

MULTISTANDARD COLOR TV DECODER

- FULLY AUTOMATIC MULTISTANDARD SWITCHING : THE CIRCUIT INCLUDES A SCANNING CONTROL SYSTEM USED FOR THE AUTOMATIC STANDARD RECOGNITION
- NO CRYSTALS REQUIRED : ALL THE FREQUENCIES ARE SYNTHESIZED FROM THE EXTERNAL REFERENCE FREQUENCY OF 62.5 kHz, AND FROM SPECIFIED DATA STORED IN AN INTERNAL ROM
- AUTOMATIC BELL FILTER ADJUSTMENT
- ONLY ONE DELAY LINE COMPENSATION ADJUSTMENT
- AUTOMATIC INTERNAL PAL AND NTSC OSCILLATOR ADJUSTMENT
- AUTOMATIC ADJUSTMENT FOR FOB AND FOR IN SECAM
- POSITIVE R-Y AND B-Y OUTPUTS

cluded on the chip are, four numerical frequency locked loops that allow the elimination of PAL and NTSC crystals. The circuit uses an external reference frequency of 62.5 kHz generally provided by the frequency synthesizer tuner of the TV set.

DESCRIPTION

The TEA5640C is a multistandard TV decoder for PAL-SECAM NTSC1 (3.58 MHz) and NTSC2 (4.43 MHz). The circuit automatically selects the standard corresponding to the input signal. It produces all the reference frequencies required for decoding, which is achieved by a digital frequency synthesizer. In-

**PIN CONNECTIONS**

AGC filter	1	28	Not delayed signal output
Delayed signal input	2	27	Not delayed signal output
Delayed signal input	3	26	3.58 MHz tuning switch
DL gain compensation	4	25	Chrominance input
DL phase compensation	5	24	Band filter
U identification	6	23	DC decoupling
Super sandcastle input	7	22	Ground
Ground	8	21	PAL VCO filter
Regulated voltage	9	20	Current supply
Regulated control output	10	19	Not to be connected
V identification	11	18	Regulated voltage
B-Y de-emphasis	12	17	R-Y de-emphasis
B-Y output voltage	13	16	R-Y output voltage
D/A current reference	14	15	62.5 kHz reference frequency input

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FEATURES

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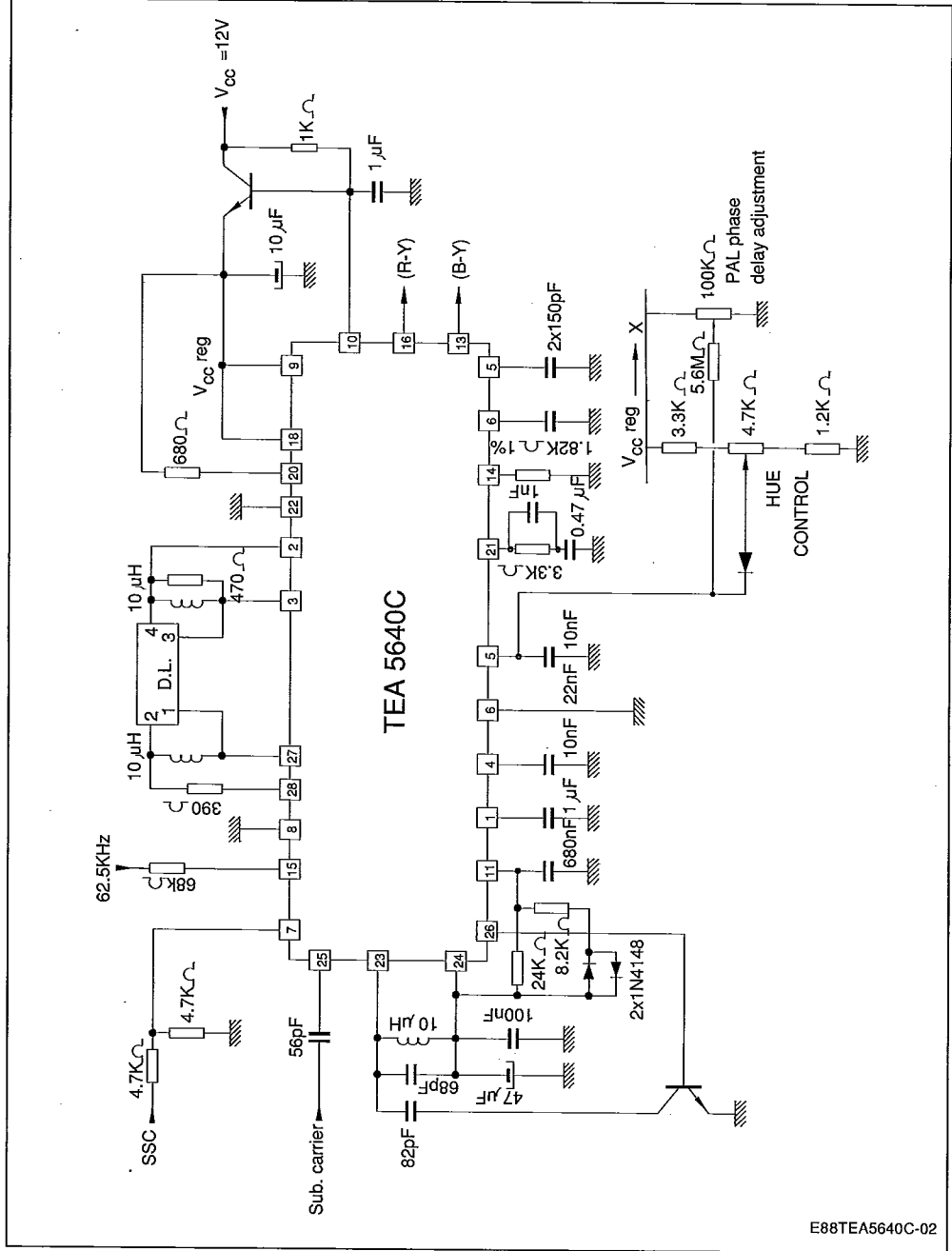
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- FULL AUTOMATIC MULTISTANDARD SWITCHING :
- THE CIRCUIT INCLUDES A SCANNING CONTROL SYSTEM THAT PROVIDES ALL THE SWITCHINGS REQUIRED FOR THE AUTOMATIC STANDARD RECOGNITION. THIS SYSTEM IS SYNCHRONIZED BY THE FRAME PULSE.
- NO CRYSTAL REQUIREMENT :
THE PAL AND NTSC FREQUENCIES ARE SYNTHESIZED ORIGINALLY BY THE EXTERNAL REFERENCE FREQUENCY OF 62.5 kHz AND DATA STORED IN THE ROM.
- AUTOMATIC ADJUSTMENT OF THE BELL FILTER : BY SWITCHING AN INTERNAL CAPACITOR NETWORK INCLUDED IN A DIGITAL LOOP.
- AUTOMATIC GAIN ADJUSTMENT OF THE DELAY LINE COMPENSATIONS :
THIS ADJUSTMENT IS MADE ON THE BURST AND IS REFRESHED EVERY LINE RETRACE
- AUTOMATIC ADJUSTMENT FOR PAL AND NTSC OSCILLATOR :
THIS OSCILLATOR HAS A DIGITAL AND AN ANALOGIC LOOP. THE PAL AND NTSC FREQUENCIES ARE MEMORIZED IN A ROM CONNECTED TO THE DIGITAL LOOP. THE DIGITAL LOOP GIVES THE RIGHT FREQUENCY AND THE ANALOGIC ONE HOLDS THE PHASE.
- AUTOMATIC ADJUSTMENT OF FoR AND FoB IN SECAM : THESE FREQUENCIES ARE PROGRAMMED IN THE ROM AND ARE SENT TO TWO OTHER DIGITAL LOOPS WHEN SECAM STANDARD IS SELECTED.
- AUTOMATIC DIFFERENCE PHASE ERROR COMPENSATION IN PAL MODE.
THE PAL VCO IS LOCKED ON THE BURST AND DURING THE LINE, ON THE BLUE PICTURE CONTENT (0° axis color vector).

TYPICAL APPLICATION

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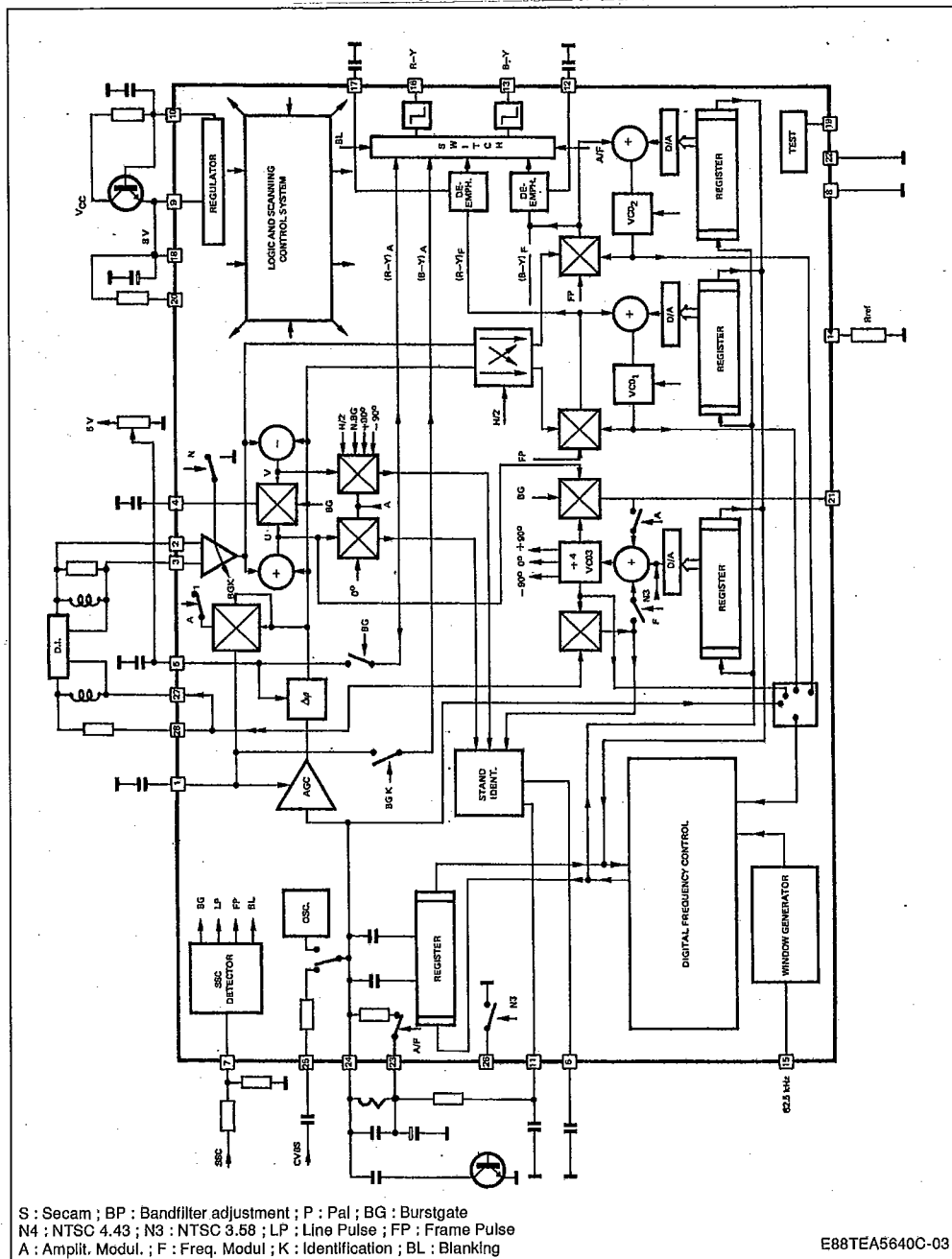


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BLOCK DIAGRAM

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STANDARD SWITCHING AND INHIBITION

NTSC inhibition
 NTSC 1 and 2 standards can be inhibited by connecting pin 6 to the ground.
 3.58 MHz filter switching :
 Pin 26 can be used to switch external filters when NTSC 1 is selected (For example luma filter).

SECAM recognition :

- When SECAM on, pin 12 and pin 17 DC voltages are lower than 5 V.
- For other standards, pin 12 and pin 17 DC voltages are regulated V_{CC} (typical 8 V).

ABSOLUTE MAXIMUM RATINGS **SGS-THOMSON**

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Symbol	Parameter	Value	Unit
V	Supply Voltage Pins 9 - 18	9.5	V
I	Current Pin 20	200	mA
T _{oper}	Operating Temperature Range	0 to 70	°C
T _{stg}	Storage Temperature	- 40 to 150	°C

THERMAL DATA

R _{th (j-a)}	Junction Ambient Thermal Resistance (with mini 10 % Cu on board)	55	°C/W
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ELECTRICAL CHARACTERISTICS

T_{amb} = 25 °C ; V_{CC} = 12 V ; With Normalized Color Bar Pattern Input Signal (75 %) Subcarrier Level : 320 mVPP
 Refer to Application Diagram Page (unless otherwise specified)

Symbol	Parameter	Min.	Typ.	Max.	Unit
Supplies					
Vreg	Regulated Voltage I10 = 4 mA Pins 9 - 18	7.5	8	8.5	V
ICC	Supply Current Pin 9 + Pin 18		90	120	mA
I9	Supply Current Pin 9			90	mA
I18	Supply Current Pin 18			27	mA
VI2L	DC Voltage at I20 = 15 mA Pin 20		0.8		V
I10	Input Current Pin 10	2		20	mA
	Transfer Characteristic (I10 = 4.0 mA)		250		mAV
Current Reference Pin 14					
V14	DC Voltage (I14 = 0.77 mA)	1.2	1.4	1.6	V
Internal Bias Pin 24					
V 24	DC Voltage	3.7	4.2	4.7	V
	Impedance (I _{out} = 2 mA)		90	110	Ω
Reference Clock Input Pin 15					
I15L	F = 62.5 kHz ± 6Hz Low Level Input Current (V15 = 2.1 V)	- 20	- 10	- 5	μA
I15H	High Level Input Current (V15 = 3.2 V)		5	10	μA
V15L	Low Level Input Voltage R Source = 68 kΩ			1	V
V15H	High Level Input Voltage R Source = 68 kΩ	4			V
	Voltage Threshold		2.8		V
Super Sandcastle Detector Pin 7					
VB	Blanking Threshold	0.5	0.75	0.9	V
VL	Line Threshold	1.6	1.8	1.9	V
V6	Burst Gate Threshold	3.2	3.5	3.8	V
	Minimum Frame Blanking Duration	1.15			mS
I7	Input Current (V7 = 1.75 V)	- 20		0	μA
	Max Input Voltage Pin 7			6.0	V

ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V25	Chrominance Input Pin 25				
	DC Voltage		5.5		V
	Maximum AC Input Voltage			0.64	V _{pp}
	Impedance	0.8	1		k Ω
	Automatic Gain Control				
	SECAM MODE				
	• 0 dB Reference Voltage for Measurement on Pins 27 - 28 (chroma input voltage V25 = 320 mVpp)	50	150	250	mVpp
	• AC Voltage Variation on Pins 27 - 28 (V25 = + 6 dB)	- 3		+ 3	dB
	• AC Voltage Variation on Pins 27 - 28 (V25 = - 24 dB)	- 5		+ 2	dB
	PAL/NTSC MODE WITH IDENTIFICATION				
	• 0 dB Reference Voltage for Measurement on Pins 13 - 16 (chroma input voltage V25 = 320 mVpp)				
	• AC Voltage Variation on Pins 13 - 16 (V25 = + 6 dB)	- 3		+ 3	dB
	• AC Voltage Variation on Pins 13 - 16 (V25 = - 24 dB)	- 5		+ 2	dB
	Demodulator Part				
	GENERALITIES				
V13	B-Y Output DC Voltage Pin 13	3	3.5	4	V
V16	R-Y Output DC Voltage Pin 16	3.2	3.7	4.2	V
	Maximum Sink Current Pin 13	0.4			mA
	Maximum Sink Current Pin 16	0.4			mA
	Differential Delay Time Between PAL/SECAM Delay Diff Tolerance			50	nS
	Delay Between Chroma Output and Luma Signal		450		nS
	B-Y Output AC Impedance ($\pm 50 \mu\text{A}$)		250		Ω
	R-Y Output AC Impedance ($\pm 50 \mu\text{A}$)		250		Ω
	Blanking Level Offset			± 2	%
	Secam Mode				
VBYS	B-Y AC Voltage	1.0	1.34	1.6	Vpp
VRYS	R-Y AC Voltage	0.8	1.05	1.3	Vpp
	B-Y/R-Y Ratio	1.1		1.45	
	Residual Subcarrier		30		mVpp
	Pal Mode				
VBYP	B-Y AC Voltage	1.0	1.34	1.6	Vpp
VRYP	R-Y AC Voltage	0.8	1.05	1.3	Vpp
	B-Y/R-Y Ratio	1.0		1.3	
	Residual Subcarrier		30		mVpp
	NTSC 4.43				
VBYN2	B-Y AC Voltage	1.0	1.34	1.6	Vpp
VBYN2	R-Y AC Voltage	0.8	1.05	1.3	Vpp
	B-Y/R-Y Ratio	1.0		1.3	
	Residual Subcarrier		50		mVpp

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ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Min.	Typ.	Max.	Unit
VBYN1 VRYN1	NTSC 3.58				
	B-Y AC Voltage	1.0		1.6	V _{pp}
	R-Y AC Voltage	0.8		1.3	V _{pp}
	B-Y/R-Y Ratio	1.0		1.3	
	Residual Subcarrier		50		mV _{pp}
	De-Emphasis				
	SECAM MODE				
	DC Voltage (blanking level)		3.5	4.0	V
	Impedance		11		k Ω
	PAL NTSC MODE				
	DC Voltage		VREG		V
	Impedance		70		k Ω
	Reference Oscillator PLL				
	Catching Range in PAL Mode	± 350			Hz
	Holding Range	± 500			Hz
	Band Filter				
	Impedance SECAM Mode	3.7	4.7	5.7	k Ω
	PAL NTSC Mode	0.85	1.1	1.35	k Ω
	Minimum Switchable Internal Capacitance (all standards)		20		pF
	Maximum Switchable Internal Capacitance (all standards)		50		pF
ΔF	Internal Oscillator Frequency Range for L = 10 μ H C = 68 pF	590			kHz
	Frequency Offset, After Automatic Adjustment			± 10	kHz
	3.58 MHz Switch Output				
	NTSC1 (3.58 MHz)				
V26N1	DC Voltage (I ₂₆ = 0 mA)	1			V
	Impedance		2		k Ω
V26N2	NTSC2 (4.43 MHz) or PAL or SECAM			0.3	V
	DC Voltage	0.35			V
	Max Sink Current				mA
	Undelayed Signal Outputs				
V27	DC Voltage		1.6		V
V28					
I27	Sink Current	1			mA
I28					
	Impedance		30		Ω
	Identification				
	Burst Attenuation Range / Nominal Level				
	SECAM Mode (line identification)	30			dB
	Pal Mode	30			dB
	NTSC Modes	20			dB

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ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Min.	Typ.	Max.	Unit
V5 I5	TINT Control (NTSC Modes) Range of Phase Change For V Pin 5 Changing from 2 to 4.5 V DC Voltage for 0 Degree TINT Change	0.08	± 40 3.5	0.2	Degrees V mA
	Pin 5 Pin 5 Input Current				
	NTSC Detection Detection Threshold NTSC Mode Inhibition Threshold Leakage Current	3 0.5	3.5	4 2.5 0.5	V V µA
	Delayed Signal Input DC Voltage in PAL Mode Input Impedance	0.88	2.4 1.1	1.32	V kΩ
	Delay Line Attenuation Compensation Range of Automatic Attenuation Compensation	- 3	- 9	- 15	dB
	Delay Line Phase Shift Compensation Range of Phase Shift Compensation with a 100KΩ Potentiometer (see application diagram p. 3)	± 30			degree
VTHH VTHL	Alternation Line Detection PAL or SECAM High Differential Threshold (VTHH = V11H - V24) Low Differential Threshold (VTHL = V11L - V24) Leakage Current Threshold (V11 = V24 + 1V)	200 - 350		350 - 200 0.5	mV mV µA

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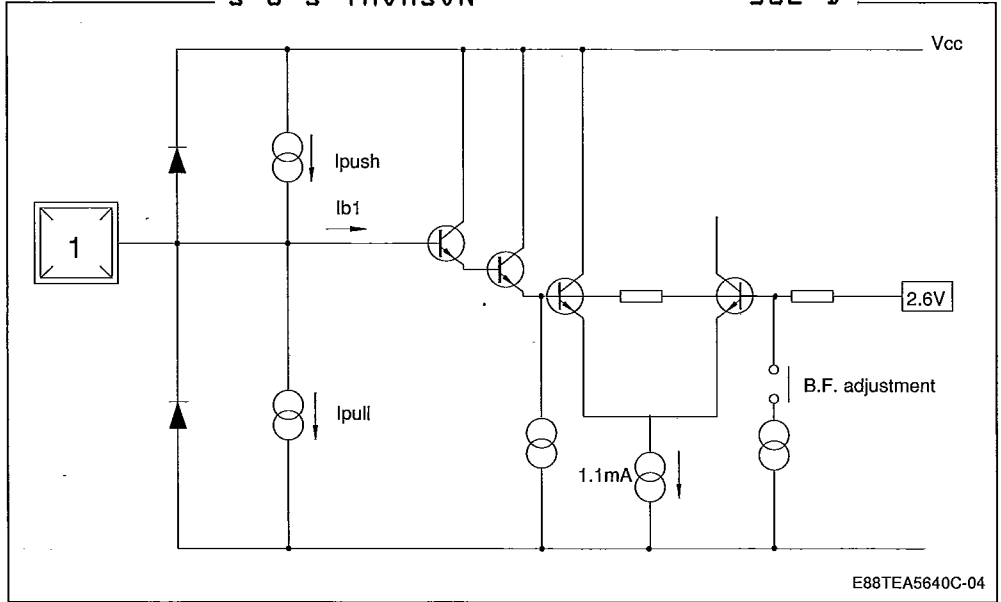
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INPUTS/OUTPUTS EQUIVALENT INTERNAL DIAGRAMS

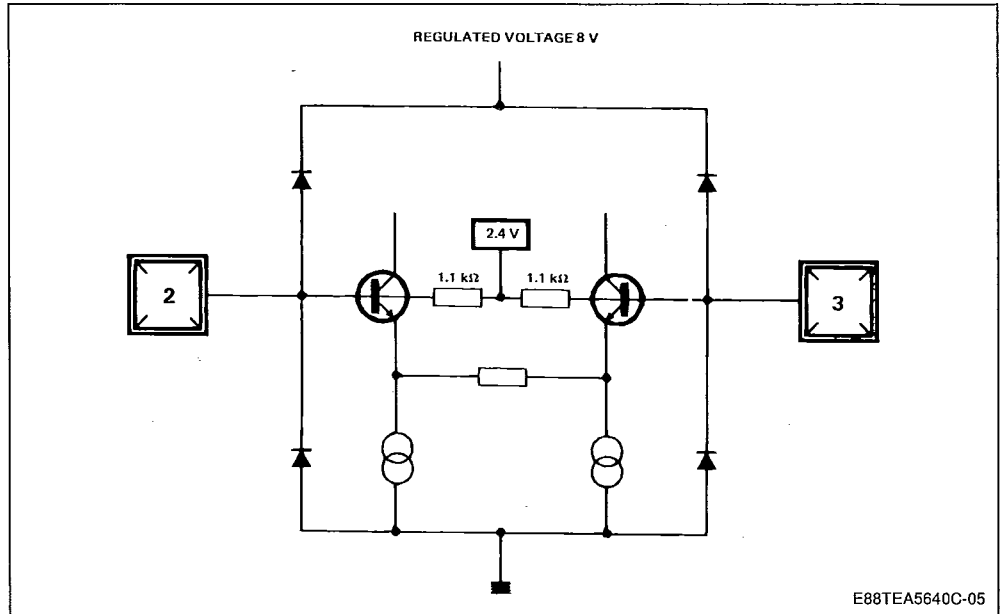
PIN 1

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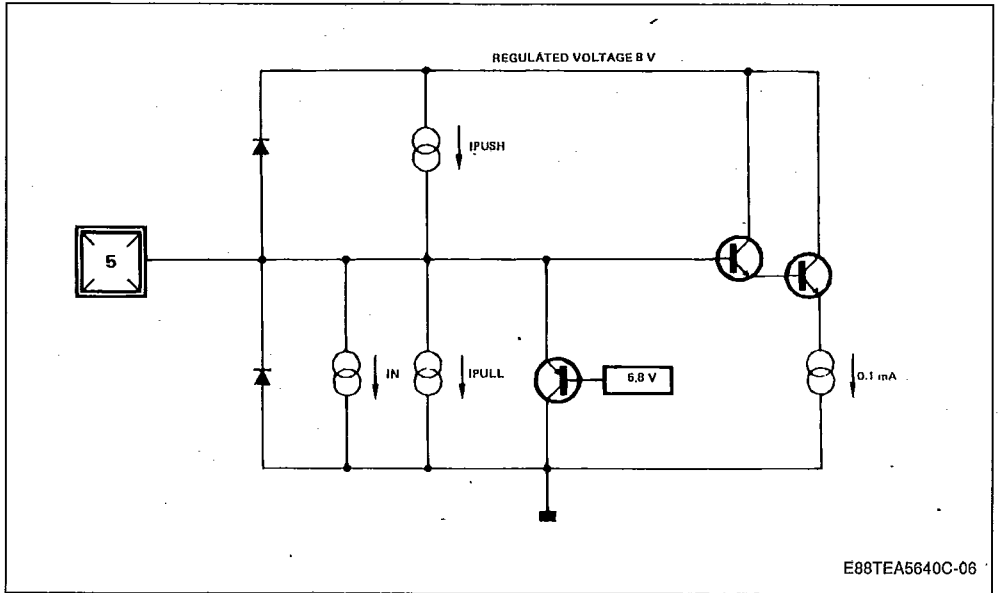
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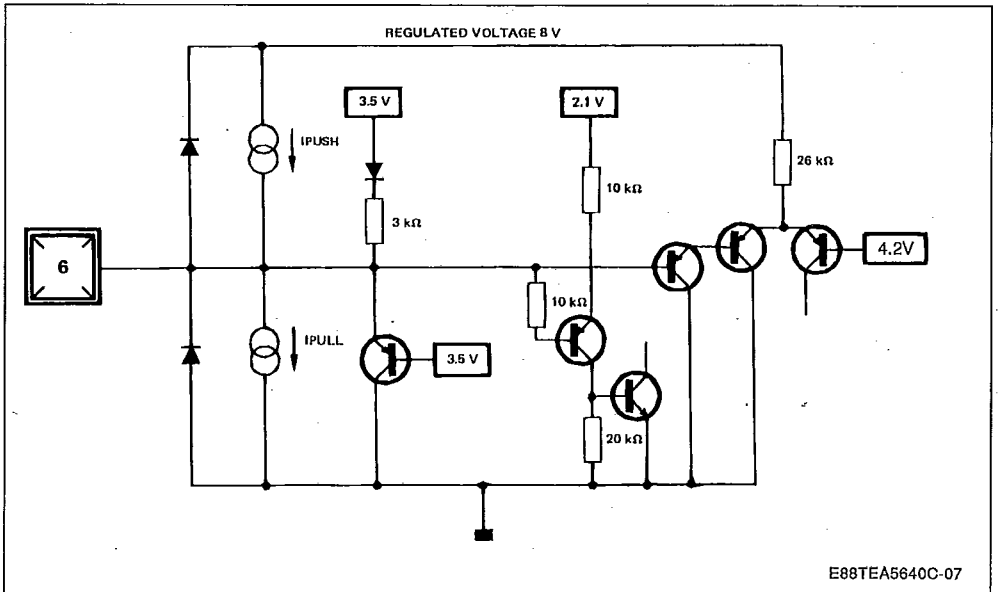
PINS 2-3



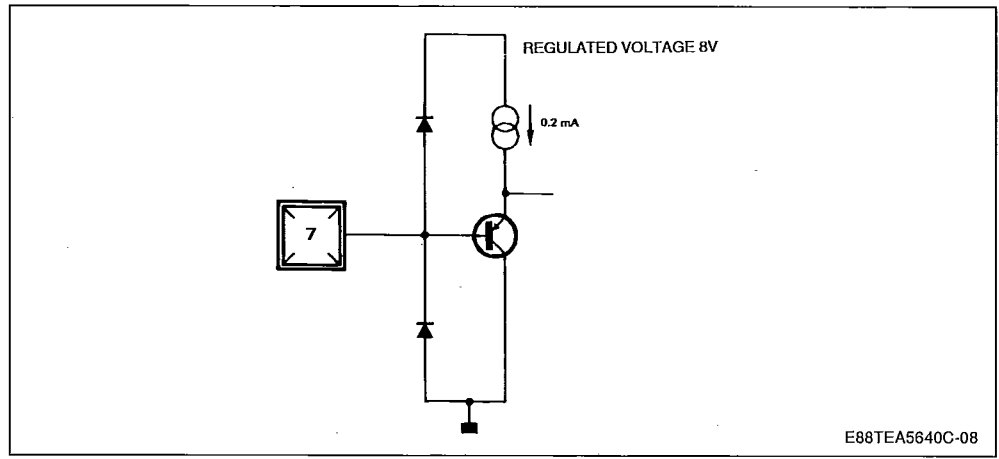
PIN 5



PIN 6

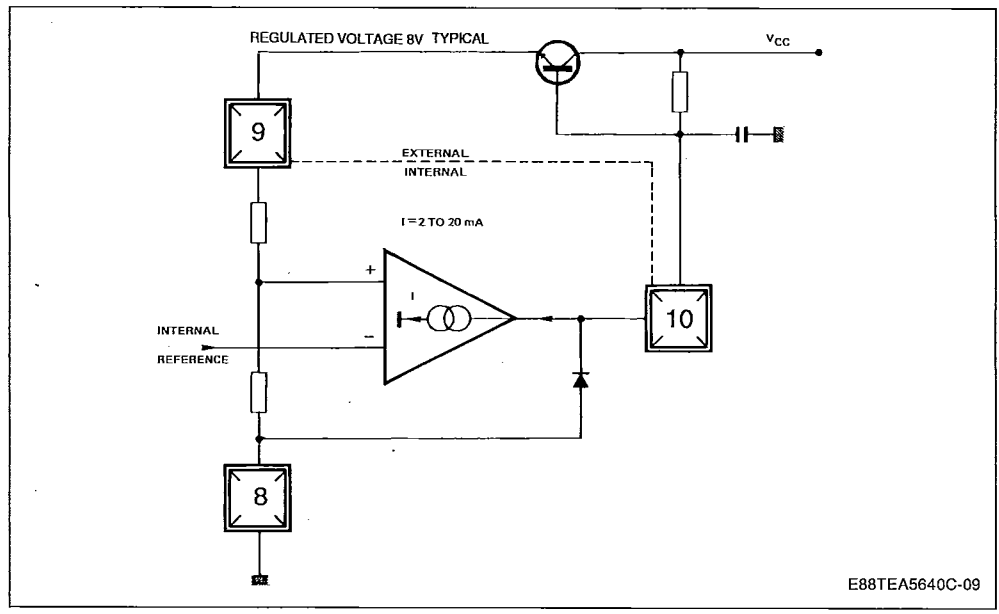


PIN 7



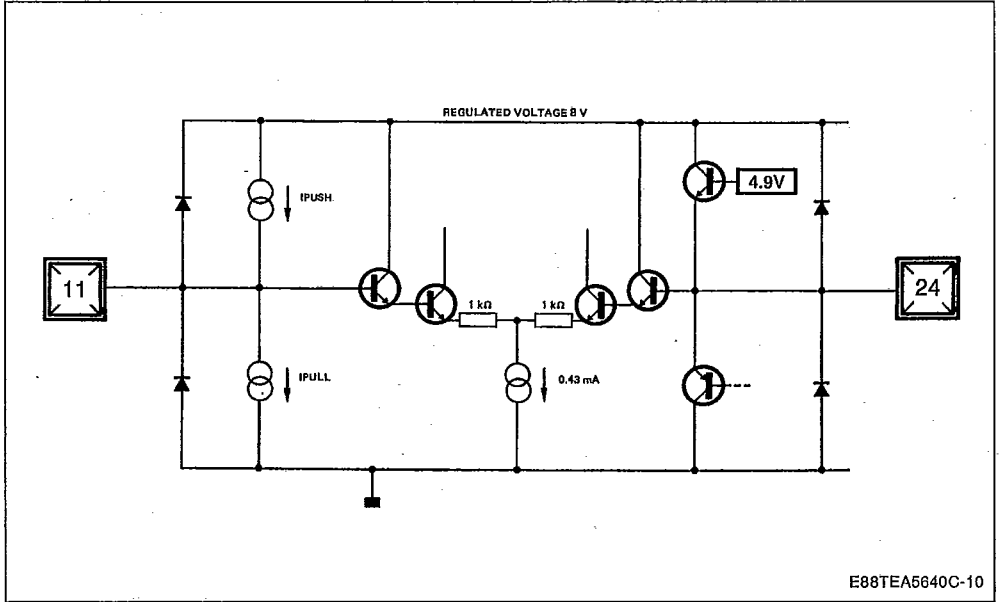
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PINS 8 - 9 - 10

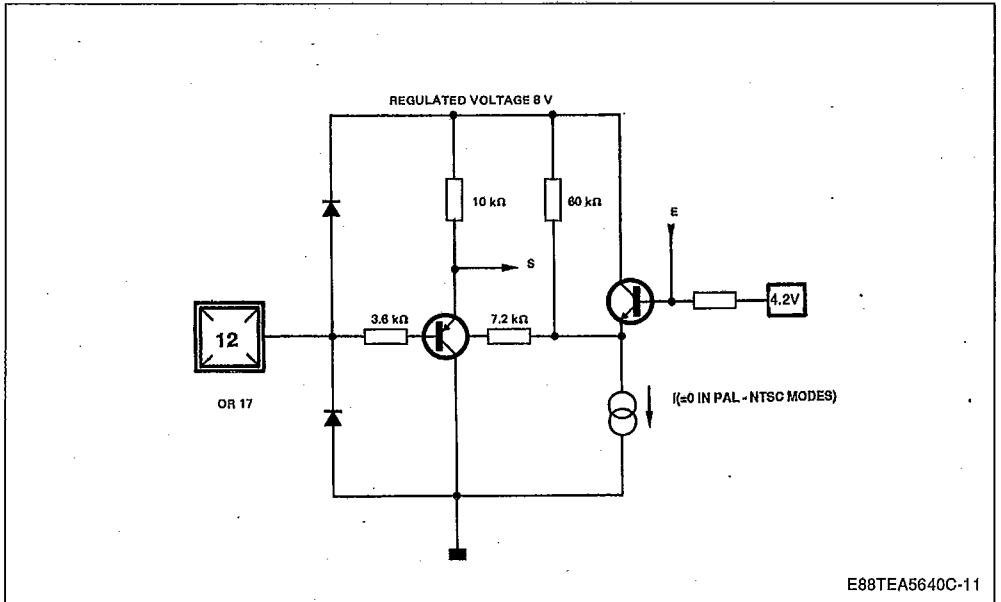


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PINS 11 - 24



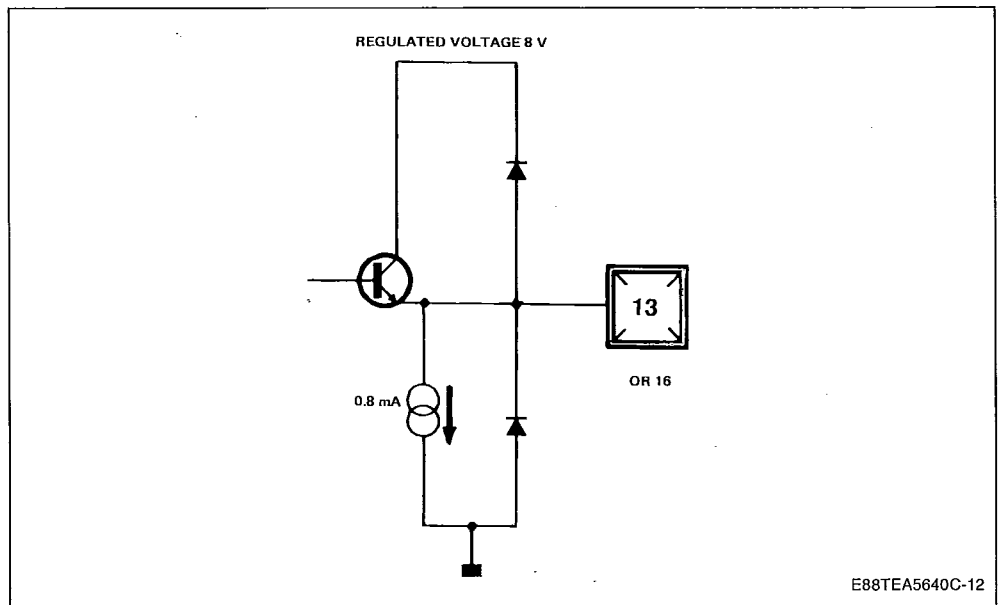
PINS 12 - 17



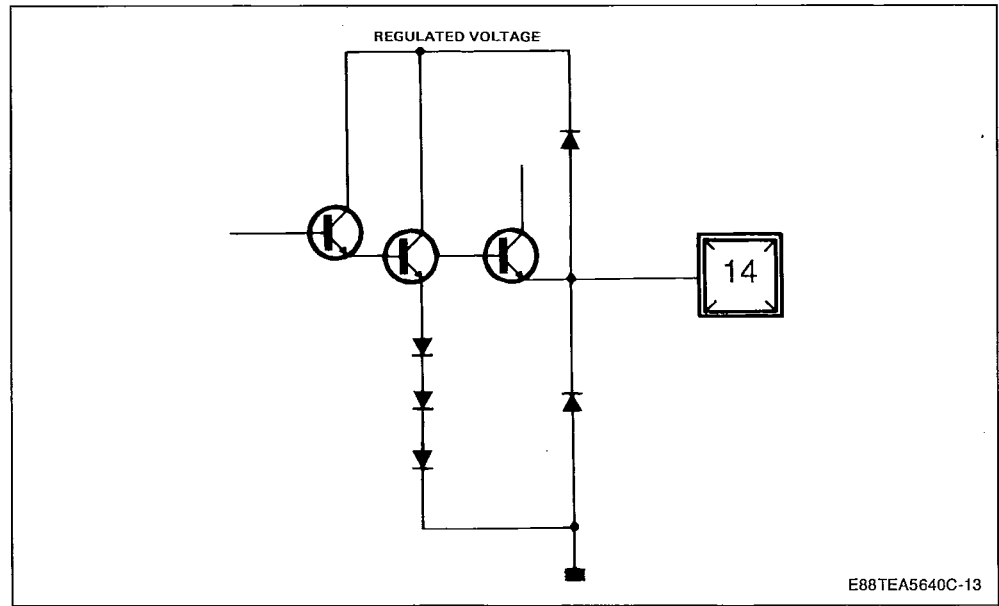
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PINS 13-16



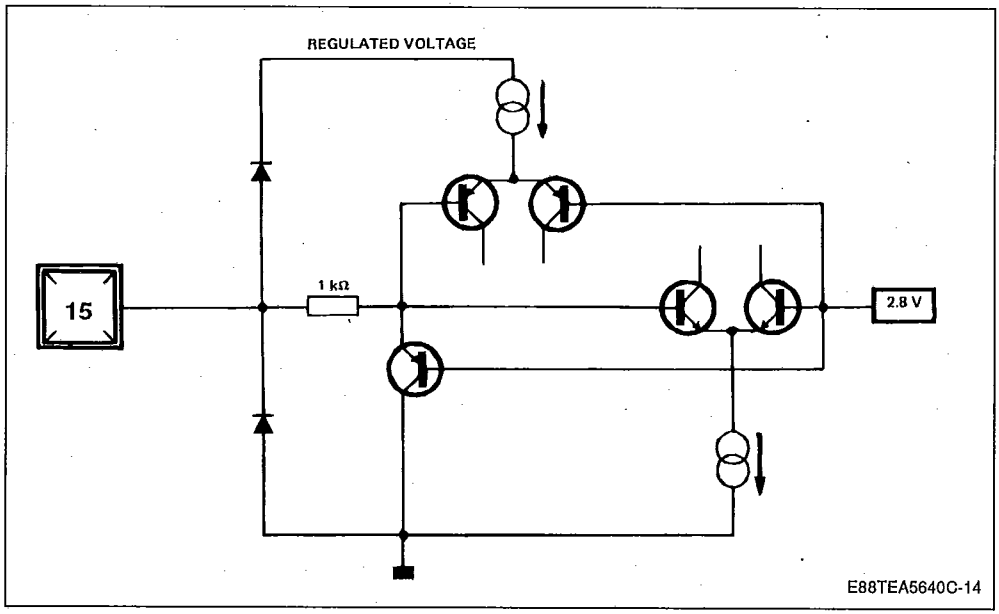
PIN 14



PIN 15

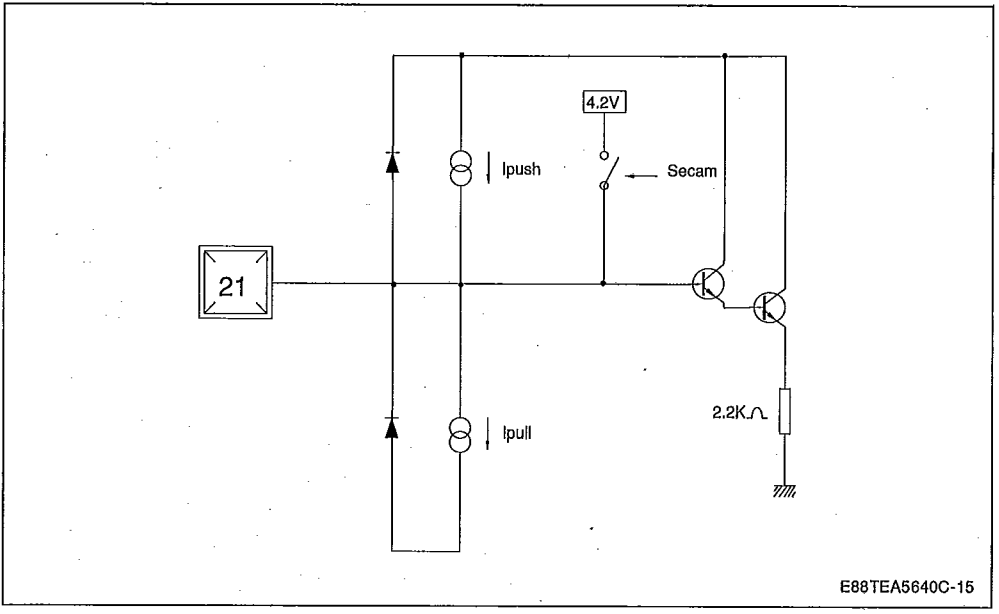
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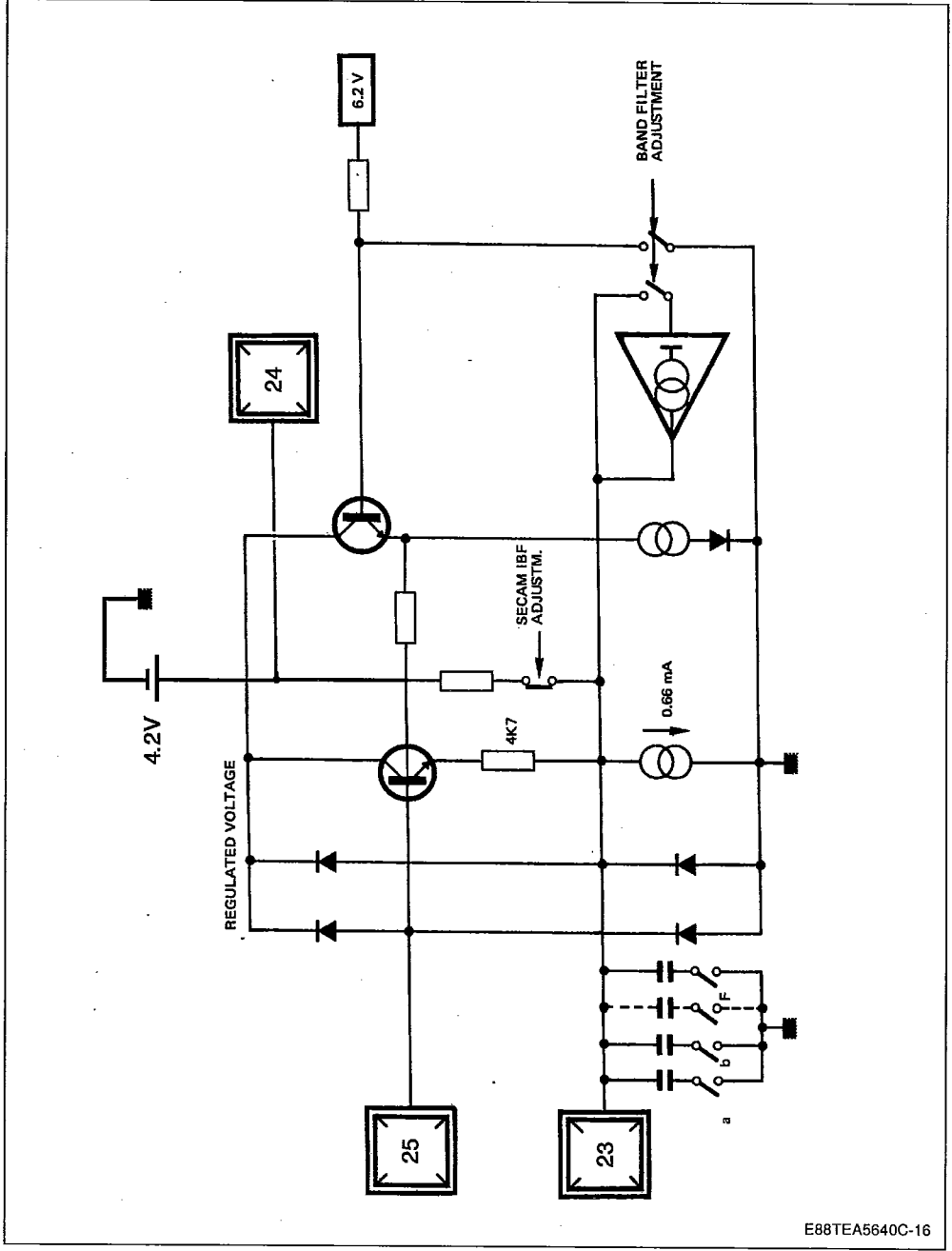


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PIN 21



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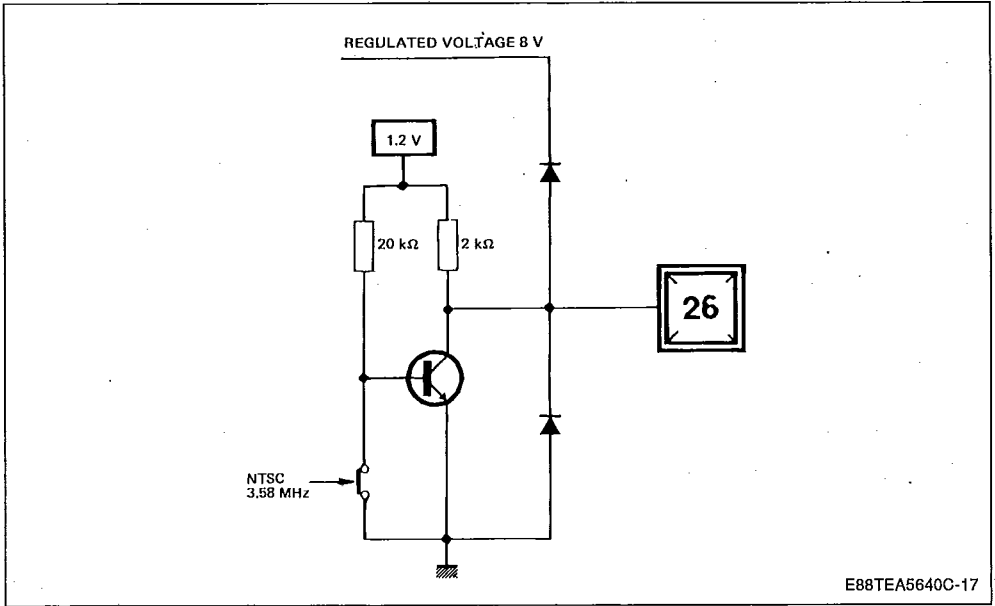


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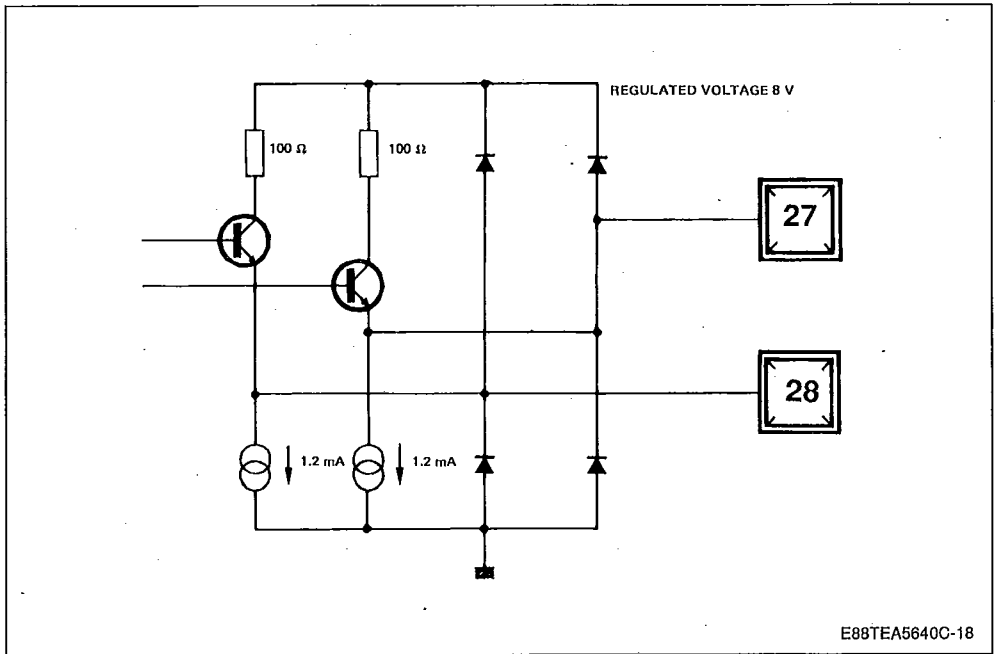
PIN 26

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PINS 27 - 28



PACKAGE MECHANICAL DATA

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28 PINS - PLASTIC DIP

