio operation.

## SPECIFICATIONS

### MECHANICAL:

**CAPACITY** — 48 trays, NAB type "A" cartridges (16 or 32 on special order)

**HEADS** — Metal face, laminated. NAB standard stereo or mono configuration, as ordered

**MOTORS** — Tape Drive: synchronous, with precision drive shaft. Support bearing always at pinch-roller location.

Tray: Continuous action high torque reversible.

**TAPE SPEED** — 7 ½ IPS, standard

**WOW AND FLUTTER** — 0.2% Maximum

**CUE TIME** — Maximum: 8 seconds. (end of cartridge to next ready)

**CONTROLS** — **UP**: Moves playback assembly up; **DOWN**: Moves playback assembly down; **TRAY**: Moves cartridge from storage to ready position, or from ready to storage position; **STOP**: stops cartridge; **START**: starts cartridge; **AUTO/MANUAL**: allows remote control from automation or front-panel control. In **MANUAL** position, audio is only on cue buss.

**START TIME** — 0.1 second

**STOP TIME** — 0.1 second

**REMOTE CONTROL** — all front-panel controls and indicators

**POWER REQUIREMENTS** —  
115 V AC  $\pm$  10%, 60 Hz., 100 watts  
(50 Hz. on special order)

**WEIGHT** — 48 tray, 100 pounds (46 Kg.)

**SIZE** — 19 inches wide, 24½ inches high,  
16 inches deep

### ELECTRICAL:

**FREQUENCY RESPONSE** —  
40 to 15,000 Hz, +1, -3 DB, line

**EQUALIZATION** — NAB Standard (CCIR on special order). Adjustable high and low frequency compensation.

**OUTPUT** —  
Line, 600 ohm, +4 dbm, transformer balanced  
Cue, 600 ohm, +4 dbm, transformer balanced  
(Line and Cue levels independently user-adjustable)

**DISTORTION** — Less than 1% at +4 dbm; less than 2% at +14 dbm.

**SIGNAL TO NOISE RATIO** — unweighted  
Mono, 45 db or more below program  
Stereo, 42 db or more below program

**SEPARATION** — More than 50 db at 400 Hz.

**CUE TONES** — NAB STANDARD: 1 Khz Primary tone; 150 HZ Secondary tone; 8 Khz Tertiary tone (optional). Also 4 Khz tone sensor for Schafer VEL logging.

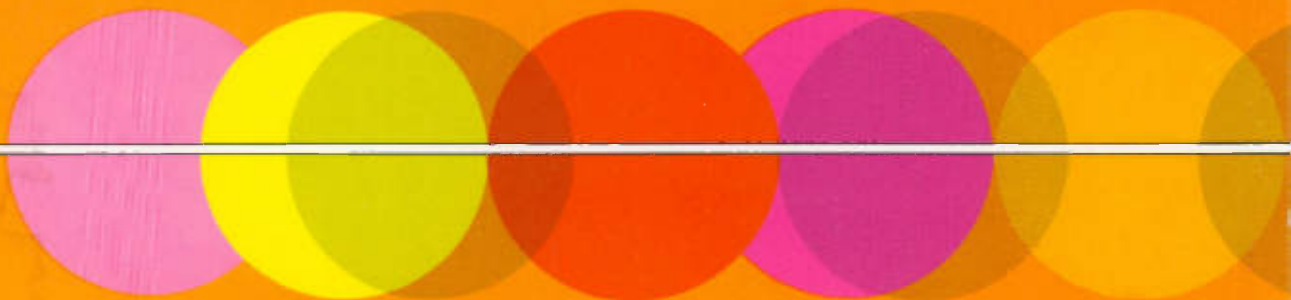


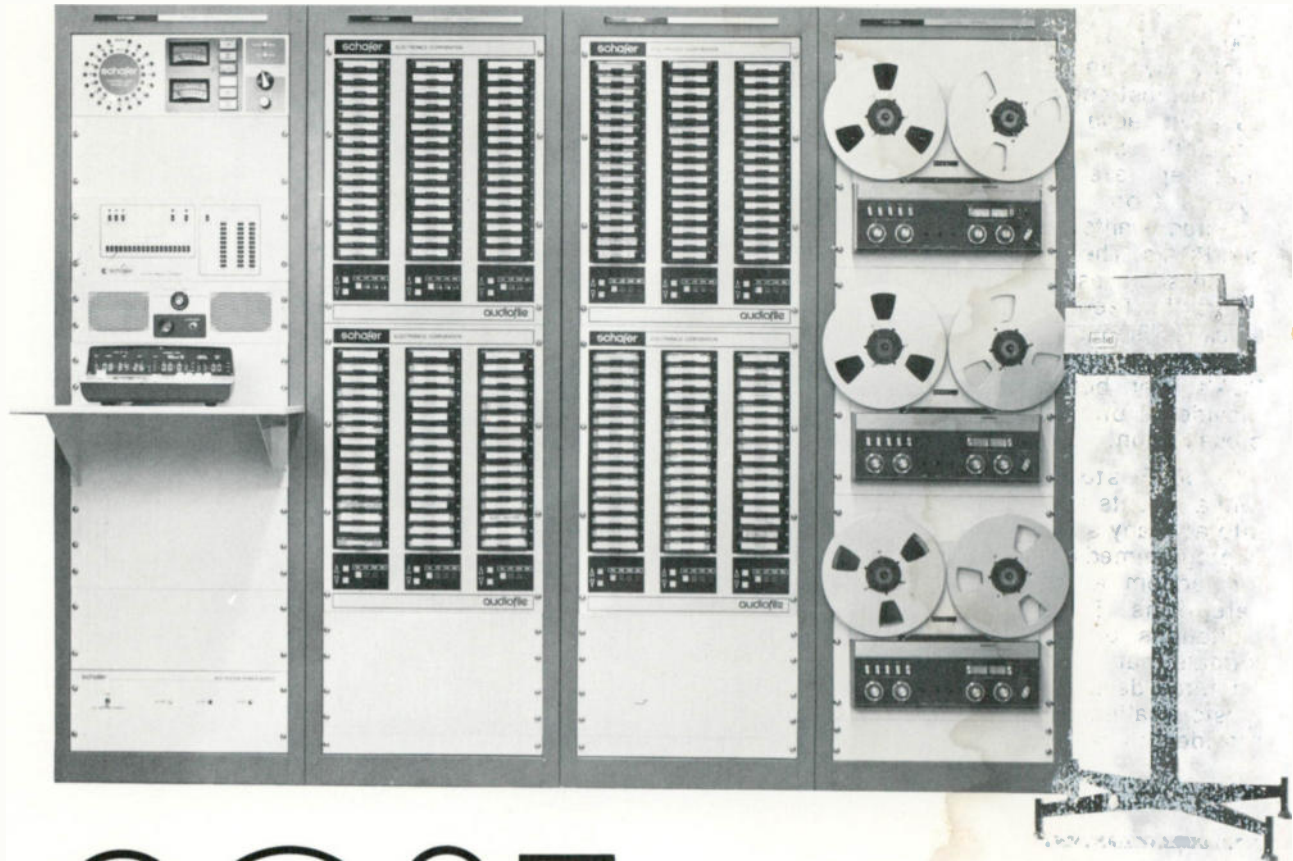
### Schafer Electronics Corporation

75 Castilian Drive, Santa Barbara Research Park  
Goleta, California 93017 (805) 968-0755

**The 3 day memory system**

**903E**





# 903E

## The 3 Day Memory

- 8000 event microelectronic memory
- 3-day storage for advance programming
- Complete manual/remote control
- One-time bulletin insertion
- Exclusive closed-loop circuit
- Network join capability
- Programmable by time and/or sequence
- Dual alarm systems built-in
- Crystal controlled digital clock
- Exclusive one-button commercial search
- Four-way keyboard access lock
- Full stereo output and monitoring
- Five year memory warranty
- Voice-track link capability built-in
- All solid-state audio and switching
- Choice of studio or rack configurations

The **Schafer 903E** is a single-keyboard 8000 event microelectronic memory control system that will store events for the most complex format for three days in advance. The 903E uses Schafer's exclusive two-file memory that separates repetitive program events from non-repetitive time-oriented events such as commercials and PSA's. The operation of the 903E is the same as in a manual station where the Program Director's format clock is separate from the Traffic Director's daily log of spots and PSA's, yet both work together to provide a properly balanced on-air presentation.

The 903E stores 3800 recyclable format events which may be divided into as many sub-formats as desired, or programmed in straight-line fashion for random access cartridge music selections. There are virtually no limitations on the number of sub-formats that may be used. Each hour for three days may have a different music rotation! In addition, the 903E provides three days of time-related

avails...60 per hour for 72 hours... enough to pre-program all commercials, PSA's, newscasts, and other time-oriented events over a weekend, or three days in advance.

As standard equipment, the 903E has a full manual control panel which may select the next source, or source and tray, to go on-the-air. A one-time bulletin insert/cancel pushbutton, plus start, stop, step, and manual/auto buttons are also located on the manual panel. The manual control panel is located on the front of the 903E control rack, but may be optionally remoted up to 150 feet from the system for use with a live DJ.

The 903E features two alarm systems. The first is a silence-sense alarm; the second, a closed-loop alarm. If for any reason a deck is not ready to play, or a tape breaks, or if the silence sensor is triggered, the alarm will sound until manually reset. Either, or both, of these alarms may be user-disconnected if desired.

The 903E keyboard entry lock system is mounted on the front panel of the 903E control rack. The keyboard lock allows the entire entry process to be locked with a key, or allows three different modes of entry; (1) Enter Format material only; (2) Enter Time material only; or (3) Enter Format and Time material. This lock allows music rotations to be entered without any chance of disturbing Time events, or commercial entries to be changed without any chance of disturbing Format events. The keyboard lock on the 903E affects only the entry process. Even with the system fully locked, the keyboard is active for looking at events already entered into the 903E memory.

#### AUDIO MONITOR AND SWITCHER

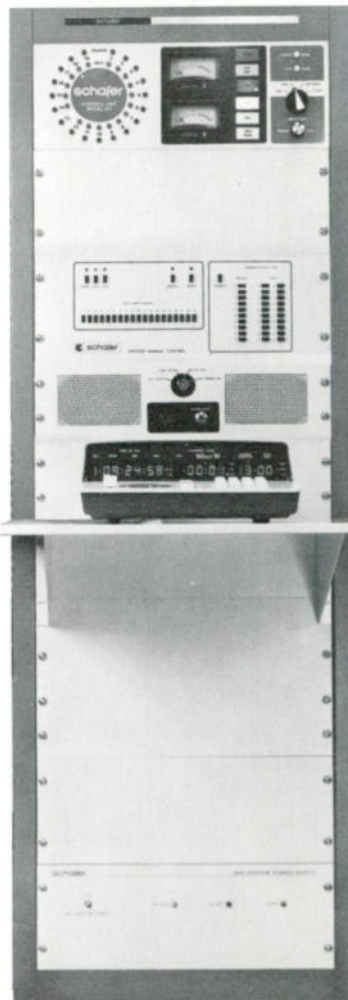
Solid state audio and control switching for up to 19 channels, 9 of which may be random access. Monitor panel includes stereo VU meters, stereo monitor/cue level control, four position monitor input switch, mono-check phase check pushbutton, start, stop, and step now pushbuttons. Source on-air and source next lights are also provided on the monitor panel.

#### 903E MEMORY AND RANDOM ACCESS CHASSIS

Contains the 8000 event 903E memory, and associated plug-in printed circuit boards for logic and display control, plus electronics for random-access of multiple cartridge machines. Front panel contains the source and tray selector pushbuttons for the system manual control. Bulletin insert is also standard on this panel.

#### CUE SPEAKER CHASSIS

Contains crystal control for digital clock on plug-in printed circuit board, plus monitor amplifier, stereo speakers, system line output, and external speaker terminals. Battery for 60 minute backup in case of power failure is also contained in this chassis, as are the two alarm systems and the four-way keyboard entry lock.



## 903E COMPONENTS

#### 903E KEYBOARD/DISPLAY TERMINAL

Contains digital clock with day, time, event, source/spot display. 16 key keyboard for entry, and four keyboard-mode controls are included. 15 feet of cable from display terminal to control rack is standard. Longer cable lengths are available, optionally. A rack-mount shelf for the control terminal is standard.

#### SYSTEM POWER SUPPLY

Fully regulated and filtered AC with five switchable outlets and two unswitched outlets. AC may be turned on or off to all tape decks with one switch on the front panel. DC voltages are fully IC regulated, and require only two fuses. The power supply is virtually short-circuit-proof and provides +5, +12, and +24 Volts.

# SPECIFICATIONS

## AUDIO MONITOR AND SWITCHER

**MAIN CONTROLS** — Start, Stop, Step Now, Mono Check

**AUDIO MONITOR** — stereo VU meters and stereo cue speakers with speaker level control switchable through monitor switch to Cue, Line, Clock, and Network

**INDICATOR LIGHTS** — Source playing (19 green lights); Next to play (19 amber lights); Start (green pushbutton); Step Now (yellow pushbutton); Stop (red pushbutton); Line (white); Cue (white); Mono Check (white pushbutton); Silence Sense (white); Auto Pulse (white)

**AUDIO CHANNELS** — up to 19, including 9 random access

**INPUTS** — All with closed loop control

**REEL-TO-REEL TAPE** — 25 Hz sensing with adjustable stop delay and lockout; Roll-fill on preselected source; Fade, 1-4 sec. on preselected sources

**CARTRIDGE TAPE** — 150 Hz contact sensing and logging capability standard

**STUDIO/NETWORK** — Silence Sense defeat; On-air light output

**AUDIO CLOCK** — Cartridge or reel-to-reel

## AUDIO CHARACTERISTICS —

**FREQUENCY RESPONSE:** 40-15,000 Hz  $\pm 2$  DB including 25 Hz filtering

**DISTORTION** — less than 1% at +8 DBM

**LINE OUTPUT** — 600 OHMS, stereo, at +4 DBM, balanced (0 to +8 DBM output, user adjustable)

**SIGNAL TO NOISE** — 60 DB or more below +4 DBM, (not including audio source noise)

**MONITOR SPEAKER OUTPUT** — 2 watts

**SILENCE SENSE** — 3 seconds at -21 DBM (user adjustable 1 to 10 seconds at -20 to -45 DBM)

## 903E MEMORY

### TIME EVENTS

one event for every minute in three 24-hour days (1440 per day X 3 days = 4320 total)

### FORMAT EVENTS

3800 standard

## SYSTEM FUNCTIONS

Format reset; Format group change; Change Day; Update random sources; Roll fill; Fade; Step Now; 10 external; Start; Stop.

## KEYBOARD CONTROLS

**NEXT** — shows next event on display

**OTHER** — changes display to show other memory area

**KEYBOARD** — activates keyboard for entry

**AUTO** — scans through memory (display only)

**CLEAR** — changes display to show "0000"

**ENTER** — enters command into memory

**ADVANCE** — advances display one step

**ADVANCE COLUMN** — advances display to show random access sources or all memory entries, as selected

## KEYBOARD INDICATORS

**TIME OF DAY** — digital clock (actual time)

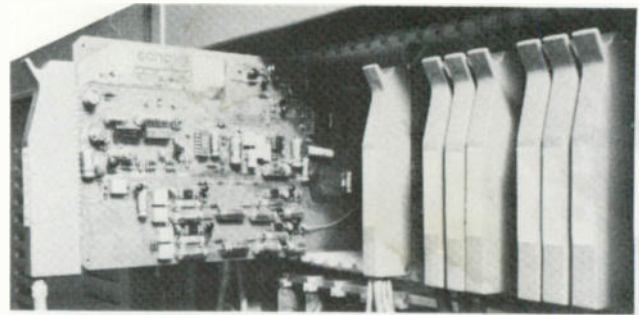
**ADDRESS CODE** — shows day, hour, and minute for Time file, or sequence number in Format file, as selected

**AM/PM/FOR** — indicates whether display is showing AM, PM, or Format

**SOURCE/FUNCTION** — indicates which audio source is in, or being entered in, memory; or which non-audio command has been given (ex: system start, format change, system stop)

**SPOT/SEC** — indicates random access source tray number or exact second function to be performed

**NOW/NEXT/LINK** — shows whether audio source is to play next, or is linked in a cluster of events, or if a function is to be performed at a specific second.



Interface cards plug-in from the rear making expansion and servicing simple and convenient.

## SYSTEM TERMINAL

16-key keyboard with selectable display, digital clock, and four-way keyboard entry lock standard.

## MANUAL CONTROL PANEL

Contains start, stop, step manual and bulletin insert/cancel pushbuttons with LED indicators, plus 19 pushbuttons for selecting the next audio source, and pushbuttons for selecting the next random access source and tray. May be mounted at system or at a remote location.

## ALARM SYSTEMS

Two standard — silence sense and closed-loop — with audible alarm and manual reset pushbutton.

## GENERAL

Power:

105-125V, 60 Hz., AC. 20 Amp. service (including tape decks) recommended

Size:

Audio/Monitor Chassis: 19"W x 7"H x 17"D (48cm x 18cm x 43cm)

903E Chassis: same as above

Random Access Chassis: same as above

Power Supply: same as above

Cue Speaker Chassis: 19"W x 5 1/4"H x 12"D (48cm x 13cm x 30cm)

Keyboard terminal: 13"W x 5"H x 11"D (33cm x 13cm x 28cm)

Keyboard cable: 15 feet (4.6 meters) standard, from terminal to control rack. Longer lengths on order.

## OPTIONS

Schafer English Logging with cleartext descriptions of each event, and discrepancy notations.

Schafer memory List/Load. Automatically lists events stored in memory or loads system memory from magnetic tape or punch paper tape, as ordered.

Schafer remote clock driver. Drives up to 30 digital or standard clocks from the 903E crystal controlled clock.



## Schafer Electronics Corporation

75 Castilian Drive, Santa Barbara Research Park  
Goleta, California 93017 (805) 968-0755

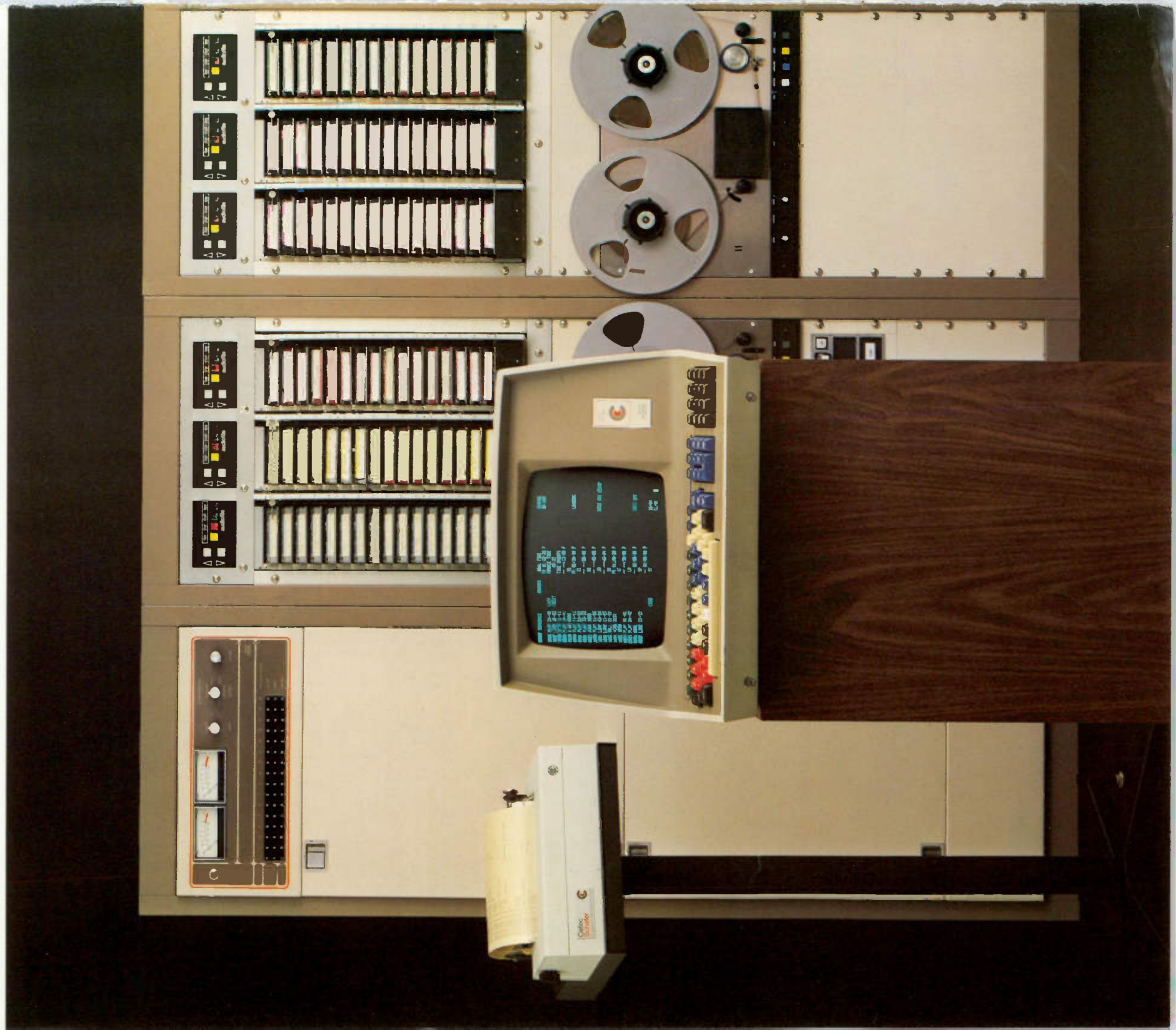
## Cetec Schafer Automation System 7000



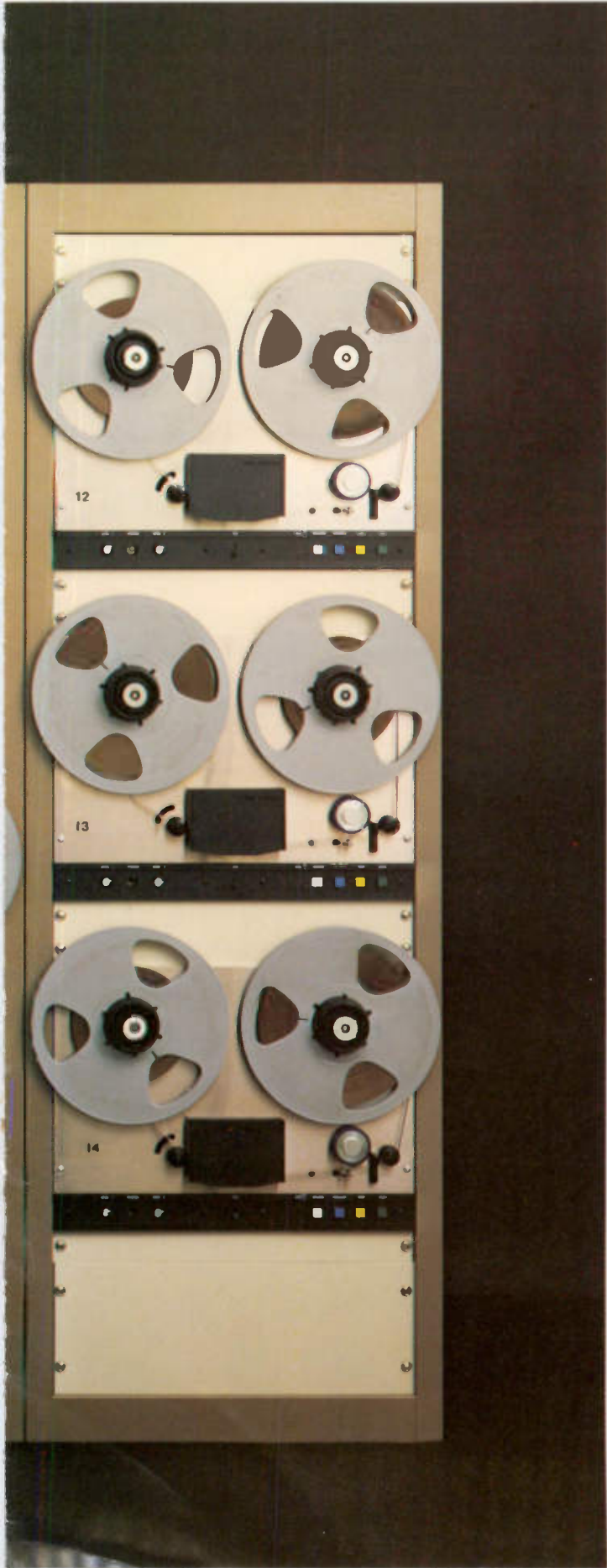
The microcomputer-based 7000 sets all-new standards for radio automation versatility, quality, and expandability



**System 7000: Third-generation microprocessor sophistication  
human-engineered for ease of operation and fail-safe performance**







Now there is a new standard for radio program automation and it is named the Cetec Schafer System 7000.

The role of automation in radio broadcast has changed several times since Schafer Electronics introduced the first system 25 years ago. For a time, some broadcasters used automation as a passive element — simply a way to economize, and to reduce on-the-air staff. History proved that to be a limited view of the possibilities.

#### **A positive role in programming**

More than ever, modern automation is a major factor in broadcast economics — but in clearly positive and productive ways. And the most advanced system of all, Cetec Schafer's 7000, contributes to profitability in a dozen ways: absolutely consistent high-quality audio, maximum editing and programming flexibility, long-range plug-in expandability, true computer precision, error-free keyboard interlocking, real-time response, simple operation in clear English, and others.

#### **Sophistication made simple**

The 7000 is a highly sophisticated programming and management system — and the third-generation multiprocessor electronics are highly reliable and solid-state. The software is broadcast-dedicated and *built-in* to the firmware in the system. You edit and program the 7000 in English, and it displays its compliance, or asks questions, or advises of errors — also in English.

That's a prime example of the "human engineering" designed into System 7000. It is a system that works for *broadcasters*. Nobody has to be an electronics engineer, or a computer programmer, or any kind of a specialist to program and edit the System 7000. Any member of the station staff can learn to operate the system in a matter of minutes.

The specifics of this remarkable broadcasting system are described and illustrated on the following pages.

---

Cetec Schafer 7000 "family photo". System 7000 is shown with real-time clock and Verified English Logging subsystems. In foreground at left is VEL impact printer. System video terminal in photo displays *program*, *edit*, *time*, and *system status* columns. At rear, from left, are main control cabinet (housing microcomputer, universal source cards, "debug" card, emergency power supply), two Schafer Audiofile II multi-cart systems, and reel-to-reel equipment. Video terminal and VEL printer can be moved to any convenient location.



**Cetec Broadcast Group**

# System 7000 is ready to grow when you are

The Cetec Schafer System 7000 comes complete with micro-computer power; 1000-event memory; capacity for 16 audio sources; dual stereo program buses; separate, dedicated video terminal — and the ability to expand and diversify almost without limit. It is state-of-the-automation-art today — it will still be state-of-the-art five years from now.

You can expand memory to 10,000 events, 1000 at a time. You can expand to 64 audio sources. You can expand to as many as four separate CRT channels, and an unlimited number of terminals. You can add a logging system. You can add a real-time clock subsystem for precise network feeds or other critical time requirements.

**The universal hardware concept** in the 7000 design provides the basis for expansion. When you're ready to grow, the system grows with you. Starting with the powerful Z80 micro-processor, the proprietary Schafer microcomputer architecture is engineered to accommodate *tomorrow's* work, not just today's. You already have as much computer and control capability as you'll ever need, whatever the station task.

**Super-clean audio:** System 7000 has higher audio fidelity specs than any other available automation system. Consistent audio quality, whatever the audio source, is mandatory in any contemporary broadcast situation. The System 7000 universal source cards deliver the station "sound" to its listeners with fine fidelity — whether the source is live, reel-to-reel, cart, or multi-cart.

**Dual stereo program buses:** Voice-over-music is always balanced perfectly with the 7000, thanks to an *exclusive* dual bus feature. And it's automatic! When the voice comes up, the music is properly mixed to blend with the voice. The buses are easily accessible, so that audio processing equipment can be conveniently inserted in the loop.

**Dedicated CRT terminal** is the "conversation piece" of the system. It can be located in the control room — or anywhere else that is convenient. You can add video terminals for different functions — for example, program event-entries can be in process on one terminal, while the program director is editing tomorrow's schedule, or traffic is working on its next-day scheduling on an additional terminal.

Terminal keyboards are color-coded and interlocked — you can't mis-program by accident. When an incorrect or illogical entry is made, the system will advise the operator in plain English on the video display — and await new instructions. In the editing mode, the system asks for step-by-step verification: Function? Source? Tray? Enter?

**Operating the 7000:** This system is human-engineered for operation by radio station people. Entries and system responses are displayed in broadcast English, and the system verifies entries step-by-step. The video keyboard won't let you get in the wrong mode. Example: If you are in "program edit," all the other keyboard modes are inoperative.

It's true: any station employee can be taught to operate System 7000 in one hour or less.



7000 Terminal Keyboard Groups at a Glance

<b>System Control Keys (Red)</b>		CMND	- Special internal system commands.
STEP	- Step to next event.	UPDAT	- Identify event as update position.
FADE	- Fade on-air audio and step to next event.	GO	- Go to new event number.
ALARM	- Reset alarm indicators.	SUB	- Go to subroutine.
START	- Start system.	PLAY	- Normal play command.
INSRT	- Insert last event in memory into next-to-play position.	LINK	- Link source to previous source for uninterrupted programming.
STOP	- Instruct system to stop after source airs.	DSTR	- Double start two sources simultaneously.
OPER	- Activate all system control keys.	AVAL	- Clear memory address.
<b>Edit Mode Control Keys (Blue)</b>		STOP	- Format stop request.
SKIP	- Skip to next programming entry.	<b>Time Function Control Keys (Green)</b>	
QUERY	- Allow entry of new event address.	STEP	- Step to next event.
CLEAR	- Reposition display cursor to function position.	START	- Start system.
XFER	- Transfer new address to "next to play."	STOP	- Instruct system to stop after source airs.
EDIT	- Activate all edit control and function keys.	FADE	- Fade on-air audio.
ENTER	- Load entry into memory.	INSRT	- Insert last event in memory into next-to-play position.
ADV	- Advance edit display one event.	JOIN	- Used for Network Join.
BACK	- Back up edit display one event.	LEAVE	- Conditional leave instruction used with Network Join.
<b>Function Keys (Blue)</b>		UPDAT	- Jump program to next update function.
0-9	- Numbers used for source, tray, event.	EXT	- Activate external relay controls.
RETN	- Return to main format from subroutine.	ON	- Day/Hour marker on.
ROLL	- Start source "off air."	OFF	- Day/Hour marker off.
		TIME	- Activate all time function and control keys.



# System 7000: The versatility is almost unlimited

**The "debug" card:** A diagnostic printed circuit card gives the station engineer the ability to locate and display the source of system irregularities. System 7000 is a modular design, and problems of other than minor significance, should they occur, are most often solved by replacement of the appropriate plug-in board.

**Remote control diagnosis:** When there is a system problem that defies solution on the scene, Cetec Schafer's 7000 engineers can address the microcomputer directly, via telephone-and-modem link, isolate the problem, diagnose the solution, and start corrective procedures — all in real-time!

**Remote control options:** Up to four active communications channels can talk to System 7000; and additional inactive video monitors can be installed wherever necessary in the station.

Using a telephone line and modem hookup, a station manager can address the system from his home. The remote control capability opens many other possibilities. The broadcaster can take a terminal with him to the live football remote broadcast; to the major store opening; to the political convention.

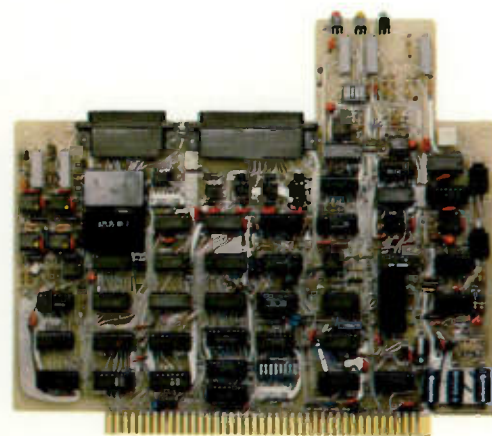
A simpler remote control option consists of a keyboard with which the operator can command "start," "stop," and "step" only.

**Universal source cards** direct "traffic" among the 16 audio sources available in the standard system (as noted earlier, the capability is expandable up to 64 sources at any time). Universal source cards are engineered in three source categories: reel-to-reel tape; tape cartridge, and multi-cart systems. They achieve exceptionally good signal-to-noise ratios. They also provide another Schafer exclusive — System 7000 interfaces with *all* quality audio source equipment. LED displays on the control cabinet provide an instant reading on the source status: on air; next to play; or pre-roll.

**The cabinet control panel** includes twin vu-meters (left and right); an alarm reset button that draws operator attention to Schafer's exclusive closed-loop and silence-sense controls; an audio mode monitor; volume control; and the source-status indicator display noted above.

**Verified English Logging:** Schafer's Mark II VEL system is a valuable add-on to System 7000. Its own microprocessor allows VEL to log exact time, source, and description of every event that goes on-the-air — and to note any discrepancies in the program.

Using the System 7000 video terminal, English description of commercials and public service announcements is encoded with 3.5 kHz tones on the cue track of each cartridge. When the cartridge is played, the description is decoded and



Above: Plug-in Universal Source Cards are designed for each source category: reel-to-reel, cart, or multi-cart. They permit System 7000 to interface with any quality audio source equipment with excellent signal-to-noise ratios and balance.

Left: Control cabinet panel includes vu-meters, alarm reset button, audio mode monitor, volume control, and source-status display (*on air; next to play, pre-roll*). Lower section of cabinet houses microcomputer master board, universal source boards, debug board, event memory boards — and still has plenty of room for follow-on expansion.

printed on the log. Where no specific description has been encoded, VEL will select the appropriate *fixed* English description from ten that are stored in its memory: station ID, network, voice track, weather, local studio, time announce, network fill music, station jingle, reel-to-reel music, or local news cart.

Discrepancy notations include silence-sense, closed loop, "step now," transmitter carrier "on," and transmitter carrier "off."

VEL firmware interprets time, source, and event data, and drives a high-quality Extel or other printer to produce the log.

**Battery-power:** A first-quality, computer-grade emergency power supply is standard equipment with the System 7000. It will supply power to the memory for several hours in event of power failure — and as much additional back-up power supply as seems necessary can be added externally to the system — 72 hours or even more.

**Cetec Schafer follow-through:** For 25 years, Schafer automation systems have been sold with a not-so-secret ingredient: after-sale service. That prompt and thorough back-up policy is stronger than ever. Schafer response is still available on a 24-hour-a-day basis; and Schafer is expanding its field service nationwide.

System 7000 design features themselves aid maintainability: master, memory, source and "debug" cards are all plug-in replaceable, and there is the remote "diagnosis" feature in which Schafer customer service people "talk" to your system directly via telephone-and-modem link.

The Cetec Schafer System 7000 is a highly sophisticated broadcast system that keeps its complexities to itself — in order to present a very versatile, expandable, precise, and easy-to-operate advantage to any radio broadcaster.

It's an addition that will contribute more than its share to station profitability — by improving audio quality and consistency and reducing the chances of inadvertent human error in repetitive, mechanical tasks.

It's a system that will enhance any broadcast format by delivering the broadcast product exactly as it was designed. System 7000 takes you flawlessly through day-part transitions and in and out of network events and other live inserts.

It's a system that programming, traffic, and management can accept, because it benefits all three — measurably.

It's a wise investment for today's competitive broadcast environment — and it's readily expandable to keep you ahead tomorrow, not just in program automation, but in other station-related considerations.

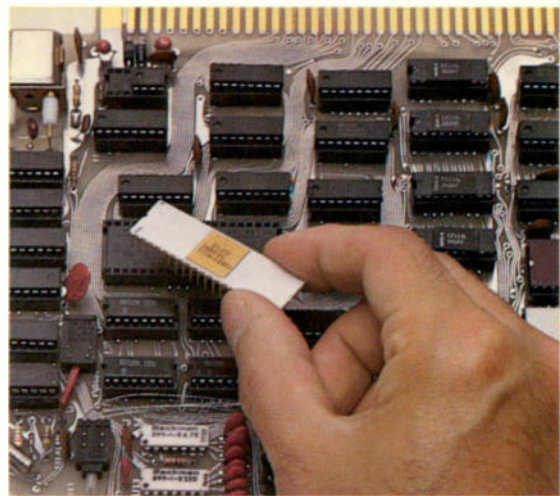
We consider that System 7000 sets all-new standards for program automation — even including the nearly 1000 fine systems that Schafer has produced during the last quarter-century.

System 7000 is engineered for excellence, priced to be competitive, and designed to grow as you grow. Your further inquiry is invited.

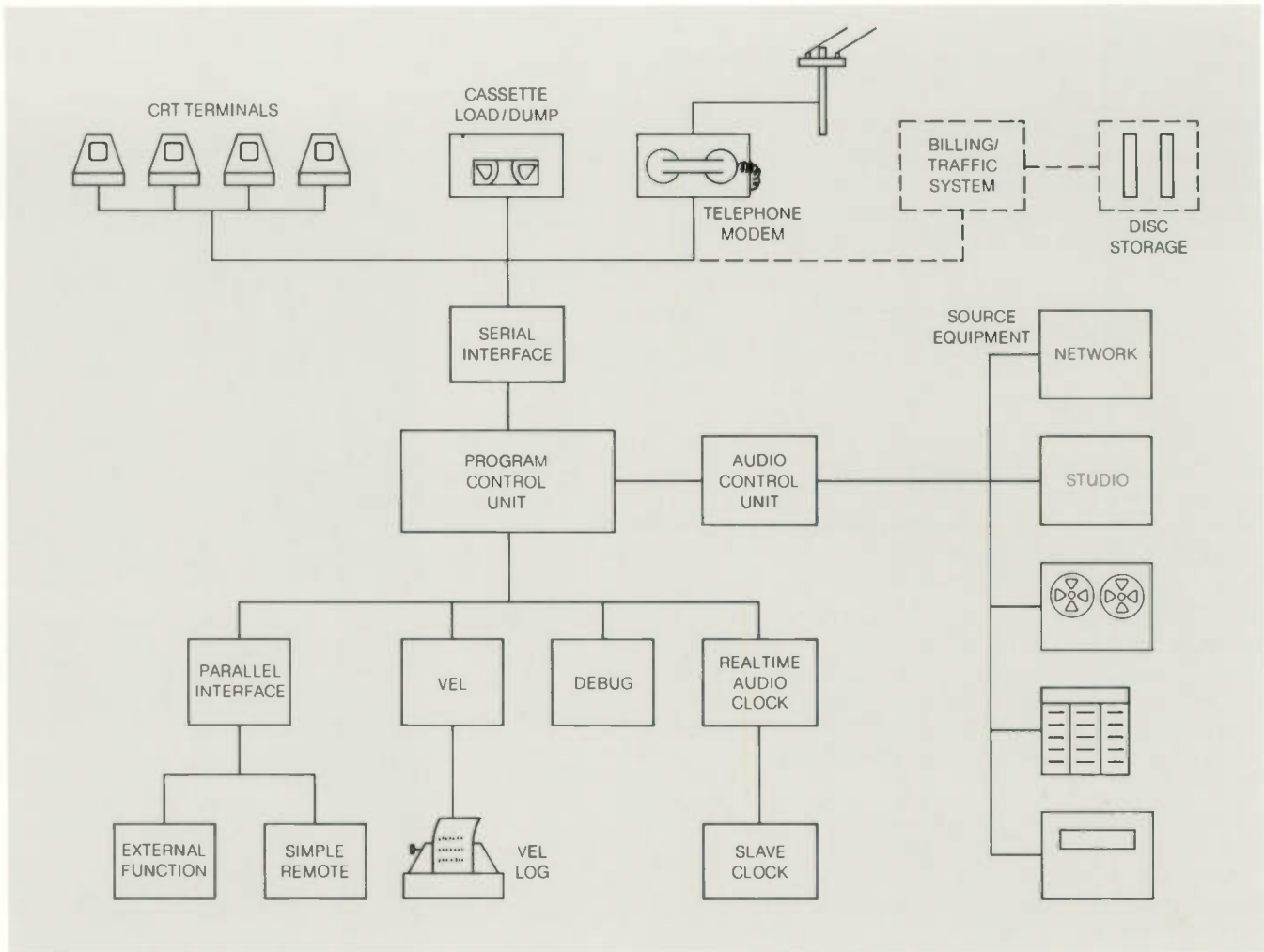
Z80 microprocessor the powerful third generation processor from Zilog, is the base for System 7000 proprietary micro computer design. Micro computer and master memory functions are on a single plug-in board. The 7000 is a true multi processor system.

Center Using telephone and modem link Schafer engineers can talk directly to any System 7000 anywhere in the field thus providing unique diagnostic service in real time. With phone link broadcasters can also operate the system from any remote location.

Bottom Verified English Logging system by Schafer has its own microprocessor. It provides time and descriptive event log correctly interpreting and editing time and commercial description (from separate data track on carts). VEL drives the impact printer (Extel or other high-quality printer according to customer specification) to produce accurate log.



## System 7000 Block Diagram



### System 7000 Audio Characteristics

Frequency Response	$\pm 1$ db 50 to 15,000 Hz (including 25 Hz filtering)
Total Harmonic Distortion	Less than 0.5% at + 18 dbm (typically 0.1%)
Line Output	600 ohms balanced (stereo at + 8 dbm), adjustable - 20 to + 8 dbm out
Signal to Noise	- 60 db below + 8 dbm (not including audio source noise)
Filter Response	Greater than - 60 db at 25 Hz (rated at + 8 dbm)
Head Room	+ 10 db above rated output
Monitor Amp Output	Four Watts Stereo

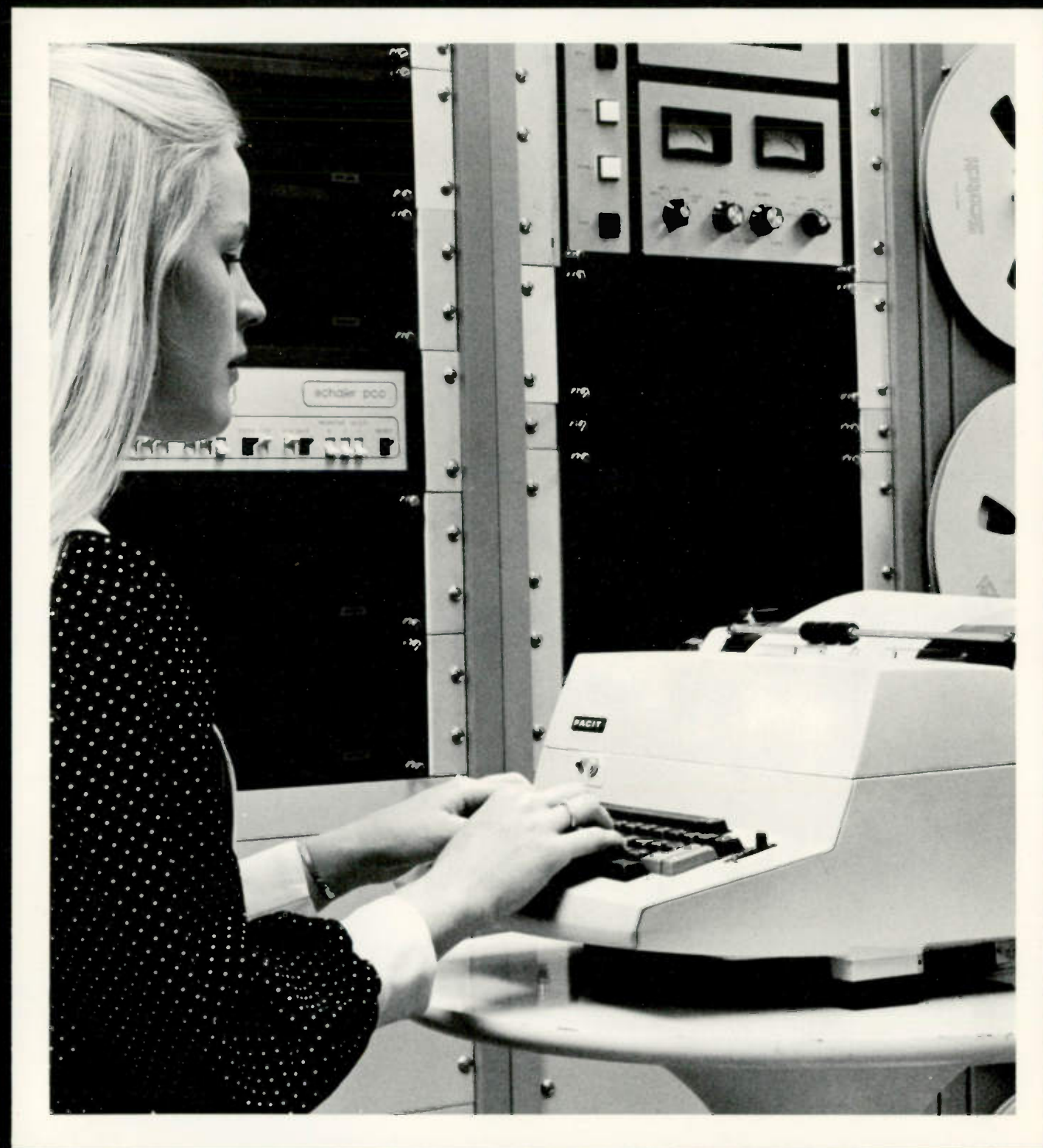
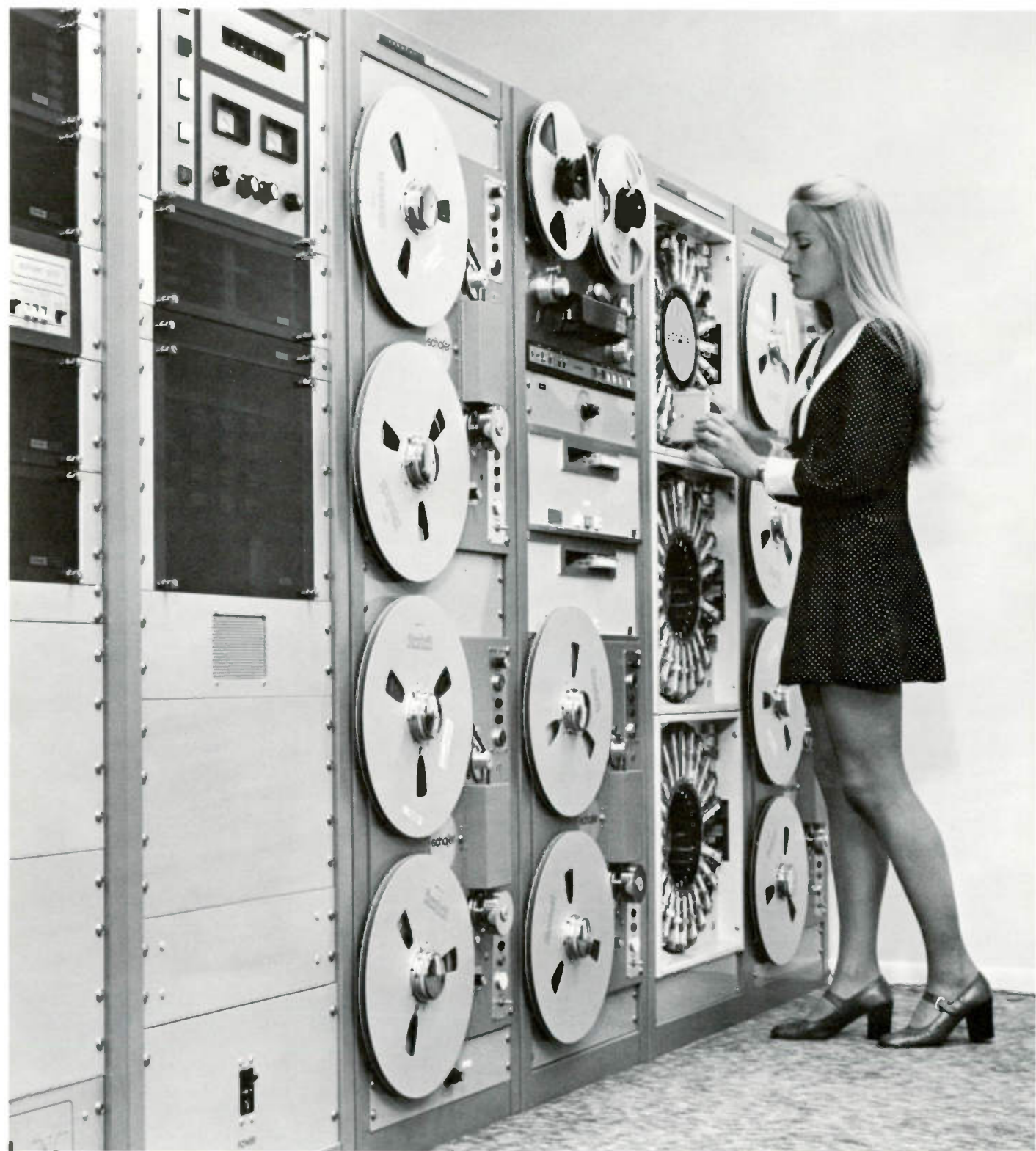


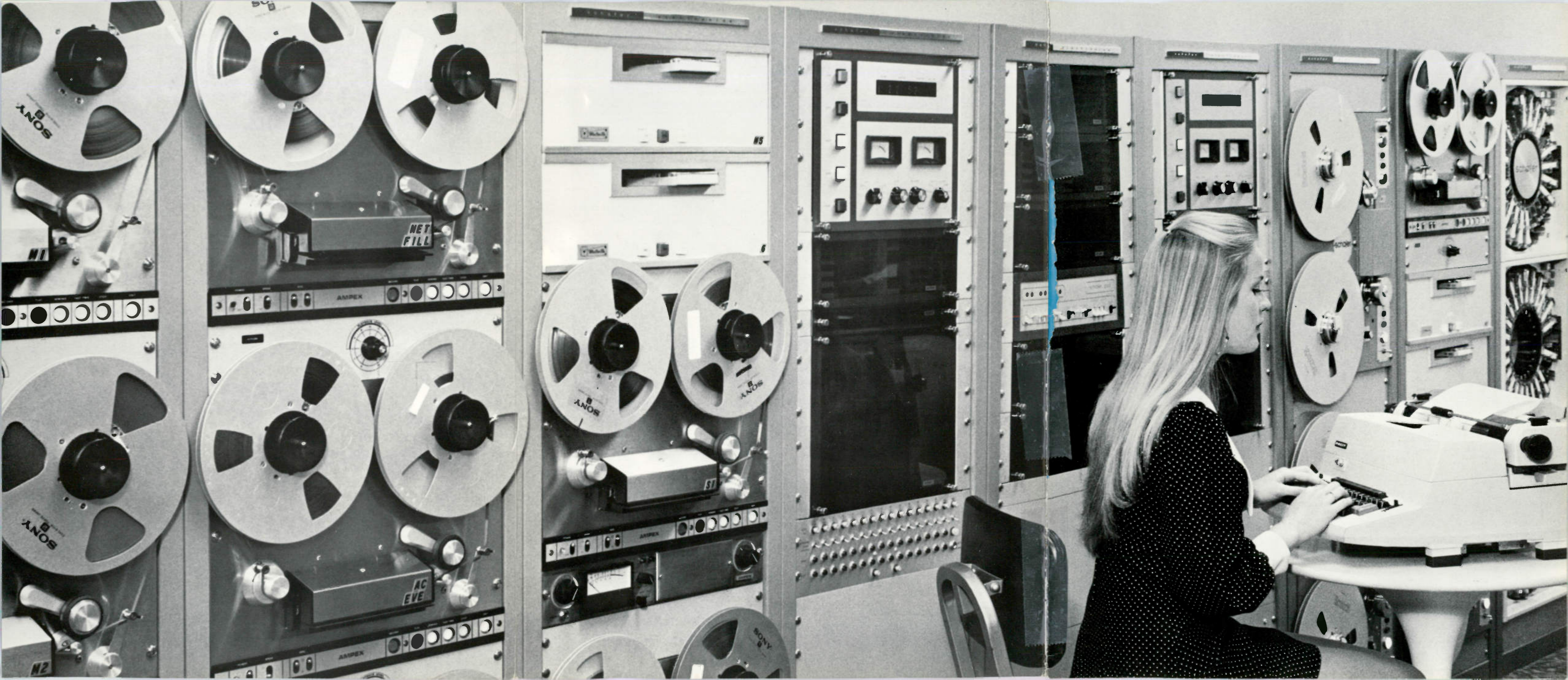
# Cetec Broadcast Group

The Broadcast Divisions of Cetec Corporation  
75 Castilian Drive, Goleta, California 93017 (805) 968-0755

The Schafer Model 8000 Broadcast Automation System

computer-controlled  
efficiency, flexibility and versatility







# The Schafer Model 8000

## Broadcast Automation System of the 70'S...and beyond.

The Schafer Model 8000 Broadcast Automation System is the only broadcast system controlled by a full-size digital process control computer. Combining advanced computer techniques with our years of broadcast automation experience, the 8000 offers features found in no other system. Here are some of the things it will do for you:

- Provide simultaneous yet separate programming for both AM and FM.
- Automatically print the program log.
- Handle the daily schedule of TIME events.
- Handle as many as 48 different FORMATS, each containing 48 events.
- Operate the digital clock.
- Operate up to 8 random access sources per station.
- Operate up to 12 music transports; reel-to-reel, cartridges or cassettes per station.
- Switch in and out of network and other program lines.
- Operate a transport for fill or closing themes — allowing exact time ending of programs without fading out of program material.
- Operate two transports as an audio clock.
- Handle many auxiliary events (like transmitter turn on or off) at specific times.

The Schafer 8000 is as simple . . . or simpler . . . to operate than any other broadcast automation system. Yet it has far greater flexibility, capacity and expandability. You simply cannot outgrow it. The 8000 silently and flawlessly runs your radio station (or AM-FM simultaneously) 24 hours a day, 7 days a week — automatically typing out a log of events as they are aired.

Model 8000 Systems have an excellent track record, under actual operating conditions. Since the initial systems were installed, new refinements have been added to further increase flexibility. It's truly the system of the 70's.





# Communicating with the computer

When Schafer engineers set out to design a computer for broadcast automation, they made sure that the system would be so simple that anyone in a radio station can use it with just a few hours of training. Communicating with and instructing the computer is in radio jargon, not "computerese."

The system doesn't use punched cards or complicated computer languages. Anyone who can hunt and peck simple messages on a typewriter can quickly learn to communicate with the system.

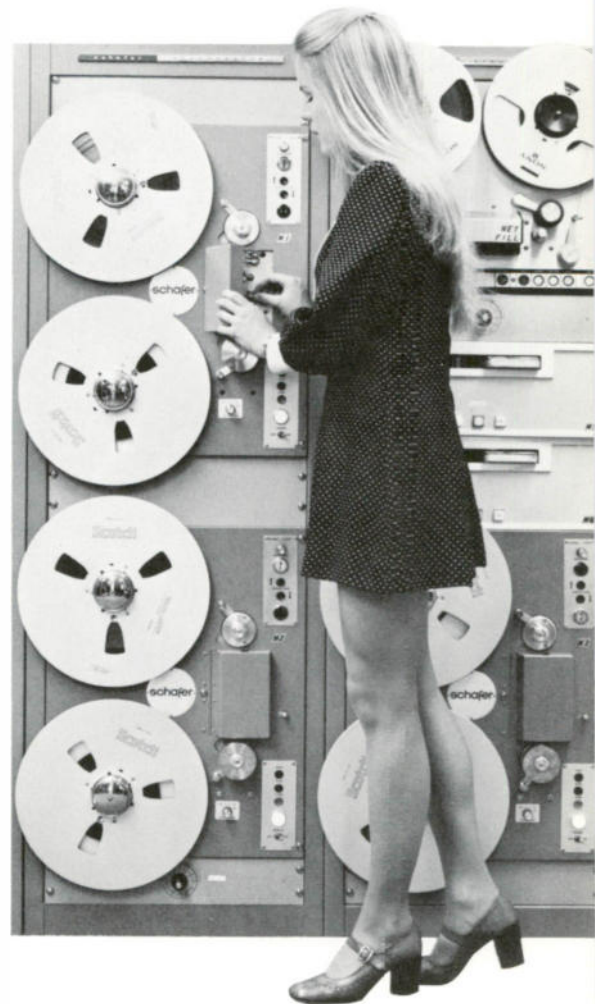
The language we use is called CLEAR (Conversational Language Easily Adapted to Radio). Words such as START, STOP, ENTER, LIST, REMOVE, AVAIL, FORMAT, TIME, FM, AM and so on are used. From the moment you type in HI, until you sign off with BYE, the 8000 is at your command (if you goof in your typing, the computer answers with WHAT?). You can call up formats, time schedules or random access sources and manipulate them at will.

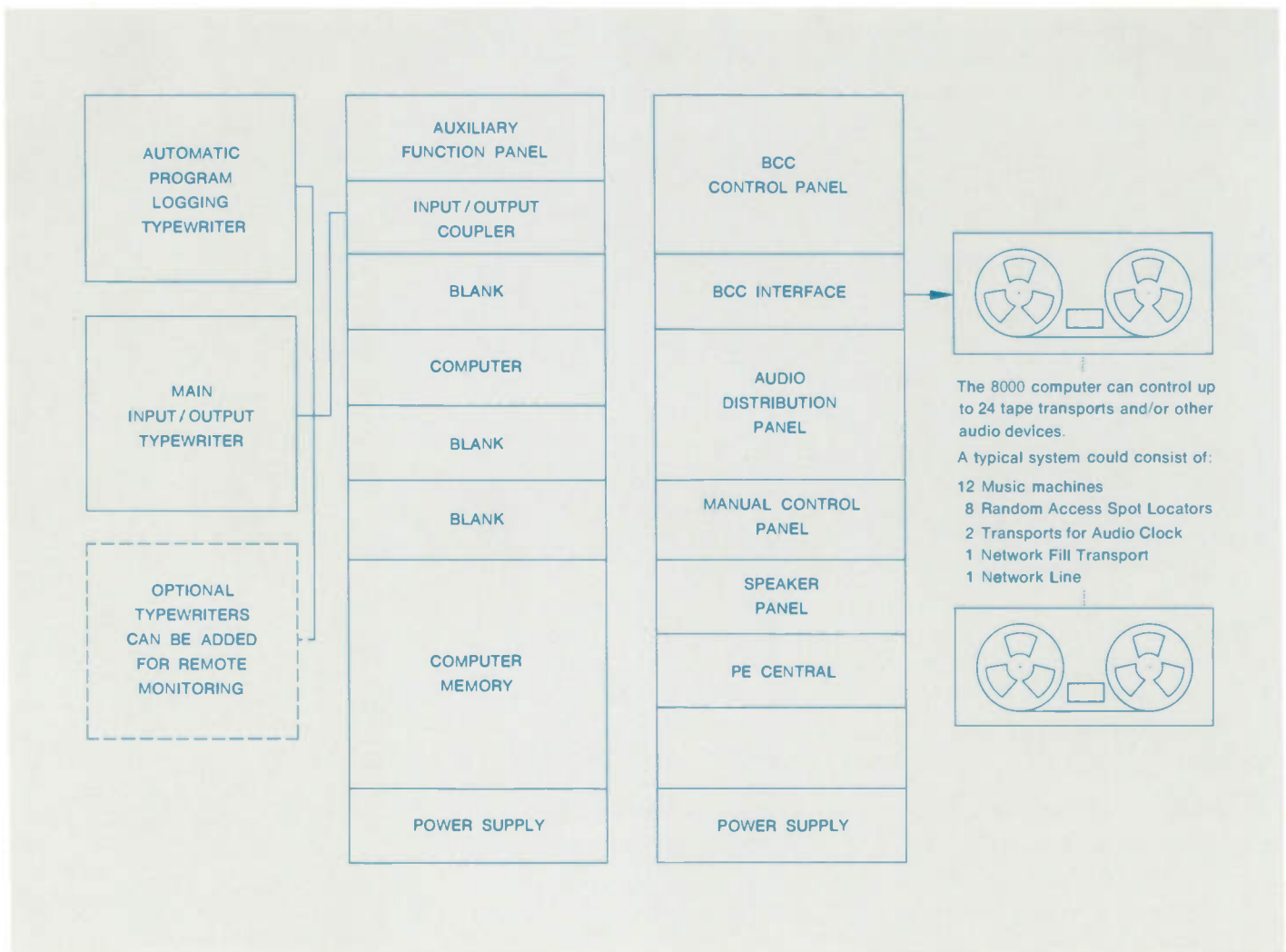
## System Components

**The Computer** Controlling the entire broadcast automation system is the Schafer 8000 computer. Designed by Schafer's own electronic engineering staff to parameters established by our broadcasting and marketing experts, the computer gives the 8000 versatility and flexibility found in no other system or combination of systems. The 8000, including the Broadcast Control Center, the computer itself, the expandable memory, typewriter control, system interface and power supply, is small enough to fit into two 19-inch racks (3 racks for AM/FM).

Up to 24 playback machines (48 for two stations) or other audio sources can be controlled. Formats are virtually unlimited and can be changed within moments. Commercials and other material can be added, deleted and shifted at will. Future days' programming can be updated while the computer is running today's events. And the powerful 8000 can even run both an AM and an FM station from one control point.

**Why Ferrite Core Memory?** The Schafer Model 8000 has no equal in the broadcast automation field. Our computer memory with the Broadcast Control and interface occupies little space. But what tremendous capability is packed into that small area. The Schafer Model 8000 has





overcome all of the disadvantages associated with switches, steppers and other cumbersome devices which dictate a fixed or repeating format and punched cards that must be stacked in a certain order and manually handled to effect a program change. The combination of small size, vast storage capability and microsecond speeds are just a few of the benefits of the 8000. Add to this . . . random selection of 250 commercials on each of up to 8 random access sources and up to 48 different formats each 48 events long and you have an unequalled combination.

The computer memory has such vast storage capability that you may program the system ahead for an entire week and not have any two segments of time alike . . . commercials, ID's by time . . . join and leave network by time . . . music called for by time . . . or all events called for by sequence if that is your choosing. The flexibility is at your command. In case of power failure the ferrite core memory retains its program information without battery backup.

The Schafer 8000 presents a cleaner appearance and takes up less space due to solid state modular design and integrated circuitry. All you need is the computer and as many transports as required to program your station for the LIVE SOUND you desire.

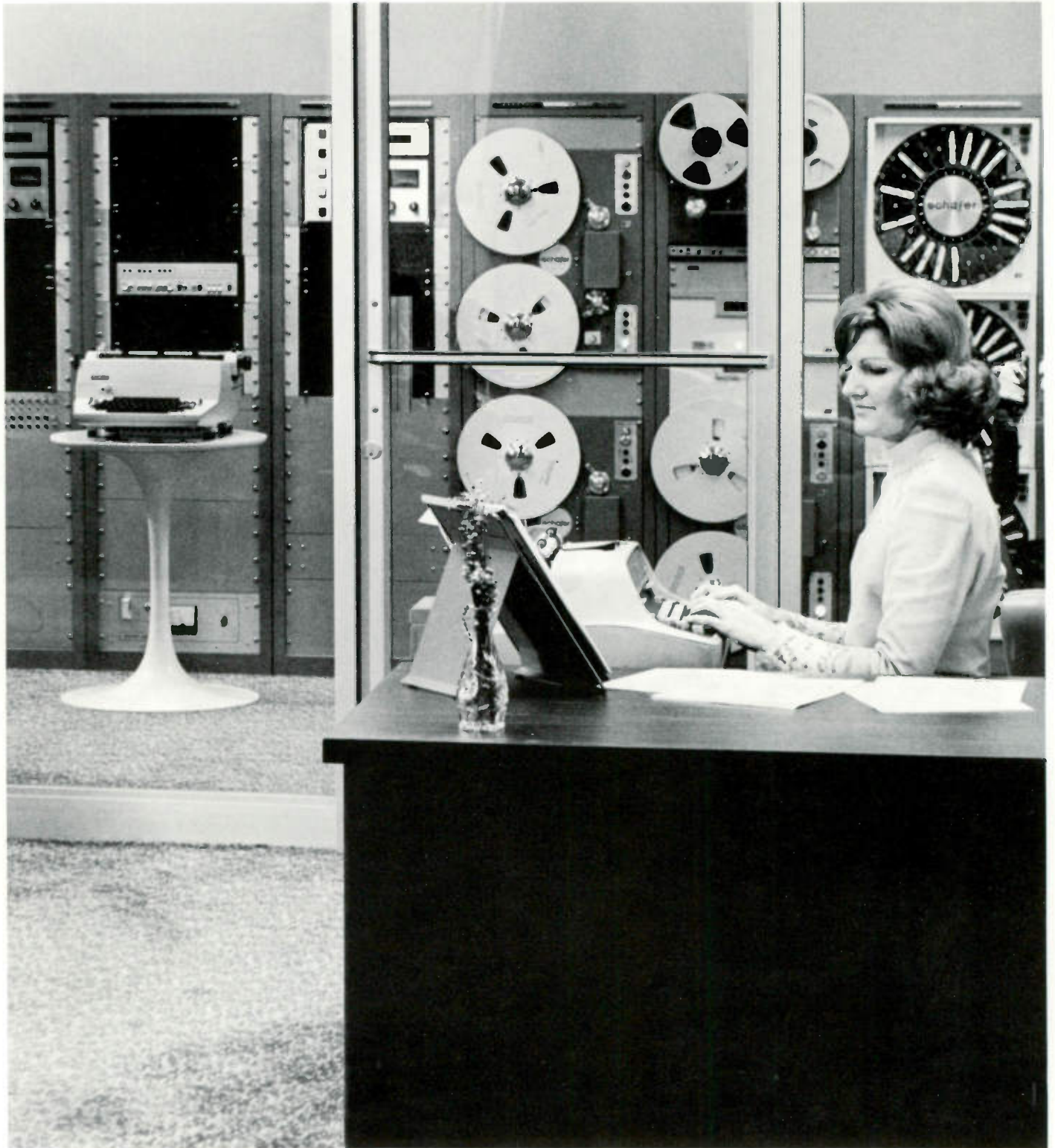
**BCC Control Panel** The Broadcast Control Center (BCC) panel contains the digital clock, master switches including Start, Stop, Panic — and meters and switches for system VU metering and aural monitoring. Power supply voltages, 25 Hz and silence sense circuits may also be metered. As an option, individual 25 Hz sensing on each playback deck can be provided, thereby allowing more than one playback to be aired at the same time and provides for automatic cueing when loading new tapes . . . another example of the 8000's flexibility.

**Computer Control Panel** The Computer Control Panel includes switches to allow direct entry into the computer registers. These controls are locked out and accessible only to qualified station personnel.

**Computer Memory Modules** The basic 8000 configuration contains an electronic ferrite core memory housed in three modules. Additional memory can expand the system to 8 modules. The amount of memory required depends on many factors — the amount of equipment to be controlled, schedule information required and whether the 8000 is to operate one radio station or AM-FM simultaneously. Memory is field-expandable by simply adding modules.

**BCC Control Interface Module** This module decodes the computer instructions to the tape recorders in the system, incorporating the necessary time delays and interface circuitry from random access sources and audio clock. The BCC Control Interface module can handle up to 24 channels.





**BCC Audio Distribution Module** This module provides the audio input circuitry for up to 24 monaural or stereo channels.

## Input-Output Typewriters...another key to system versatility.

An electric typewriter is the main communications link with the 8000 System. Another typewriter is normally used for the automatically printed program log. Use of the typewriter permits far more versatility than with previous methods. Each day's programming can have unlimited flexibility. Formats can be changed within seconds. Spots can be added, deleted and changed at will. Future schedules can be updated while the station is on the air. All the elements of the most sophisticated system are controlled by the I/O typewriter: music tapes, personality tapes, mood intros, commercials, time signals, station I.D.'s, promos, weather, traffic reports, news, network switching and special programming.

Available typewriters include: the FACIT Model 3851 which is a standard electric typewriter equipped to electrically interface with the 8000 system as a send/receive unit, and the FACIT Model 3841 which is a receive only typewriter used for automatic logging. Alternately, if you wish the Teletype Models KSR 35 and RO35, they will be supplied.

The system is supplied with a start-up program specifically prepared for each station. This is easily loaded into the computer memory.

**Silence Sense** Silence Sense protects your station against "dead" air. When an event is started and no sound is detected after a short pre-set time, the computer switches immediately to the next event in the format. The silence condition is printed into the log so that the malfunctioning system element can be corrected.

**Recovery** With the optionally available battery power, the Schafer 8000 even takes care of emergency situations — like power failure. With battery back-up, the time keeping is kept alive for at least an hour . . . or longer when more batteries are added. Upon restoration of power, the system knows where it is in time . . . restart is greatly simplified. In fact, it will restart itself, playing musical selections. The operator needs only to command the computer to re-cue the commercials and set the automatic time announcer. Once the computer is assured that all time-oriented system components are correct, regular operation resumes.



## For automatic and *verified* encoded logging

Shown at right is a typical log printout. Particularly note that the time of airing and the playback source are printed from computer information. Identification of what actually played came from digitally encoded signals directly from the tapes being played. This is what we mean by "Verified." Only what actually played is logged. This data can be used directly by the station's billing department, or for affidavits for advertisers and their agencies.

**Music Playbacks** Up to 12 sequential music playback decks can be controlled for each of two stations by the powerful 8000 computer. More than ever before, your Schafer automation system can provide music by category. A sequence never has to be repeated. There is almost an infinite number of combinations to create a fresh live sound. The powerful 8000 system is perfect for any type of musical format — Hit Parade, Middle Of The Road, Country Western, Rock, Contemporary, Classical or Ethnic.

Any standard relay controlled stereo or monaural transport can be used in the system, either reversing or non-reversing. 25 Hz switching on reel to reel playbacks and 150 Hz on cartridge playbacks are used to assure tight cues and adjustable overlap. Another very important 8000 feature is the built-in time delays which allow the transport to run for a precise time (distance) after the selection is ended in order to by-pass any clicks or pops which may have been introduced during recording.

**Cartridges and Cassettes** The 8000 computer provides complete random selection of any multiple tape cartridge device — or can select single-play cartridge or cassette machines when called for in the format.

Since the computer can control a large number of tape machines — either reel-to-reel or cartridge-type — a radio station now has far more programming capacity and flexibility than ever before.

**Audio Clock** The Audio Clock announces the time of day, accurate to the nearest minute. It consists of two self-cueing tape transports — either reel-to-reel or cartridge — one containing all of the even minute time signals, the other with odd minutes.

Customers can record the time signals themselves or can purchase custom time tapes from Schafer beautifully laid into harp, guitar or other musical backgrounds — one for every minute of the broadcast day.





01:35:31P, LNET  
 01:35:31P, FRMT, 013  
 01:35:31P, RAS5, 003  
 01:36:30P, MU05  
 01:37:00P, CLOK  
 01:37:09P, MU06  
 01:38:14P, MU01  
 01:40:48P, MU02  
 01:43:00P, FRMT, 014  
 01:43:12P, RAS5, 006  
 01:44:12P, CLOK  
 01:44:25P, MU06  
 01:45:29P, MU01  
 01:48:17P, MU02  
 01:51:10P, RAS5, 001  
 01:52:10P, CLOK  
 01:52:27P, MU01  
 01:54:43P, MU02  
 01:57:47P, RAS5, 011  
 01:58:30P, FRMT, 013  
 01:58:38P, MU05  
 01:59:08P, CLOK  
 01:59:27P, MU06  
 01:59:58P, MU01  
 02:19P, MU02  
 05:31P, RAS5, 009  
 06:35P, CLOK  
 06:57P, MU01  
 09:25P, RAS5, 022  
 10:22P, MU02  
 12:20P, MU01  
 13:00P, FRMT, 014  
 15:14P, RAS5, 024

AMPEX #1  
 KXXX

:59 NC FJB  
 :30 ID

CANADA DRY

:62 NC BBDO

SAC.TO.JUICE

:59 NC DER

COCA COLA

:62 NC GGB

CONTAC

:58 NC BBDO

ROM

:50 NC GGF

KXX

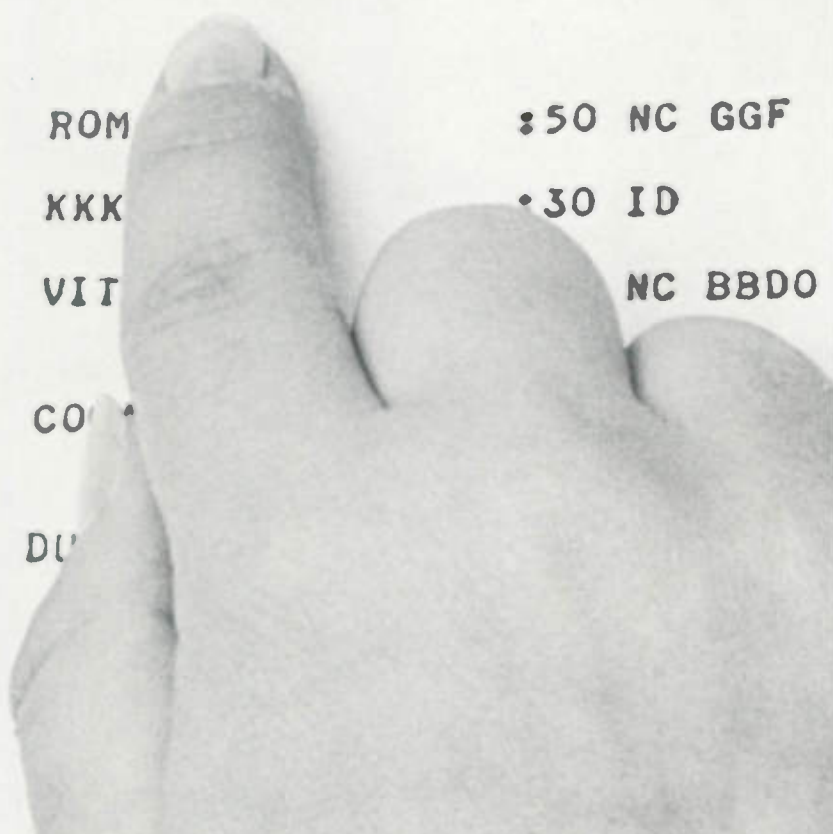
:30 ID

VIT

NC BBDO

CO

DU

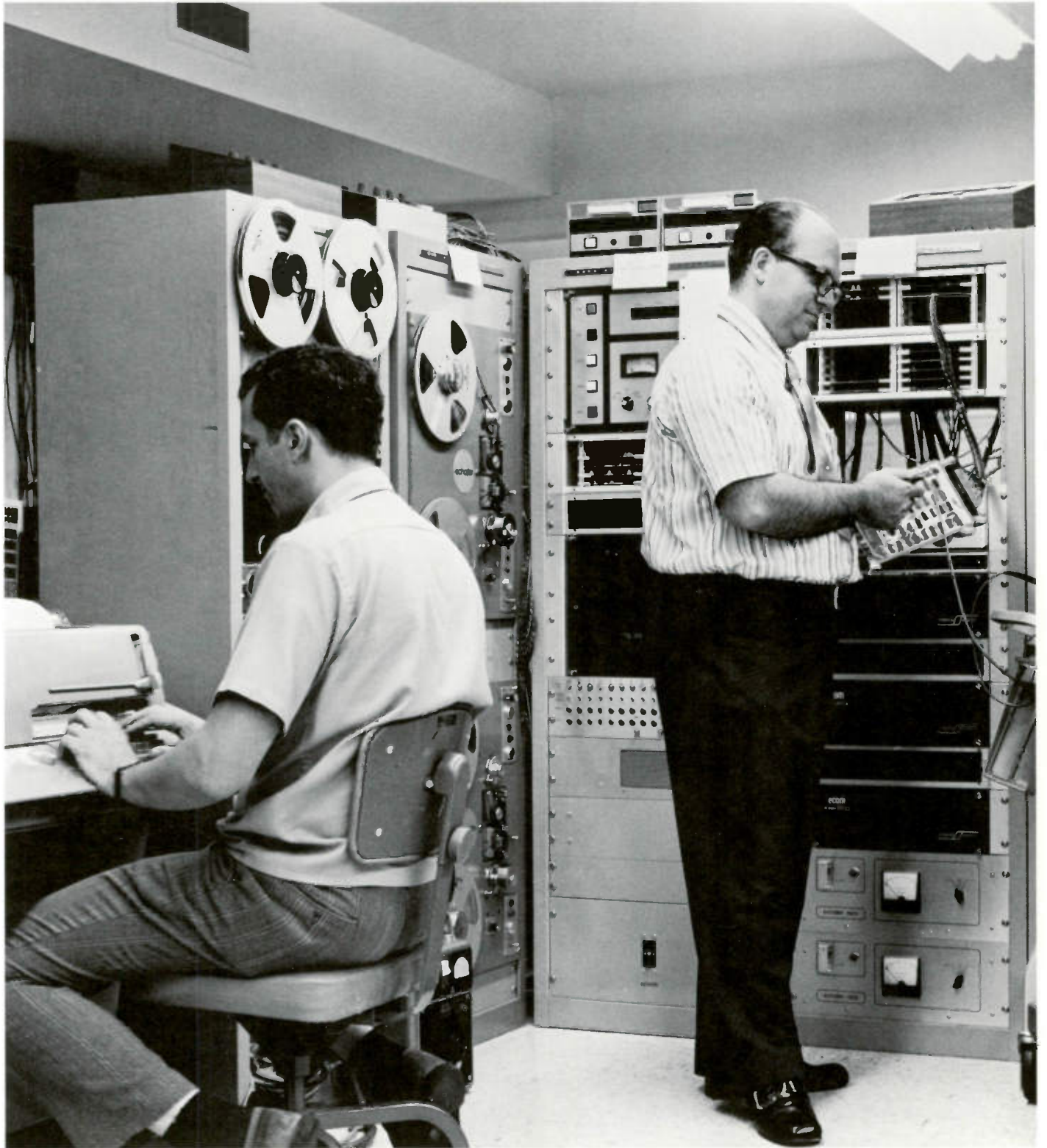


**Network Joining/Leaving** The computer can be programmed through the typewriter terminal to join and leave the network at precise times during the day and night. The only piece of equipment needed is a playback tape transport containing "fill" music. Schafer systems have never had to fade out or cut a musical selection before it has finished playing. In the 8000 system, this is accomplished by programming the computer to deadroll the fill music or closing theme so that the music ends in time to play the network agency commercial, the station I.D., or whatever events are scheduled. Timing is controlled so that all of this takes place just prior to the moment the computer switches to the network. With no break in programming, the network is on the air. Normal local programming can be resumed after the computer issues the command to leave the network.

**Makeup/Production Unit** The TRU-8 Record Unit is used to record material to be aired by the 8000 system. It may also be used as a playback unit, in or out of the system, and may be used to record material for any other use as well. The 25 Hz oscillator and a sharp cutoff 25 Hz filter are built into the TRU-8 electronics. The 25 Hz filter removes all unwanted low frequencies from the material being recorded, yet the sharp cutoff filter design assures full range fidelity. A remote control unit is provided to allow remote control of all normal recorder functions, plus the special controls designed for recording for the 8000 system.

**We Care.** After a system is installed at a station we don't forget you. We're interested in assuring that all is well and that the system is being used to the best advantage. That's why we have our service engineers available 24 hours a day, 7 days a week to aid if operational help or service is required. If an occasional malfunction occurs or some guidance is needed, we encourage the broadcaster to call . . . day or night (at night an answering service will put you in touch with our manager of field service).



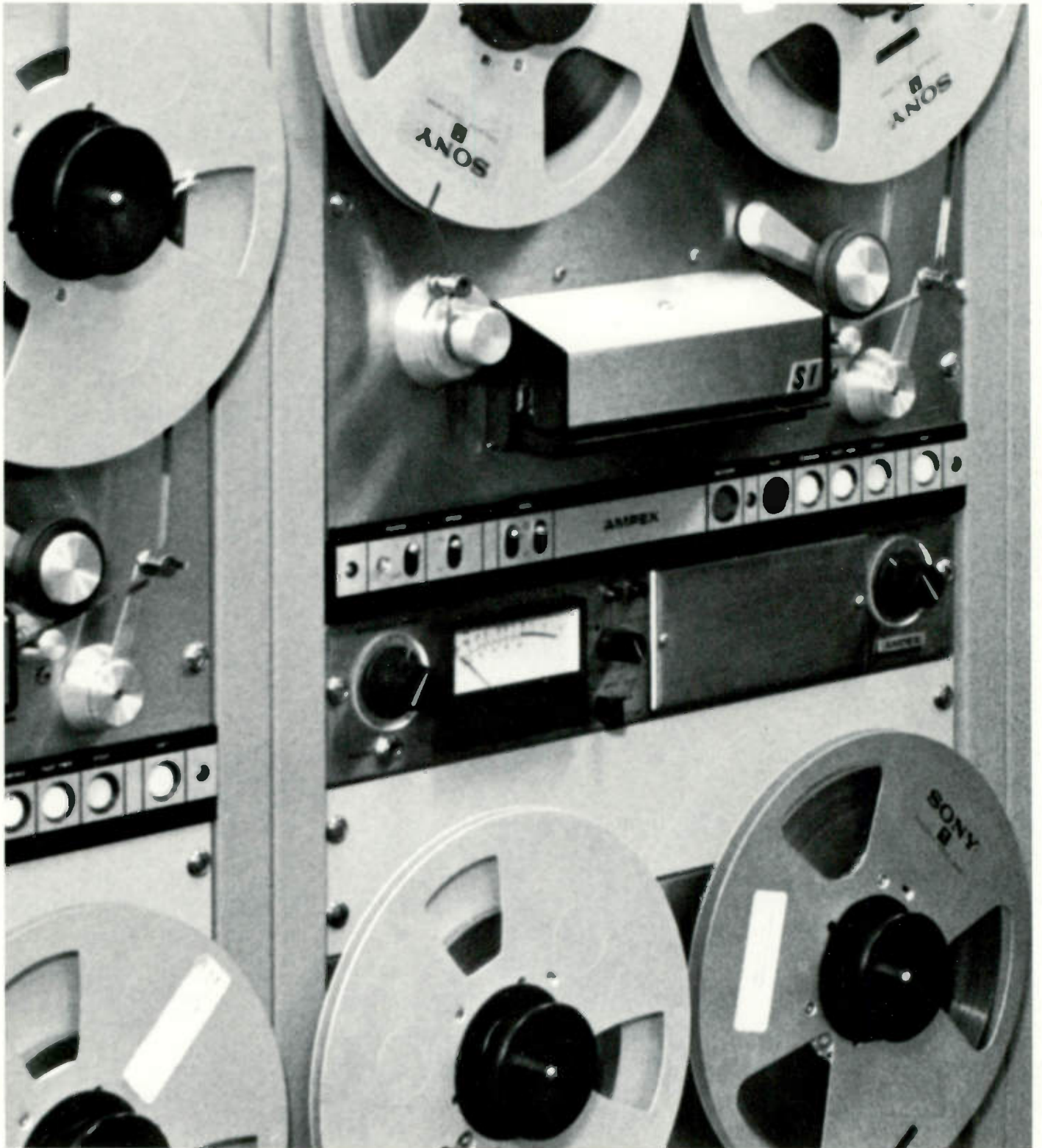


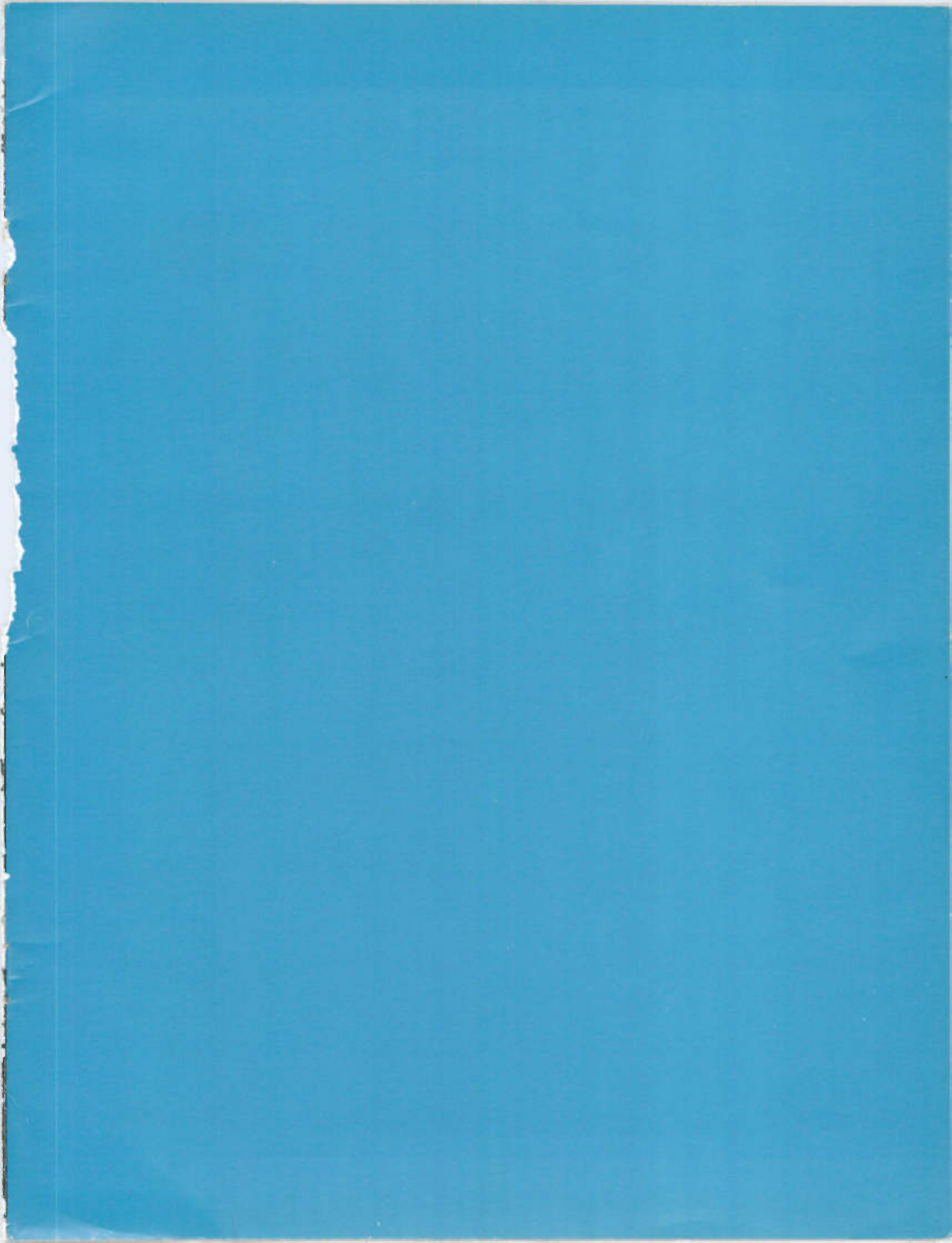
# CLEAR Dictionary

Here is the simple list of words and symbols with which to communicate with your Schafer Model 8000. It's as simple as that to go "on the air" with the most sophisticated broadcast automation system in existence.

A	Signifies AM after time has been typed
AC	Symbol for Audio Clock in Format file
AM	When system is operating both an AM and FM station, this signifies that a command pertains to AM operation
CLOK	Log designation for Audio Clock
AUXI	Time file entry for outputting an auxiliary event. Also log designation
AV	Symbol for Available in Format and RAS files
AVAL	Time file command allowing operator to make a time slot available at a specific time
BYE	Operator signoff
CORRECT TIME	Operator command to input current day and time
CR	Carriage return. This key must be used at end of each operator statement
DELETE	Allows operator to delete an item from a format or RAS file
EDIT	Allows user to exercise several options in editing the time file
ENCODE	Prepares the system to encode alphanumeric data on cartridges or reel to reel devices
ENTER	Allows operator to enter an item into a format or RAS file
FM	When system is operating both an AM and FM station, this signifies that a command pertains to FM operation
FORMAT	Gives operator access to specific format file
FRMT	A time command which changes current format to new format and log designation indicating a new format has started
GOTO	Causes the computer to change formats immediately on receiving this command from the I/O typewriter. It also logs the event
HI	Used by operator to start conversation with computer
JN	Symbol for Join Net in Format file
JNET	Log printout indicating network was joined at specific time. Also operator time file command for joining network at specific time
LNET	Log printout that network was left at specific time. Also operator time file command to leave network at specific time
LIST	Allows operator to list items in Format, Time or Spotter file
M1-M12	Symbol for Music Machines in Format file
MU01-MU12	Symbol for Music Machines in log
*NOT AVAILABLE	Computer response if operator asks for invalid format or RAS

OFF	Computer response to operator signoff BYE
ON	Computer response to operator signon HI
P	Signifies PM after Time has been Typed
PANIC	Log designation that next event was activated. Also manual switch on BCC
PF	Symbol for Play Fill in Formal file
PLAY	Log designation that fill tape goes on air
PNTR	Log designation that pointer in format being played has been moved. Also a time file command which sets format to a particular position
POSITION	RAS instruction permitting operator to tell computer to what spot a RAS is cued
RAS	Gives an operator access to a specific RAS file (Random Access Source)
RAS1-RAS8	Time file command to play a particular RAS. Also log designation for RAS
*READY	Computer response to a valid operator command. Indicates that action has been taken
*RECOVERY	Log designation of a system recovery after a power failure or dead start
REMOVE	Allows operator to remove an audio device from the system
RE	Format command which causes format to be restarted from its first event
ROLL	Allows operator to start fill tape rolling at specific time using the time file. Also log designation that fill tape was rolled at specific time
S1-S8	Symbol for RAS in Format file
SET	Command which causes a RAS to automatically cue to a particular spot and moves pointer to position in file
*SILENCE	Log designation indicating that silence sense occurred on last event
STATUS	Requests current system status from computer
STRT	Time file command by operator to put station on the air at specific time. Also, log designation for same
STOP	Time file command to take station off the air at specific time. Also log designation for same
TIME	Gives operator access to Time file
*WHAT?	Computer response to invalid operator command
↑	Deletes entire line on Teletype
←	Deletes previous character on line.
*	Prefix for any typed computer response. Also indicates a system element which has been removed in the Format file





# **schafer**

ELECTRONICS CORPORATION

If you would like more information,  
a representative to contact you, or a  
demonstration of a Schafer 8000 at  
your station in our fully-equipped van,  
please write or telephone.