CIRCUIT DESCRIPTION

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5

# CROSSBAR SYSTEMS
# NO. 3
# CIRCUIT PACK SCHEMATICS

## CHANGES

### D. Description of Changes

D.01 For Description of Operation see CD Issue 3D.

BELL TELEPHONE LABORATORIES, INCORPORATED

DEPT 5245

WE DEPT 45820-SSA-WEA-GLW



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# CROSSBAR SYSTEMS
# NO. 3
# CIRCUIT PACK SCHEMATICS

TABLE OF CONTENTS



## SECTION I - GENERAL DESCRIPTION

### 1. PURPOSE OF CIRCUIT

1.01 Circuit design for crossbar No. 3 and possibly other system circuit packs is provided.

### 2. GENERAL DESCRIPTION OF OPERATION

2.01 A general description of operation is described under each circuit pack heading in SECTION II.

## SECTION II - DETAILED DESCRIPTION

### A1054 - AUDIO AMPLIFIER

1.01 This circuit pack amplifies a low-level audio signal from a magnetic tape head to a usable high-level signal capable of driving an impedance of three to four ohms. The transformer coupled output is capable of driving up to 100 trunks. An additional secondary winding referenced to ground is provided to drive a high-impedance load.

1.02 A decoupling circuit is provided by C1, C2, and R1. Capacitor C3 is used as DC block for the input transistor Q1. Transistors Q1 and Q2 operate as the pre-amplifier with negative feedback. The R16 provides amplitude adjustment. Transistors Q3 through Q6 provide the power amplifier stages which terminate into transformer T1. Transformer T1 is for output isolation and impedance matching.

### A1055 - END OF TAPE DETECTOR

1.03 This end of tape detector sets a flip-flop if a 4500-hertz signal is present for at least 50 milliseconds. The flip-flop is reset if T3 is grounded. The circuit pack is also capable of driving a relay which operates for one to three seconds each time the 4500-hertz signal is detected.

1.04 Potentiometer R1 is an input level control which supplies the input signal to C3 a DC blocking capacitor. Detection is accomplished with IC1, a phase-locked loop detector. Reaction time and band width is determined by C1, C2, C5, and C13. Center frequency is determined by R2, R4, and C5. The IC2 is a double monostable multivibrator used to generate a delayed window. Resistor R5 is an output load for TC1. Timing components for IC2 include R6, C6, R7, and C8. The IC3 consists of four logic gates two of which are used as a flip-flop, one is used as an inverter and the last to strobe the IC1 output with the IC2 output. The IC4 is used as a relay driver. The IC5 is a timer to generate a 1- to 3-second period. The IC5 timing components are C12 and R9. A

voltage supply consisting of R3 and IC6 provides five volts for the integrated circuits. Decoupling is provided by C4, C7, C9, C10, and C11.

A1056 - AC-to-DC CONVERTER

1.05 This ac-to-dc converter converts 25-volt ac to a regulated and filtered 23-volt dc.

1.06 The CR1 through CR4 act as a full-wave bridge rectifier which feeds a pi-filter consisting of C1, C2, R1, and R5. Regulation is provided by IC1 and Q1. Oscillations of the regulator amplifier are prevented by C4. Current limiting is set by R4. The regulator voltage is controlled by a voltage divider consisting of R2 and R3. A final decoupling is provided by C3.

A1216 - RECORDING AMPLIFIER AND BIAS OSCILLATOR

1.07 This circuit pack provide microphone amplification and bias current for the record function of the 12A announcement set.

1.08 Diode CR1, CR2, CR3, and CR4 provide a full-wave bridge rectifier power supply for the entire pack from the 24-volt ac power supply on the 12A announcement set. The C12 is for decoupling. The R22 and R23 constitute a voltage divider network. The C13, C15, and C21 in the resonant ta. circuit determine the frequency of the oscillater. Transistors Q5 and Q6 together with associated resistors, capacitors, and transformer T1 constitute a cross-coupled multivibrator with a tuned load. The erase head winding is coupled to the transformer tap with C22 which series resonates with the erase head winding. The bias current for the recording head is adjusted by the bias potentiometer. Transistors Q1, Q3, and Q4 and associated components serve as a microphone amplifier to drive the record head. Transistor Q2 provides a high-impedance input for a tone preamplifier.

A1264 - DETECTOR

1.09 This circuit pack is used as an end of tape detector on the 12A announcement set.

1.10 The end of tape is detected by a reflective foil which is attached to the tape. The detector is an assembly containing a gallium arsenide infrared emitting diode and a N-P-N silicon phototransistor mounted in a molded plastic housing. The R1 is a current limiting resistor for the IED. The R2 and R4 provide biasing and input for the phototransistor. When the foil is detected the collector of transistor Q1 goes to zero volts thus triggering IC2 which is a dual monostable multivibrator used to generate a delayed window. Timing components for IC2 include R6, C3, R9, and C9. The IC3 consists of four logic gates two of which are used as a flip-flop, one is used as an inverter and the last to strobe the IC2 output. The IC4 is a relay driver. The IC5 is a timer to generate the 1- to 3-second period. The IC5 timing components are C8 and R8. A voltage supply consisting of R5 and IC6 provides five volts. Decoupling is provided by C1, C2, C6, C7, and C5.

## SECTION III - REFERENCE DATA

### 1. WORKING LIMITS

1.01 None.

### 2. FUNCTIONAL DESIGNATIONS

2.01 None.

### 3. FUNCTIONS

3.01 None.

### 4. CONNECTING CIRCUITS

4.01 When this circuit is listed on a key-sheet, the connecting information listed thereon is to be followed.

(a) A1054, A1055, A1056, A1216, and A1264 Circuit Packs are all connected to SD-26435-01 - Announcement Circuit.

### 5. MANUFACTURING TESTING REQUIREMENTS

5.01 This circuit shall be capable of performing all the functions listed in this Circuit Description.

## SECTION IV - REASONS FOR REISSUE

### B. Changes in Apparatus

B.01 Removed

From A1054 Circuit Pack

Capacitors

KS-19658 L4 250 µF @ 30V

Capacitors (Cont)

608C 22 µF @ 60V

KS-14056 L34, 68 ρF

KS-19774 L6 0.047 µF

KS-20736 L1 0.1 µF

601B, 10 µF @ 20V

KS-20736 L1 0.1 µF

KS-14056 L34 330 ρF

KS-19774 L2 0.01 µF

Resistors

KS-20289 L6 - 100

KS-20616 L1A - 162K, 61.9K, 221, 82.5, 1.2K, 182, 82.5K, 12.1K

KS-16645 L2 1M, 820K, 2.2M

Integrated Circuit

MFC 9020 (Motorola)

Potentiometer

KS-20945 L1 10K

Transformer

3-19650-0000 ADC Products

Transistors

16C

From A1055 Circuit Pack

Potentiometer

KS-19193 L2 50K

KS-20945 L1 5K

Resistors

KS-20289 L6A 46.4

KS-20616 L1A 8.25K

KS-20616 L1A 17.9K

KS-20616 L1A 46.4K

Capacitors

KS-20736 L1 0.1 µF

607E 60 µF @ 35V

601B 10 µF

KS-20736 L1 0.1 µF

605B 2.2 µF

570 LW 0.0243 µF

Integrated Circuit

NE 567V

B.02 Added

To A1054 Circuit Pack

Capacitors

KS-16390 L6 100 µF

KS-19774 L6 0.047 µF

KS-14056 L34 68.1 ρF

601B 10 µF

KS-14056 L32 27.1 ρF

KS-20736 L4 0.01 µF

Diode

458A

Potentiometer

KS-20945 L1 10K

Resistors

KS-20289 L2B 100 7W

KS-20616 L1A 162K

KS-20616 L1A 221

KS-20616 L1A 1.78K

KS-20616 L1A 82.5

KS-20616 L1A 61.9K

KS-20810 L1A 392K

KS-20810 L1A 34.8K

Resistors (Cont)

KS-20289 L6A 100

KS-20810 L1A 909

KS-20289 L6A 681

KS-20810 L1A 10

KS-20810 L1A 1

KS-20289 L6A 470 1W

KS-20289 L6A 8.2

Transformer

BSH-732

Transistors

66C

2N4401

2N4403

2N5192

2N5195

To A1055 Circuit Pack

Resistors

KS-20616 L1A 100

KS-20616 L1A 27K

Resistors (Cont)

KS-20616 L1A 12K

KS-20616 L1A 1K

Transistor

66AK

To A1056 Circuit Pack

| Removed | Replaced By |
|---|---|
| KS-19658 L31 | 500D307G050FH7 300 µF @50 |
| KS-14603 L2D 27 | KS-14603 L2D 10 µF |

TO A1216 Circuit Pack

Record Assembly

R103 Paradigm MFG Baton Springs, Ka

To A1264 Circuit Pack

Transistor

66AK

Resistors

KS-20616 L1A 1K

KS-20616 L1A 100

KS-20616 L1A 27K

KS-20616 L1A 12K

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