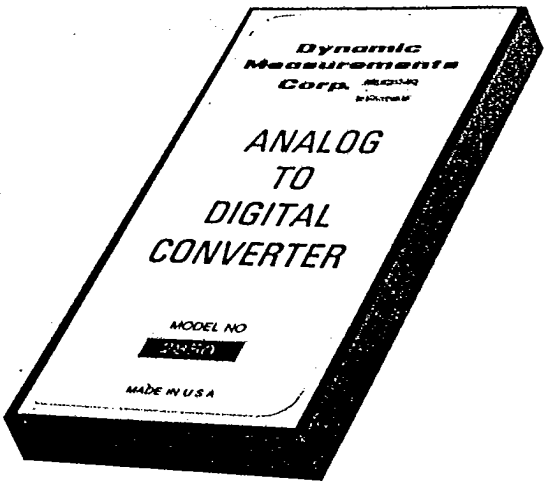
ANALOG TO DIGITAL CONVERTERS

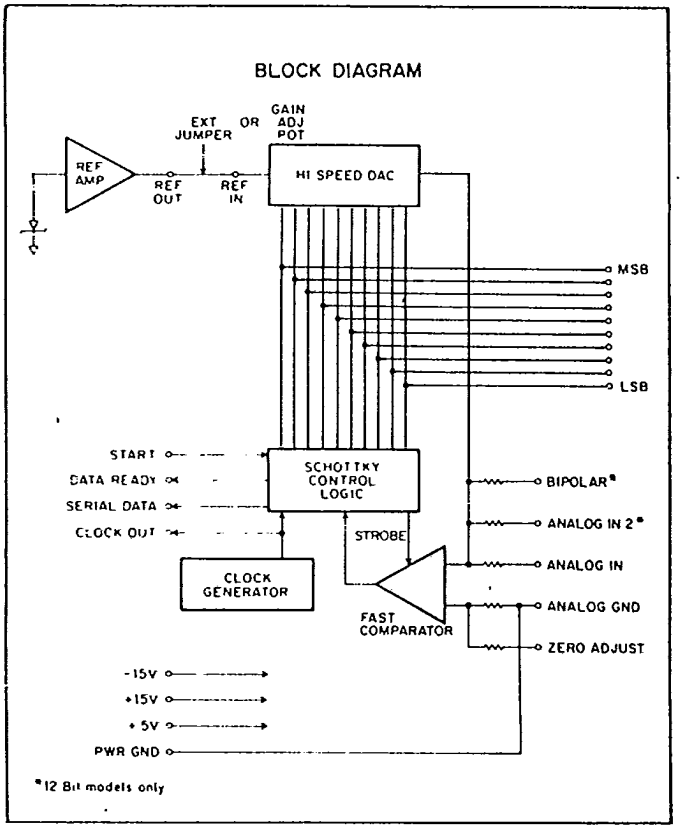
VERY HIGH SPEED MODELS

MAX. TOTAL CONVERSION TIMES DOWN TO:

650ns ..... 8 Bits
850ns ..... 10 Bits
1.7us ..... 12 Bits

- THROUGHPUT RATES OVER 1.5MHz
- ¼ LSB TYP. DIFFERENTIAL NONLINEARITY
- FIVE SIDES RFI/EMI SHIELDING STANDARD ON 10 AND 8 BIT MODELS, AVAILABLE ON 12 BIT MODELS.
- LESS THAN 1/5 LSB OF NOISE TYP. AT MAJOR TRANSITIONS
- PROPRIETARY DMC CIRCUITRY PROVIDES SUPERIOR (OFTEN PIN-COMPATIBLE) PERFORMANCE IN MANY EXISTING APPLICATION SLOTS
- MILITARY VERSIONS AVAILABLE...CONSULT FACTORY





12 BIT MODELS 2850-2851
10 BIT MODELS 2852-2856
8 BIT MODELS 2857-2861

This very high speed family uses new DMC proprietary circuitry to extend 12 bit data conversion rates beyond 0.58MHz ... and 8 bit data conversion rates beyond 1.5MHz ... to open up new applications and to upgrade many existing slots.

These converters are designed and characterized for use in high speed data acquisition systems, fast Fourier transform analysis, radar pulse analysis, scanning medical instrumentation and similar applications requiring fast conversion rates, good linearity and excellent stability ... or where many inputs must be digitized in a very short period of time.

These are successive approximation designs. Internal −10V references are available in the series, as well as capability for an external reference between −9V and −11V. Precision metal film technology is employed for ultra-stable operation.

Dynamic Measurements Corp. 6 Lowell Avenue, Winchester, Massachusetts 01890

(617) 729-7870 Cable: DYMECO TWX (710) 348-6596

In the U.S.A. call DMC toll-free (800) 225-1151 Printed in U.S.A.

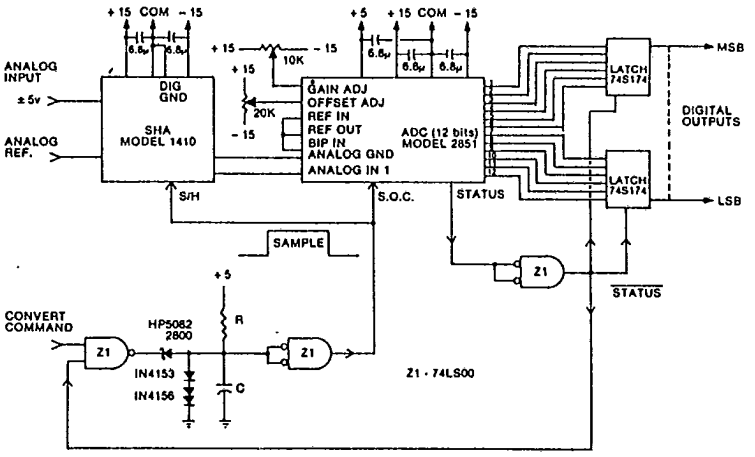
MODEL SELECTION, ANALOG INPUTS

Models	Resolution	Max. Total Conversion Time	Min. Throughput Rate	Bipolar Input Ranges	Unipolar Input Ranges	Input Resistance	Models
2850	12 bits	1.7us	0.588MHz	± 5V	0 to + 10V	1K Ω ± 0.5%	2850
2851	12 bits	1.7us	0.588MHz	± 5V ± 10V	0 to − 10V 0 to − 20V	1K Ω ± 0.5% 2K Ω ± 0.5%	2851
2852	10 bits	850ns	1.176MHz	± 5V	0 to + 10V	1K Ω ± 0.5%	2852
2853	10 bits	850ns	1.176MHz		0 to − 5V	0.5K Ω ± 3 Ω	2853
2854					0 to − 10V	1K Ω ± 5 Ω	2854
2855				± 5V		1K Ω ± 5 Ω	2855
2856				± 10V		2K Ω ± 10 Ω	2856
2857	8 bits	650ns	1.538MHz	± 5V	0 to + 10V	1K Ω ± 0.5%	2857
2858	8 bits	650ns	1.538MHz		0 to − 5V	0.5K Ω ± 3 Ω	2858
2859					0 to − 10V	1K Ω ± 5 Ω	2859
2860				± 5V		1K Ω ± 5 Ω	2860
2861				± 10V		2K Ω ± 10 Ω	2861

12-BIT · 500 KHZ DATA ACQUISITION SYSTEM

The schematic diagram to the right demonstrates the ease with which a 12-Bit Data Acquisition System operating at 500 KHz can be implemented using the DMC 1410 (SHA) and DMC 2851 (ADC).

The positive pulse generated by the one-shot determines the length of time over which data is to be sampled. For .01% accuracy, pulse duration should be a minimum of 350 ns. The data is then held while the ADC makes its conversion. This technique takes maximal advantage of the ADC's internal logic which insures that the (SHA) has settled before making its first decision. Even faster data rates can be achieved, if less bit resolution is acceptable. Please consult DMC for details.

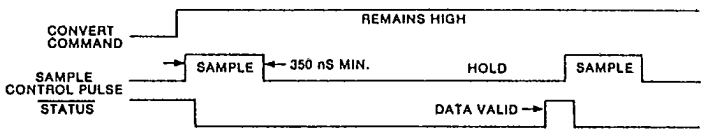


CONTINUOUS CONVERT OR RANDOM CONVERT MODE

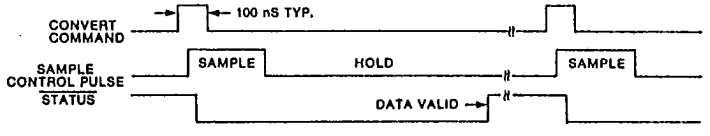
Two modes of operation governed by a single control line can be employed without additional circuitry. In the "Continuous Convert" mode, the Convert Command Input is held at a logic "1" state...enabling the Status Signal to retrigger the one-shot and regenerate a conversion. When employing the "Random Convert" mode, the $\overline{\text{Status}}$ Signal is used to enable a "Convert Command" input pulse...which determines when a conversion is to be performed. The timing diagram shows the relationship of the appropriate signals for the respective modes of operation.

TIMING DIAGRAMS

(CONTINUOUS CONVERT MODE)



(RANDOM CONVERT MODE)



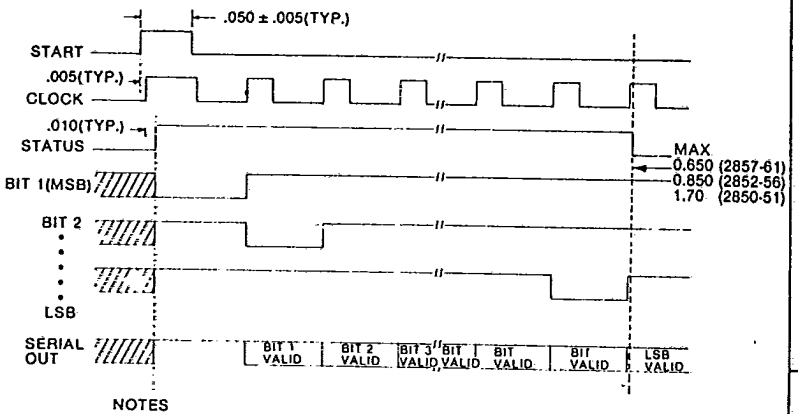
OPERATING SPECIFICATIONS

Typical and nominal at +25°C, unless otherwise noted
Minimum warmup time 15 minutes

Group	Item	12 Bit Models 2850-51	10 Bit Models 2852-56	8 Bit Models 2857-61
INPUTS	Digital Inputs			
	Initiate Conversion		TTL Positive Pulse	
	Pulse Width		100ns±50ns	
	Maximum Input Loading		1 TTL Load	
	Reference Input		−10V, 4KΩ	
	Input Power	+15V±0.5V @ 50mA max. −15V±0.5V @ 30mA max. +5V±0.25V @ 325mA max.	+15V±0.5V @ 40mA max. −15V±0.5V @ 30mA max. +5V±0.25V @ 325mA max.	+15V±0.5V @ 40mA max. −15V±0.5V @ 30mA max. +5V±0.25V @ 325mA max.
TRANSFER CHARACTERISTICS	Accuracy		±½ LSB max.	
	Nonlinearity		±½ LSB max.	
	Differential Nonlinearity			
	Zero Offset Error ①	±10mV	±10mV	±25mV
	Gain Error ①	±0.1% max.	±0.06% typ., ±0.1% max.	±0.2% typ., ±0.3% max.
	Stability vs. Temperature			
	Nonlinearity	±5ppm/°C max.	±10ppm/°C max.	±10ppm/°C max.
	Differential Nonlinearity	±3ppm/°C typ., ±5ppm/°C max.	±5ppm/°C typ., ±10ppm/°C max.	±5ppm/°C typ., ±10ppm/°C max.
	Zero Offset Error			
	Unipolar	±5ppm/°C max.	±15ppm/°C max.	±15ppm/°C max.
	Bipolar	±10ppm/°C max.	±15ppm/°C max.	±15ppm/°C max.
	Gain Error	±10ppm/°C max.	±10ppm/°C max.	±20ppm/°C max.
	Conversion Time	+2.8ns/°C max.	+2ns/°C max.	+2ns/°C max.
	Vref out		±3ppm/°C typ., ±10ppm/°C max.	
	Long-Term Stability	0.007%/month	0.01%/month	0.02%/month
	3σ Noise, P-P	0.01% FS	0.02% FS	0.02% FS
	PSRR (Ref to Input)		0.002%/%	
OUTPUTS	Reference Output (−5mA)	−10V±0.1%	−10V±0.1%	−10V±1.0%
	Digital Outputs			
	Logic Codes			
	Parallel Unipolar		BIN	
	Parallel Bipolar		OBIN, 2's C	
	Serial Unipolar		BIN	
	Serial Bipolar		OBIN	
	Format		NRZ	
	Output Drive, Min.		8 TTL Loads	
	Switching Levels			
	"0" State		≤0.5V	
	"1" State		≥2.4V	
	Status			
	"1" State		During Conversion	
	Output Drive, Min.	5 TTL Loads	5 TTL Loads	4 TTL Loads
	Clock Out			
	Logic		TTL Positive Pulse	
	Output Drive, Min.		8 TTL Loads	
	Pulse Width		40ns	
ENVIRONMENTAL	Temperature Ranges			
	Operating, Full Ratings		0°C to +70°C	
	Operating, 50% Derated		−25°C to +85°C	
	Storage		−55°C to +125°C	
	Relative Humidity		95% Non-condensing	
	Shielding		RFI and EMI, on five sides	
RATINGS	Absolute Maximum Ratings			
	Supply Voltage to Ground			
	±15V Input		±18V	
	+5V Input		+6V	
	Digital Input Voltage		+5V	
	Analog Input Voltage			
	R_{in} = 250Ω	±8V		
	R_{in} = 500Ω		±11V	
	R_{in} = 1KΩ		±16V	
	R_{in} = 2KΩ		±22V	

Notes: ①Adjustable to Zero

Timing Diagram



NOTES
1. VALUES ARE IN MICROSECONDS.
2. INDICATED BIT STATES ASSUME DIGITAL OUTPUTS ARE ALL "1"s.
3. ▨ INDICATES UNKNOWN STATES.

DIGITAL CODES

Analog Input		UNIPOLAR	BIPOLAR	
2850, 52, 57	2851 2853-56, 2858-61	Binary	Offset Binary	2's Complement
−FS	+FS		000 000	100 000
−FS+1 LSB	+FS-1 LSB		000 001	100 001
−¾ Scale	+¾ Scale		001 000	101 000
−½ Scale	+½ Scale		010 000	110 000
0−1 LSB	0+1 LSB		011 111	111 111
0	0	000 000	100 000	000 000
0+1 LSB	0−1 LSB	000 001	100 001	000 001
+½ Scale	−½ Scale	100 000	110 000	010 000
+¾ Scale	−¾ Scale	110 000	111 000	011 000
+FS−1 LSB	−FS+1 LSB	111 111	111 111	011 111

GAIN TRIMMING

All models are gain-trimmed by DMC to within ½ LSB of specified full scale input voltage. For optional gain trimming, apply −FS+1½ LSB of voltage to ANALOG INPUT*. With the gain trim potentiometer, set the digital output exactly on the threshold of changing from 111 . . . 110 to 111 . . . 111.

OFFSET TRIMMING

Apply −½ LSB (for unipolar mode) or +FS−½ LSB (for bipolar mode) of voltage to ANALOG INPUT*. With the offset trim potentiometer, set the digital output exactly on the threshold of changing from all 0's to 000 . . . 001.

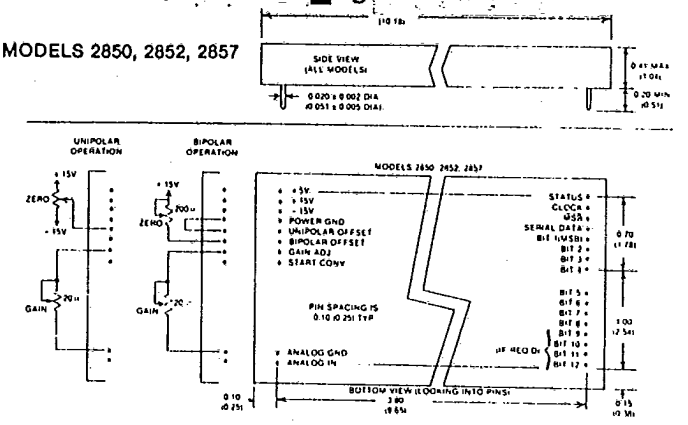
* Model 2851 has two ANALOG INPUTS. Trimming either one will automatically trim the other.

POWER AND GROUNDING CONSIDERATIONS IN HIGH SPEED SYSTEMS

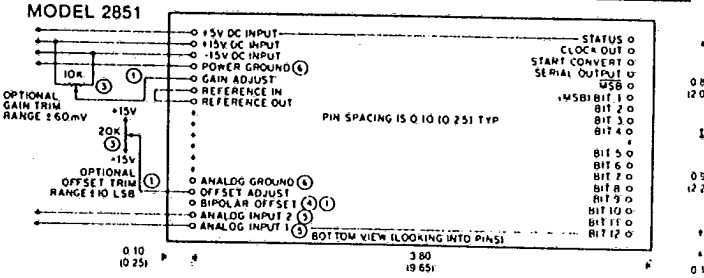
For maximum accuracy and speed, high speed systems require added care in power distribution. To minimize RF contamination, supply voltages should be bussed. For optimum performance, it is good practice to bypass each power supply input with a 1uF tantalum capacitor and a 0.01uF disc capacitor.

To guard against ground loop errors, the system power ground must be at very low impedance . . . since ANALOG GROUND is internally connected to POWER GROUND.

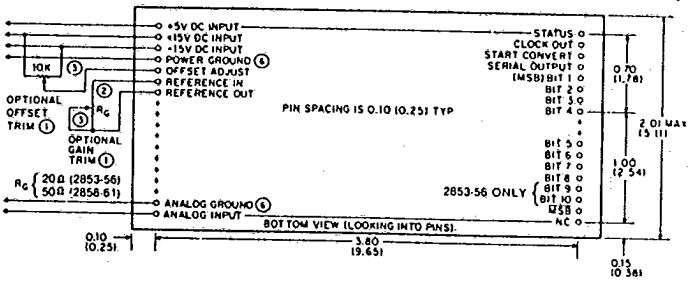
MODELS 2850, 2852, 2857



MODEL 2851



MODELS 2853-56, 2858-61



CONNECTION NOTES:

1 Pins are left unconnected when optional trim circuits are not used. Please see Note 2 .
2 On eight and ten bit models (2853-56, 2858-61) when optional gain trim is not used, please connect REFERENCE OUT to REFERENCE IN, unless an external reference is used.
3 Potentiometers should be Cermet (⩽ 100ppm/°C).
4 For bipolar operation of twelve bit model 2851, please connect BIPOLAR OFFSET to REFERENCE OUT.
5 To select input voltage ranges on Model 2851, please use ANALOG INPUT 1 for −10V/±5V ranges and ANALOG INPUT 2 for −20V/±10V ranges.
6 POWER GROUND and ANALOG GROUND are internally connected.

MECHANICAL NOTES:

7. Dimensions in parentheses are in Centimeters.
8. Dimensional tolerance between pins is ±0.01 (±0.025), non-cumulative. Dimensional tolerance from case edge to center of pins is ±0.02 (±0.51).
9. DMC Mating Socket is Model 6524 (2 req'd.)

In the U.S.A. call DMC toll-free (800) 225-1151

DMC
Dynamic Measurements Corp.
6 Lowell Avenue Winchester Mass 01890 (617) 729-7870 TWX (710) 348-6596

Printed in U.S.A. c