Rec'd 3/23/88

TSP[redacted]3477 EVALUATION BOARD

EVM3477

OPERATION MANUAL
(TENTATIVE)

TEXAS INSTRUMENTS JAPAN LTD.

[NOTICE]

THE EVM3477 IS A DEVELOPMENT SUPPORT TOOL FOR PURPOSE OF THE TMS3477/TMS3477A EVALUATION. PLEASE READ THROUGH THIS OPERATION MANUAL BEFORE SUPPLING POWER TO THE EVM3477, AND REFER TO THE TMS3477/TMS3477A USER'S MANUAL FOR THE DETAIL OF TMS3477/TMS3477A. ANALOG CIRCUITS SUCH AS MICROPHONE AMPLIFIER, POWER AMPLIFIER AND ACTIVE FILTER ARE ALREADY MOUNTED ON THE EVM3477. BUT, IT IS RECOMMENDED TO EVALUATE THE SPEECH QUALITY BY MODIFING ANALOG CIRCUIT EXTERNALY BASED ON THE DATA SAMPLING FREQUENCY AND YOUR APPLICATION.
THE CONTENTS OF THIS OPERATION MANUAL MAY BE UPDATED WITHOUT ANY INFORMATION.

AUG,1987

MOS LOGIC PRODUCT MARKETING
TEXAS INSTRUMENTS JAPAN LTD.

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1. GENERAL

THE EVM3477 IS A VOICE RECORDING/PLAY-BACK BOARD WHICH WAS DEVELOLPED FOR PURPOSE OF TMS3477/TMS3477A EVALUATION. YOU CAN EASILY EVALUATE ALL OF FUNCTIONS ON TMS3477/TMS3477A BY ADDING MICROPHONE, SPEAKER AND +5V DC POWER SUPPLY UNIT EXTERNALLY.

2. SPECIFICATIONS

ITEMS	SPECIFICATIONS
PCB SIZE	83mm(VERTICAL) X 160mm(HORIZONTAL) (EXCEPT EDGE BOARD AREA)
VOICE RECORDER LSI	TMS3477 OR TMS3477A
MICROPHONE AMPLIFIER	LM358 (A = 36 to 60 dB)
INPUT ACTIVE LOW-PASS FILTER	LM358 (Fc = 2.6 KHz, -6 dB/oct)
POWER AMPLIFIER	LM386 (Pout =< 0.3 W)
OUTPUT ACTIVE LOW-PASS FILTER	LM358 (Fc = 2.0 KHz, -12 dB/oct)
EXTERNAL VOICE MEMORY	USABLE TMS4164 X2, TMS4256 X2 OR TMS4C1024 X2 (TMS4256 X2 ON BOARD)
KEY OPERATION	REC, PLAY, PAUSE AND STOP KEYS ON BOARD
EXECUTION MODE	ALL OF EXECUTION MODE ON TMS3477 AND TMS3477A
RECOMMENDED OPERATING CONDITIONS	SUPPLY VOLTAGE: +5 V (+- 10%) OPERATING TEMP: 0 DEG-C to +50 DEG-C
SUPPLY CURRENT	IN STAND-BY: 24mA MAX. IN RECORDING: 50mA MAX. IN PLAY-BACK: 250mA MAX.

3. OVER-VIEW

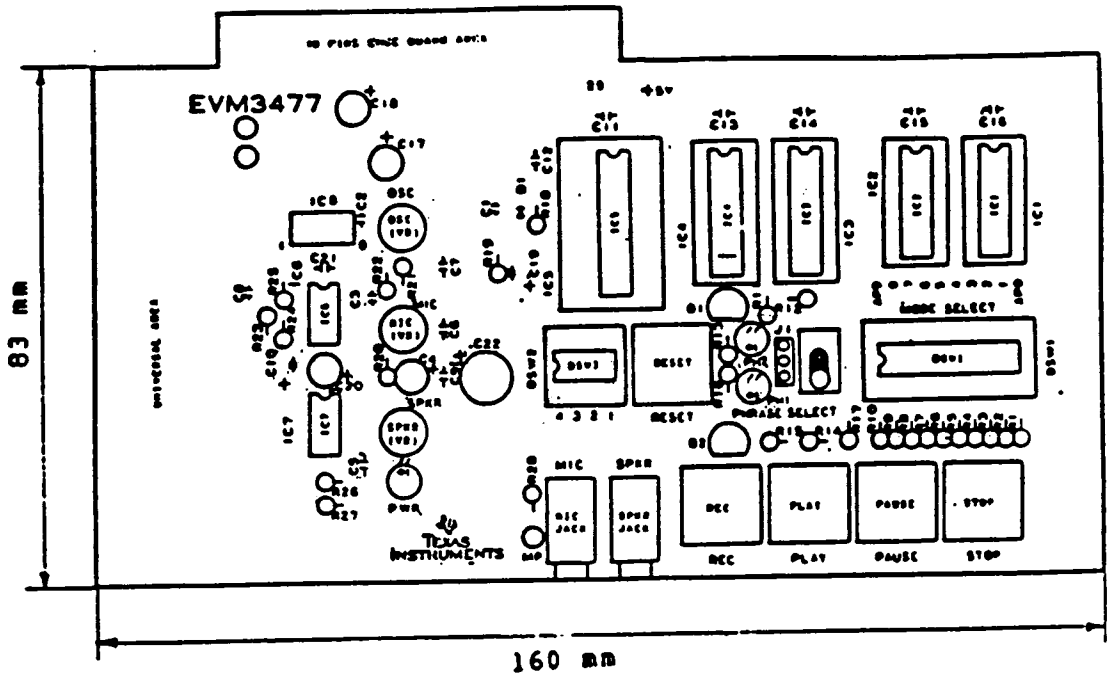


FIG. 3-1 EVM3477 OVER-VIEW

PARTS NAME	DESCRIPTION
IC5:	TMS3477 OR TMS3477A
IC1,IC2,IC3,IC4:	EXTERNAL VOICE MEMORY (DRAMs)
DSW1(AP0-AP9):	MODE SELECT KEYS
REC,PLAY,PAUSE,STOP:	OPERATION KEYS (IN KEY INPUT I/F MODE)
PHRASE SELECT:	TOGGLE SWITCH FOR DRAM SELECTION
OSC(VR):	TMS3477/3477A OSCILLATOR FREQ. ADJUSTMENT
PWR,PH1,PH2:	LED DISPLAYS
IC6,IC7:	AMPLIFIERS
MIC(VR),SPKR(VR):	GAIN ADJUSTMENT
MIC-JACK,SPKR-JACK:	MICROPHONE AND SPEAKER JACKS
DSW2(1-4),J1:	LINE CHANGE SWITCHES

4. MOUNTING PARTS AND OPERATION

4.1 EXTERNAL VOICE MEMORY (DRAMs)

TMS4164 (X2 MAX.), TMS4256 (X2 MAX.) OR TMS4C1024 (X2 MAX.) ARE USED AS EXTERNAL VOICE MEMORY. (DO NOT MOUNT DIFFERENT TYPE OF DRAMs TOGETHER ON THE BOARD.)

PARTS NAME	DESCRIPTION
IC1	TMS4256 (OR TMS4164) AS PHRASE-1.
IC2	TMS4256 (OR TMS4164) AS PHRASE-2 IN 1-PHRASE/1-DRAM MODE, AS PHRASE-1 IN 1-PHRASE/2-DRAMs MODE.
IC3	TMS4C1024 AS PHRASE-1.
IC4	TMS4C1024 AS PHRASE-2 IN 1-PHRASE/1-DRAM MODE, AS PHRASE-1 IN 1-PHRASE/2-DRAMs MODE.

4.2 MODE SELECT KEYS (DSW1)

TEN MODE SELECT KEYS DSW1(AP0)-DSW1(AP9) DETERMINE THE TMS3477/3477A EXECUTION MODE BY CONNECTING(SWITCH ON) OR DISCONNECTING(SWITCH OFF) AP0-AP9 PINS TO PULL-DOWN RESISTORS. FOR THE DETAIL EXPRESSIONS OF EXECUTION MODE, REFER TO THE TMS3477/TMS3477A USER'S MANUAL.

MODE SELECT KEYS DSW1(APn) 9 8 7 6 5 4 3 2 1 0	TMS3477/3477A EXECUTION MODE
X X X X X X X X - -	DRAM TYPE: TMS4256
X X X X X X X X - O	DRAM TYPE: TMS4164
X X X X X X X X O -	DRAM TYPE: TMS4C1024
X X X X X X X X O O	RESERVED
X X X X X X X - X X	1-PHRASE/1-DRAM MODE
X X X X X X X O X X	1-PHRASE/2-DRAMs MODE
X X X X X X - X X X	STOP ADDRESS EXHIBIT(VARIABLE PHRASE SIZE)
X X X X X X O X X X	STOP ADDRESS INHIBIT(FIXED PHRASE SIZE)
X X X X X - X X X X	ONE TIME RECORDING
X X X X X O X X X X	CYCLIC RECORDING
X X X X - X X X X X	HOST INTERFACE: KEY INPUT INTERFACE
X X X X O X X X X X	HOST INTERFACE: CPU INTERFACE
X X - - X X X X X X	BASE DATA SAMPLING FREQUENCY: Fbds = 32 KHz
X X - O X X X X X X	BASE DATA SAMPLING FREQUENCY: Fbds = 16 KHz
X X O - X X X X X X	BASE DATA SAMPLING FREQUENCY: Fbds = 64 KHz
X X O O X X X X X X	RESERVED
X - X X X X X X X X	OUTPUT DATA COMPRESSION: INHIBIT
X O X X X X X X X X	OUTPUT DATA COMPRESSION: EXHIBIT
- X X X X X X X X X	RECORDING MONITOR: INHIBIT
O X X X X X X X X X	RECORDING MONITOR: EXHIBIT

(NOTE) O: DSW1(APn) ON
-: DSW1(APn) OFF
X: DON'T CARE

4.3 OPERATION KEYS AND OSCILLATOR ADJUSTMENT

PARTS NAME	DESCRIPTION
REC	START OR RESTART RECORDING. (SEND REC COMMAND TO THE TMS3477/3477A. EFFECTIVE IN KEY INPUT I/F MODE)
PLAY	START OR RESTART PLAYING-BACK. (SEND PB COMMAND TO THE TMS3477/3477A. EFFECTIVE IN KEY INPUT I/F MODE)
PAUSE	PAUSE RECORDING OR PLAYING-BACK (SEND PAUSE COMMAND TO THE TMS3477/3477A. EFFECTIVE IN KEY INPUT I/F MODE)
STOP	STOP RECORDING, PLAYING-BACK AND PAUSING. (SEND STOP COMMAND TO THE TMS3477/3477A. EFFECTIVE IN KEY INPUT I/F MODE)
OSC(VR)	VARIABLE RESISTANCE TO ADJUST TMS3477/3477A OSCILLATOR FREQUENCY. DATA SAMPLING FREQUENCY (Fds-Hz) IS DETERMINED BY THE OSCILLATOR FREQUENCY (Fosc-Hz) AND BASE DATA SAMPLING CLOCK (Fbds-Hz) AS SHOWN BELOW. Fds = (Fosc X Fbds) / 320,000 TMS3477: 250KHz <= Fosc <= 492KHz TMS3477A: 164KHz <= Fosc <= 492KHz
PHRASE SELECT	TOGGLE SWITCH FOR DRAM SELECTION. PH2(UP): CONNECT CAS1_ SIGNAL TO IC1 AND IC3. PH1(DOWN): CONNECT CAS1_ SIGNAL TO IC2 AND IC4. WHEN 1-PHRASE/1-DRAM IS SELECTED BY THE MODE SELECT KEY, TURN OFF THE DSW2(1) SWITCH AT FIRST AND YOU CAN SELECT PH1(PHRASE-1) OR PH2(PHRASE-2) BY USING THE TOGGLE SWITCH. WHEN 1-PHRASE/2-DRAMs IS SELECTED BY THE MODE SELECT KEY, SET THE TOGGLE SWITCH TO PH1(DOWN) AT FIRST AND TURN ON DSW2(1) SWITCH.

4.4 ANALOG PARTS

PARTS NAME	DESCRIPTION
IC6	LM358 (MICROPHONE AMPLIFIER AND ACTIVE LOW-PASS FILTER)
IC7	LM386 (POWER AMPLIFIER TO DRIVE 8 OHM SPERKER)
MIC(VR)	GAIN ADJUSTMENT FOR THE MICROPHONNE AMPLIFIER.
SPKR(VR)	GAIN ADJUSTMENT FOR THE POWER AMPLIFIER.
MIC-JACK	MICROPHONE JACK.
SPKR-JACK	SPEAKER JACK.

4.5 LED DISPLAYS

PARTS NAME	DESCRIPTION
PWR	POWER INDICATOR.
PH1	RECORDING AND PLAYING-BACK INDICATOR FOR PHRASE-1.
PH2	RECORDING AND PLAYING-BACK INDICATOR FOR PHRASE-2 OR PHRASE-1.

4.6 LINE CHANGE SWITCHES

DIP SWITCH DSW2 AND JUMPER SWITCH J1 ARE PREPARED TO CHANGE LINE CONNECTIONS ON THE BOARD SHOWN BELOW.

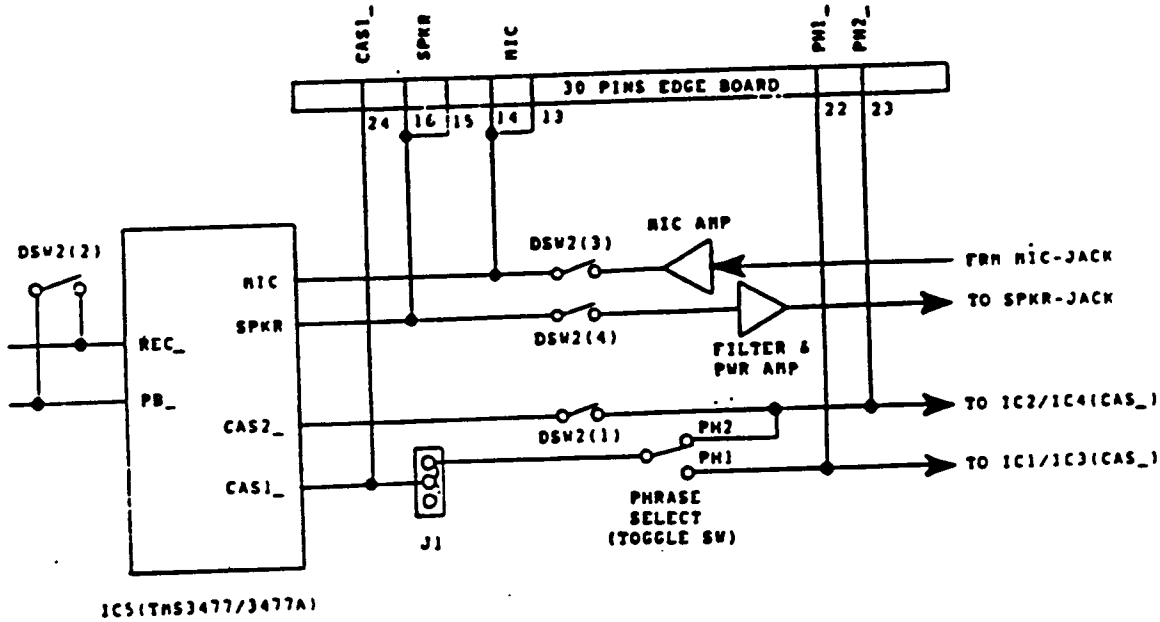


FIG. 4.6-1 LINE CHANGE SWITCHES

PARTS NAME	DESCRIPTION
DSW2	DSW2(1): CONNECT CAS2_ LINE. (BEFORE CONNECTING, SELECT PH1 BY USING TOGGLE SWITCH)
	DSW2(2): CONNECT REC_ TO PB_ PIN OF TMS3477/3477A.
	DSW2(3): CONNECT MIC LINE.
	DSW2(4): CONNECT SPKR LINE.
J1	J1(UP): CONNECT CAS1_
	J2(DOWN): DISCONNECT CAS1_

5. EDGE BOARD TERMINAL ASSIGNMENTS

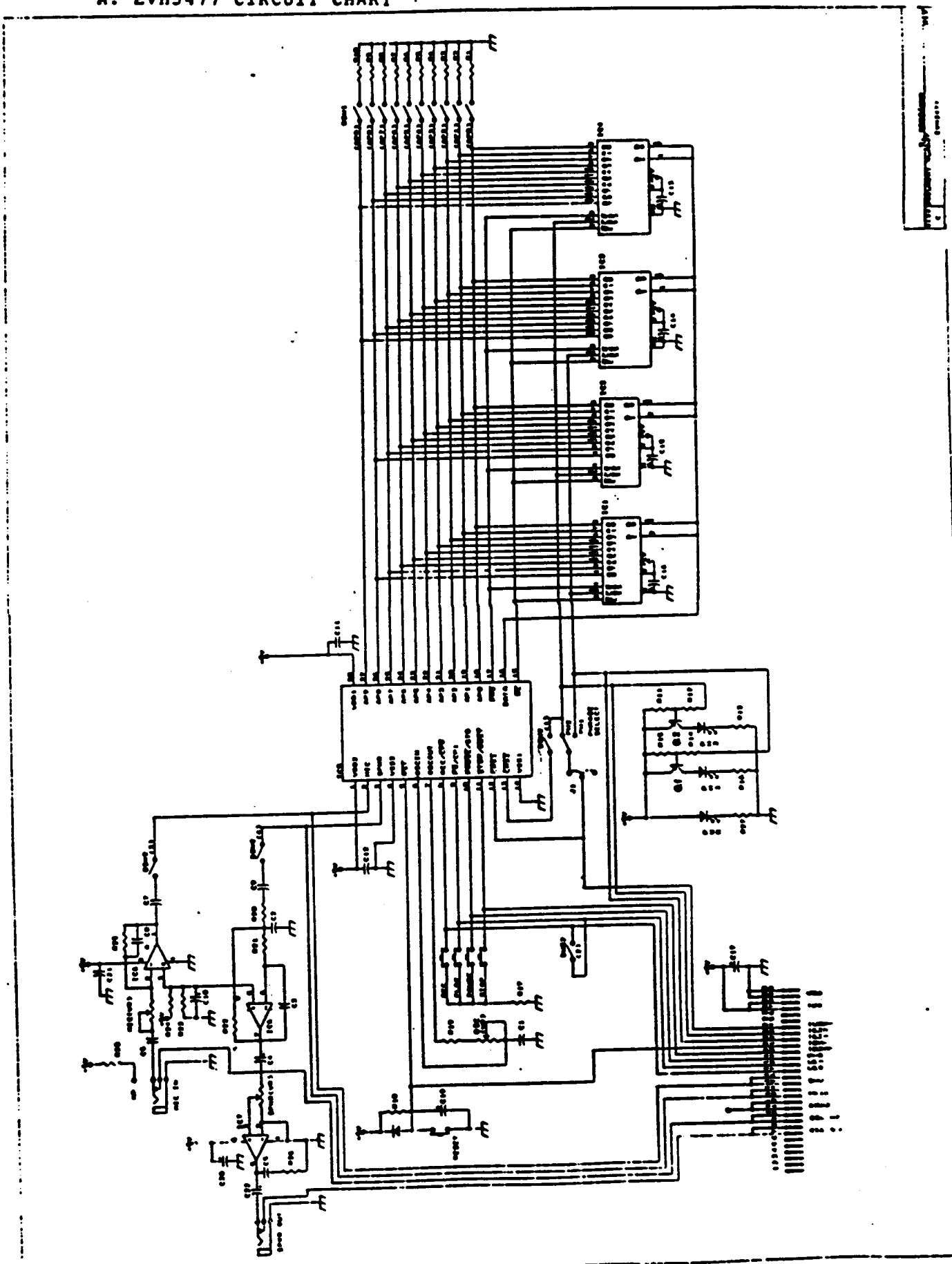
TERMINAL NO	TERMINAL NAME	DESCRIPTION
1	N.U.	NOT USED
2	N.U.	NOT USED
3	N.U.	NOT USED
4	N.U.	NOT USED
5	N.U.	NOT USED
6	N.U.	NOT USED
7	AMP OUT	POWER AMP OUTPUT PIN (LM386 OUTPUT)
8	AMP OUT	POWER AMP OUTPUT PIN (LM386 OUTPUT)
9	AMP IN	MICROPHONE INPUT PIN (LM358 INPUT)
10	AMP IN	MICROPHONE INPUT PIN (LM358 INPUT)
11	N.U.	NOT USED
12	N.U.	NOT USED
13	SPKR	TMS3477/3477A SPKR PIN OUTPUT
14	SPKR	TMS3477/3477A SPKR PIN OUTPUT
15	MIC	TMS3477/3477A MIC PIN INPUT
16	MIC	TMS3477/3477A MIC PIN INPUT
17	CP0	TMS3477/3477A CP0 PIN INPUT
18	CP1	TMS3477/3477A CP1 PIN INPUT
19	STB	TMS3477/3477A STB PIN INPUT
20	BUSY_	TMS3477/3477A BUSY_ PIN OUTPUT
21	RST_	TMS3477/3477A RST_ PIN INPUT
22	PH1_	IC1/IC3 CAS_ PIN INPUT
23	PH2_	IC2/IC4 CAS_ PIN INPUT
24	CAS1_	TMS3477/3477A CAS1_ PIN OUTPUT
25	RSVD	RESERVED
26	RSVD	RESERVED
27	+5V	+5V (+-10%) DC POWER SUPPLY PIN
28	+5V	+5V (+-10%) DC POWER SUPPLY PIN
29	GND	GROUND PIN
30	GND	GROUND PIN

(NOTE) USE 30 PINS EDGE BOARD CONNECTOR WITH 3.96 mm PIN PITCH.

APPENDIX

A. EVM3477 CIRCUIT CHART
B. EVM3477 PARTS LIST

A. EVM3477 CIRCUIT CHART



B. EVM3477 PARTS LIST

PARTS NAME	DEVICE/VALUE
IC1	TMS4164/TMS4256
IC2	TMS4164/TMS4256
IC3	TMS4C1024
IC4	TMS4C1024
IC5	TMS3477/TMS3477A
IC6	LM358
IC7	LM386
R1	10K OHM
R2	10K OHM
R3	10K OHM
R4	10K OHM
R5	10K OHM
R6	10K OHM
R7	10K OHM
R8	10K OHM
R9	10K OHM
R10	10K OHM
R11	10K OHM
R12	10K OHM
R13	100 OHM
R14	10K OHM
R15	10K OHM
R16	100 OHM
R17	100 OHM
R18	47K OHM
R19	10K OHM
R20	270K OHM
Q1	2SA1015
Q2	2SA1015
DSW1	8CH DIP SW
DSW2	4CH DIP SW

PARTS NAME	DEVICE/VALUE
R21	22K OHM
R22	27K OHM
R23	36K OHM
R24	43K OHM
R25	620K OHM
R26	10 OHM
R27	1K OHM
R28	10K OHM
OSC(VR)	200K OHM
MIC(VR)	10K OHM
SPKR(VR)	10K OHM
C1	47 PF
C2	4700 PF
C3	2000 PF
C4	10 UF
C5	0.05 UF
C6	0.1 UF
C7	0.1 UF
C8	100 PF
C9	0.1 UF
C10	2.2 UF
C11	0.1 UF
C12	0.1 UF
C13	0.1 UF
C14	0.1 UF
C15	0.1 UF
C16	0.1 UF
C17	33 UF
C19	1 UF
C20	22 UF
C21	0.1 UF
C22	100 UF

図6－1にEVM3477回路図を、表6－1に部品表を示します。

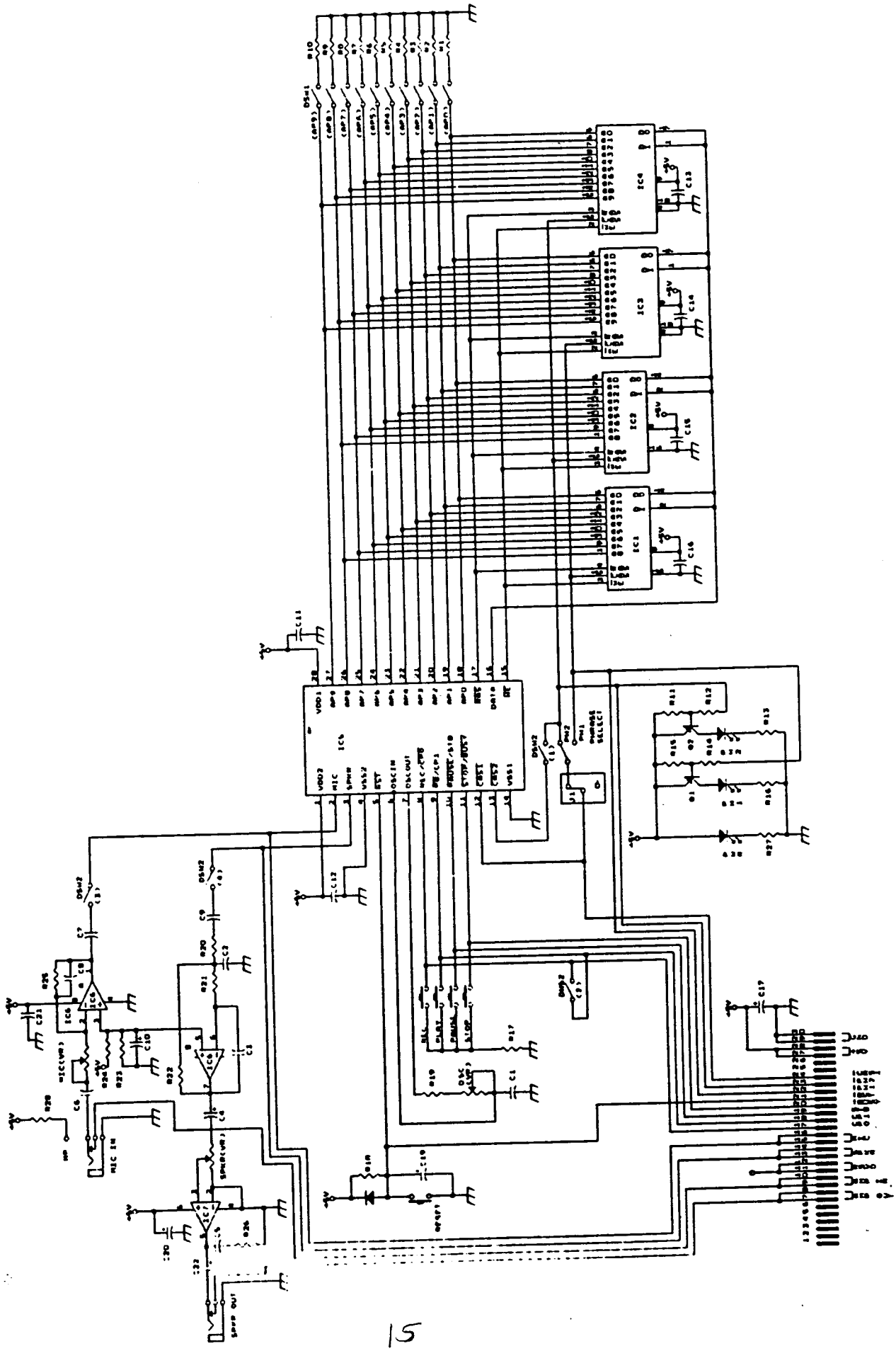
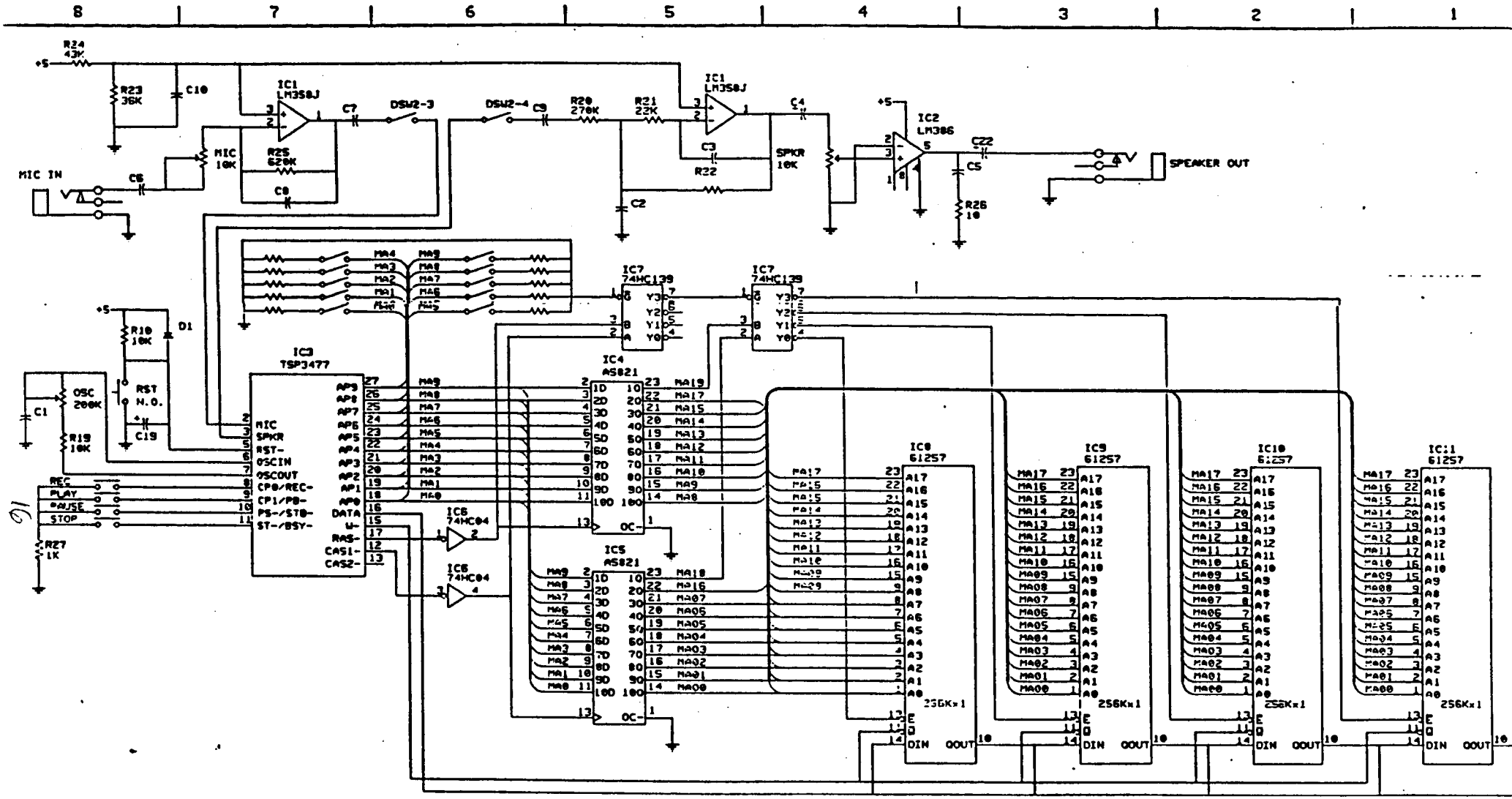


図6－1 EVM3477回路図



TEXAS INSTRUMENTS, INC	
LINEAR APPLICATIONS GROUP	
TMS3477 USING STATIC RAM	
D	REV
DATE: 9 MAY 1989	SHEET 1 OF