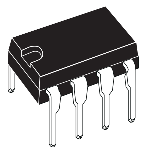
SGS-THOMSON
MICROELECTRONICS

TDA7274

LOW-VOLTAGE DC MOTOR SPEED CONTROLLER

- WIDE OPERATING VOLTAGE RANGE (1.8 to 6 V)
- BUILT-IN LOW-VOLTAGE REFERENCE (0.2 V)
- LINEARITY IN SPEED ADJUSTMENT
- HIGH STABILITY VS. TEMPERATURE
- LOW NUMBER OF EXTERNAL PARTS



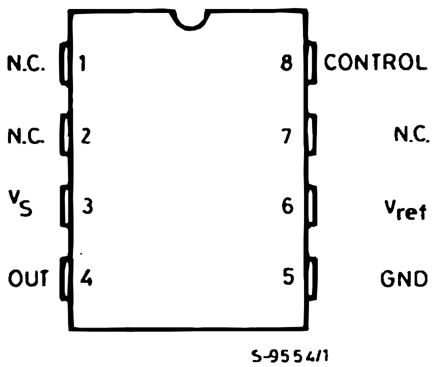
MINIDIP

ORDERING NUMBER : TDA7274

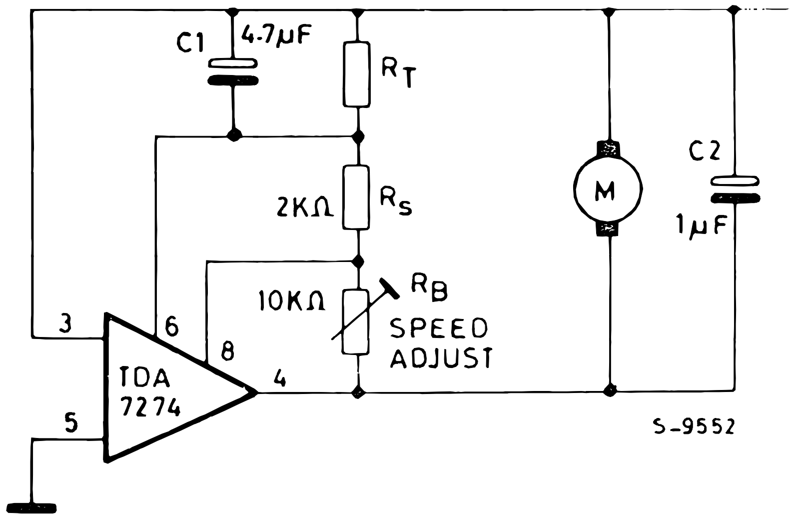
DESCRIPTION

The TDA7274 is a monolithic integrated circuit DC motor speed controller intended for use in microcassettes, radio cassette players and other consumer equipment. It is particulary suitable for low-voltage applications.

PIN CONNECTION (top view)

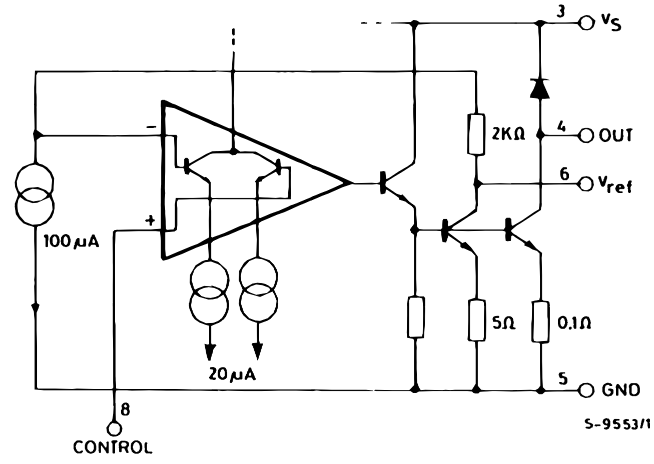


APPLICATION CIRCUIT



V_S = 3.0V
R_M = 4.9Ω
R_T = 220Ω
E_g = 1.65V
I_M = 100mA
$V_M = R_M I_M + E_g$ = 2.14V

SCHEMATIC DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_S	Supply Voltage	6	V
I_M	Motor Current	700	mA
P_{tot}	Power Dissipation at T_{amb} = 25°C	1.25	W

THERMAL DATA

Symbol	Parameter		Value	Unit
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	Max.	100	°C/W

ELECTRICAL CHARACTERISTICS (Refer to test circuit, V_S = 3V, T_{amb} = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_S	Supply Voltage Range		1.8		6	V
V_{ref}	Reference Voltage	I_M = 100mA	0.18	0.20	0.22	V
I_q	Quiescent Current			2.4	6.0	mA
I_d (Pin 6)	Quiescent Current			120		µA
K	Shunt Ratio	I_M = 100mA	45	50	55	–
V_{sat}	Residual Voltage	I_M = 100mA		0.13	0.3	V
$\frac{\Delta V_{ref}}{V_{ref}} / \Delta V_S$	Line Regulation	I_M = 100mA V_S = 1.8 to 6V		0.20		%/V
$\frac{\Delta K}{K} / \Delta V_S$	Voltage Characteristic of Shut Ratio	I_M = 100mA V_S = 1.8 to 6V		0.80		%/V
$\frac{\Delta V_{ref}}{V_{ref}} / \Delta I_M$	Load Regulation	I_M = 20 to 200mA		0.004		%/mA
$\frac{\Delta K}{K} / \Delta I_M$	Current Characteristic of Shut Ratio	I_M = 20 to 200mA		–0.03		%/mA
$\frac{\Delta V_{ref}}{V_{ref}} / \Delta T_{amb}$	Temperature Characteristic of Reference Voltage	I_M = 100mA Tamb = –20 to +60°C		0.04		%/°C
$\frac{\Delta K}{K} / \Delta T_{amb}$	Temperature Characteristic of Shut Ratio	I_M = 100mA Tamb = 20 to +60°C		0.02		%/°C

Figure 1 : Test Circuit.

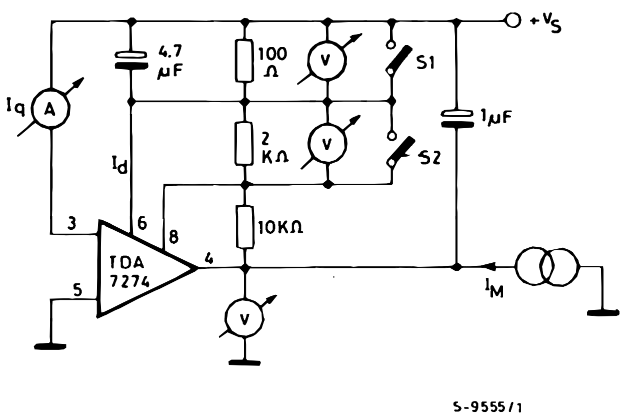


Figure 2 : Quiescent Current vs. Supply Voltage.

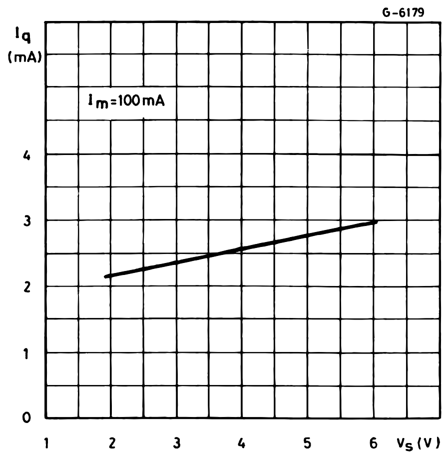


Figure 3 : Reference Voltage vs. Supply Voltage.

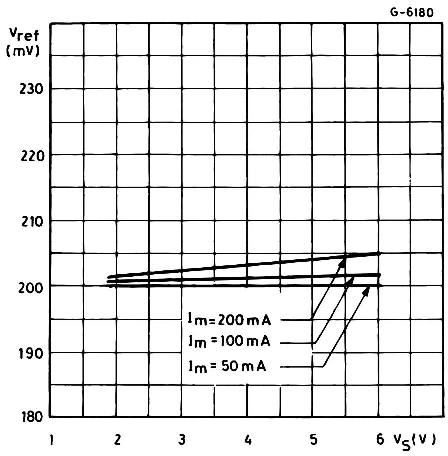


Figure 4 : Shunt Ratio vs. Supply Voltage.

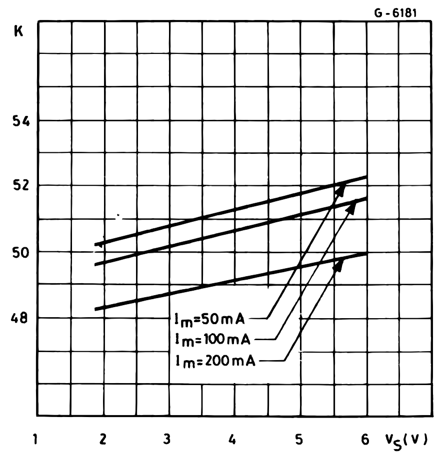


Figure 5 : Reference Voltage vs. Load Current.

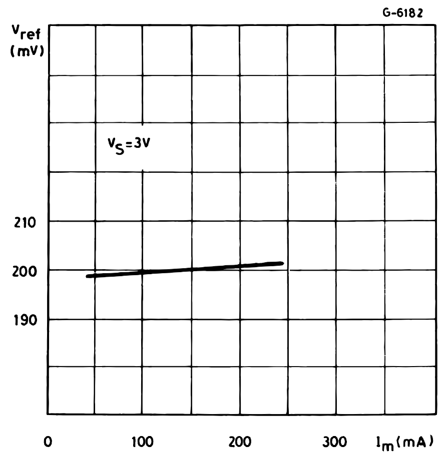


Figure 6 : Shunt Ratio vs. Load Current.

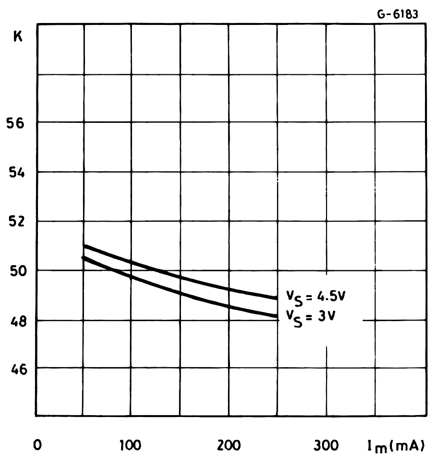


Figure 7 : Minimum Supply Voltage (typical) vs. Load Current.

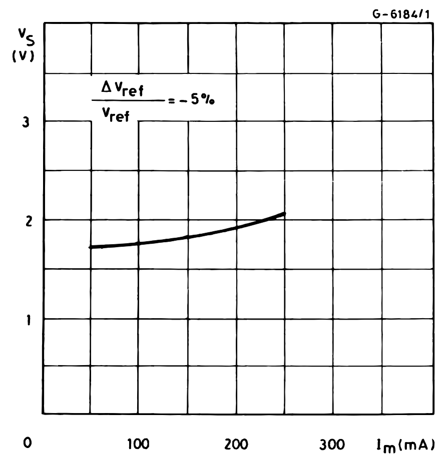


Figure 8 : Saturation Voltage vs. Load Current.

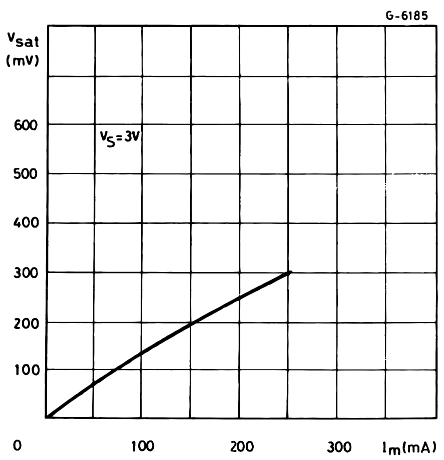


Figure 9 : Quiescent Current vs. Ambient Temperature.

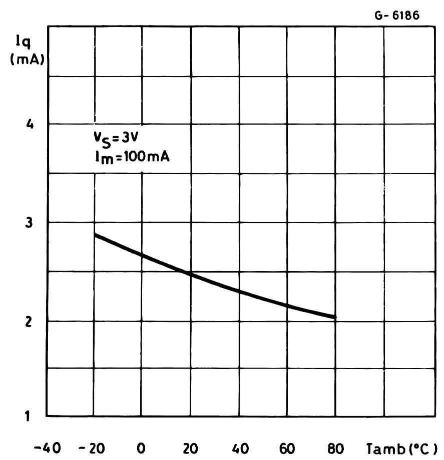


Figure 10 : Reference Voltage vs. Ambient Temperature.

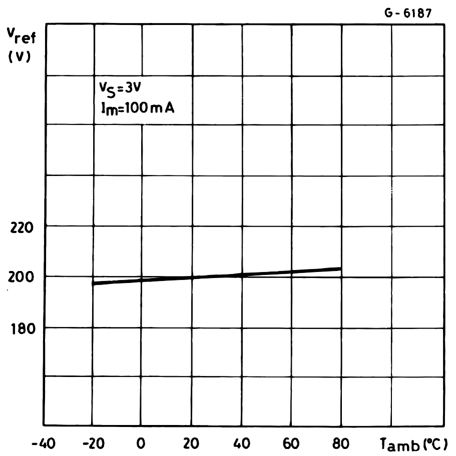


Figure 11 : Application Circuit.

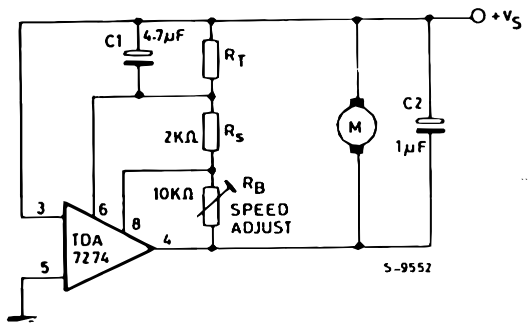


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Figure 12 : P. C. Board and Components layout of the Circuit of fig. 11 (1 : 1 scale).

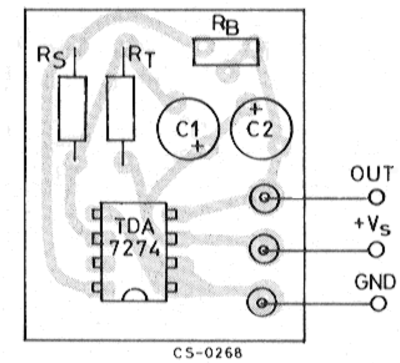


Figure 13 : Speed Variations vs. Supply Voltage.

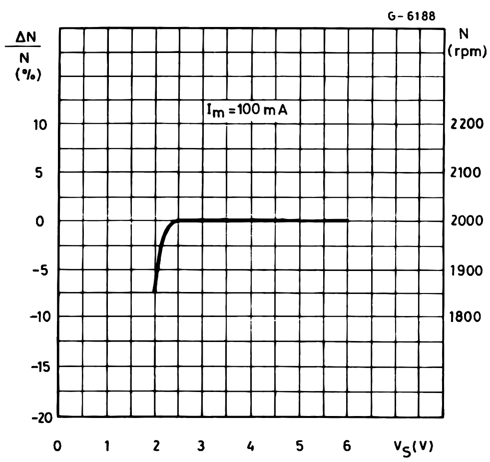


Figure 14 : Speed Variations vs. Motor Current.

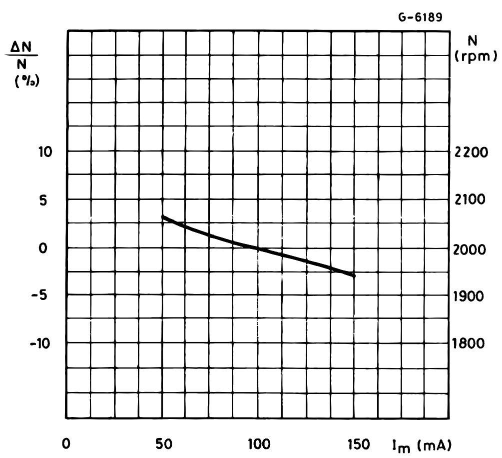
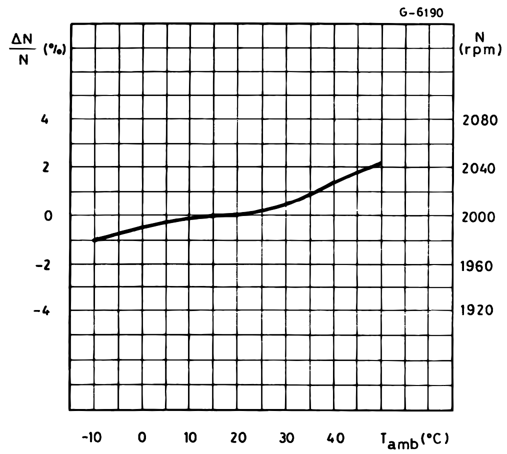
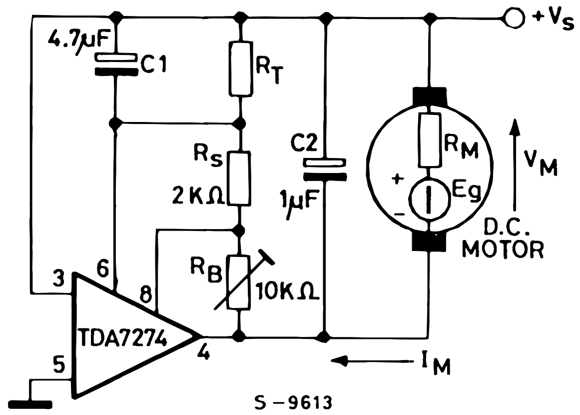


Figure 15 : Speed Variations vs. Ambient Temperature.



APPLICATION INFORMATION

Figure 16.



I_M = Motor current at rated speed
R_M = Motor resistance
E_g = Back electromotive force
$V_M = I_M . R_M + E_g$

$$E_g = R_T\, I_d + I_M\left(\frac{R_T}{K} - R_M\right) + V_{ref}$$

$$\left[1 + \frac{R_B}{R_S} + \frac{R_T}{R_S}\left(1 + \frac{1}{K}\right)\right]$$

R_S has to be adjusted so that the applied voltage V_M is suitable for a given motor, the speed is then linearly adjustable varing R_B.

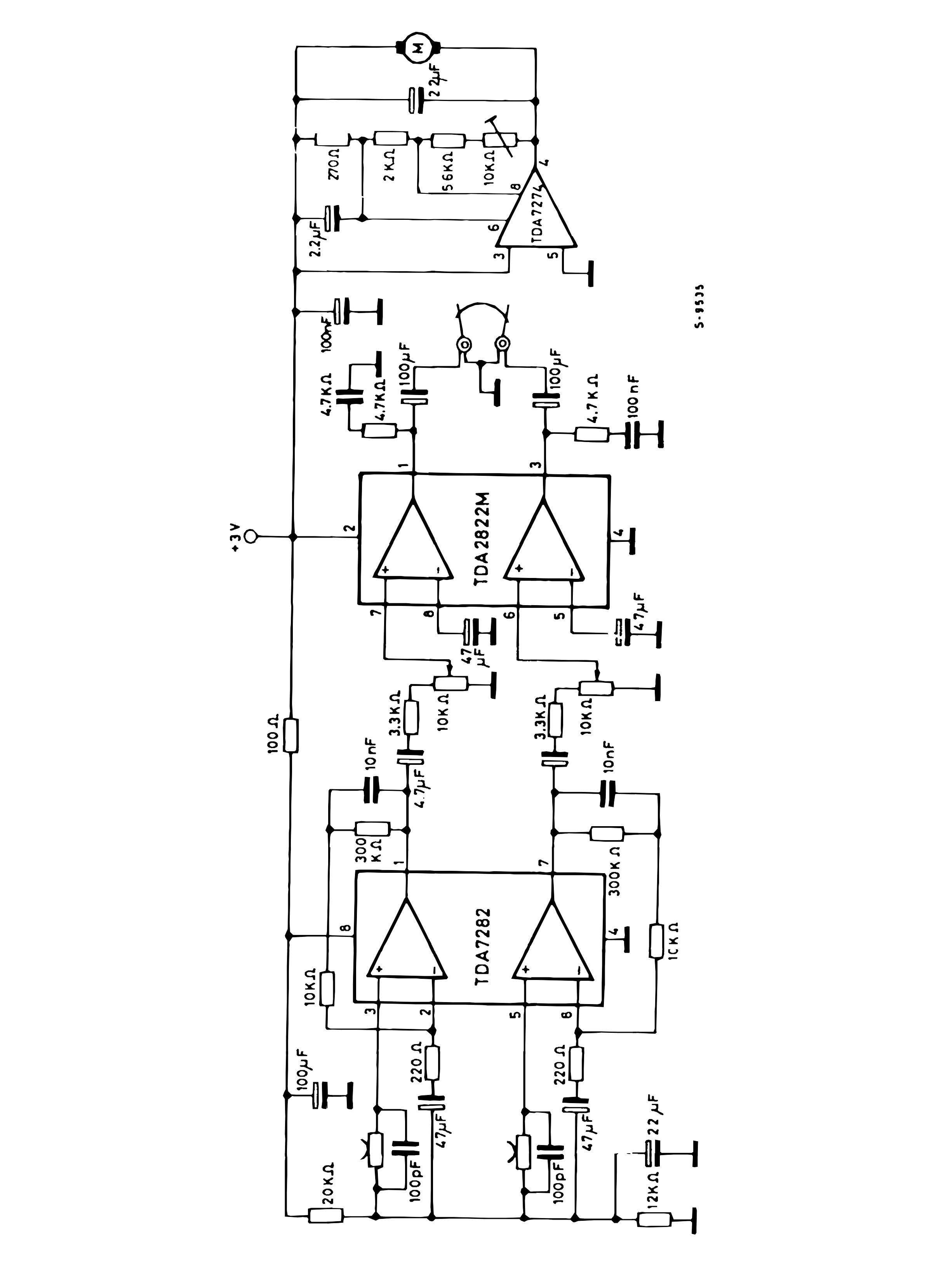
The value of R_T is calculated so that

$$R_{T\,(max.)} < K_{(min.)} \bullet R_{M\,(min.)}$$

If $R_{T\,(max.)} > K \bullet R_M$, instability may occur.

The values of C_1 (4.7 μF typ.) and C_2 (1 μF typ.) depend on the type of motor used. C_1 adjusts WOW and flutter of the system. C_2 suppresses motor spikes.

Figure 17 : 3V Stereo Cassette Miniplayer with Motor Speed Control.



MINIDIP PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A		3.32			0.131	
a1	0.51			0.020		
B	1.15		1.65	0.045		0.065
b	0.356		0.55	0.014		0.022
b1	0.204		0.304	0.008		0.012
D			10.92			0.430
E	7.95		9.75	0.313		0.384
e		2.54			0.100	
e3		7.62			0.300	
e4		7.62			0.300	
F			6.6			0.260
I			5.08			0.200
L	3.18		3.81	0.125		0.150