Colt Industries

Fairbanks Morse

Engine Accessories Operation

BELOIT, WISCONSIN 53511

INSTRUCTION
Scope Testing of SCSA Magnetos

The oscilloscope, or scope as it is commonly called, provides a picture of the operation of each electrical circuit, giving the voltage and time as they occur. Being able to view the operation of each circuit provides the service technician with a means of determining whether that circuit is operating as designed.

There are many different types and manufacturers of scopes. Each has its own advantages and disadvantages. Following are the types which were used to record the patterns shown. The models are listed for reference.

Tektronix 565
Telequipment DM64

The voltage and time setting are given as reference. They may vary with other manufacturers. A 10:1 probe was used.

NOTE:

In all of the tests listed in this procedure, the common of the scope is connected to the white/green wire, which is the H-lead of the harness. The voltage probe is moved to the various terminals or wires to make the test connection.

WARNING

WITH THIS TYPE OF TEST CONNECTION THE SCOPE MUST BE ISOLATED ELECTRICALLY FROM THE MAGNETO AND TEST STAND. SUCH ISOLATION PLACES THE SCOPE BELOW GROUND TO BOTH THE MAGNETO AND TEST STAND AND IF EITHER THE SCOPE AND MAGNETO OR THE SCOPE AND TEST STAND ARE TOUCHED AN ELECTRICAL SHOCK WILL RESULT AND MAY CAUSE INJURY.

CAUTION MUST BE TAKEN TO PREVENT A SHOCK.

Scope Setting Voltage/Time
50V/Div. 10MS/Div.

Connections:
Voltage probe to case of the magneto. Common to the white/green wire.

Test RPM: Start at 0. Increase slowly to 300 rpm. Note voltage; if over 200 VDC, repair zener diode before proceeding. If voltage is within specifications increase speed to timing rpm.

Voltage: 150 to 200VDC

A1

Connection: Voltage probe to white/red (C -2 distribution board 8 cylinder or less; E-2 distribution board on 10-12 cylinder)

Common to white/green

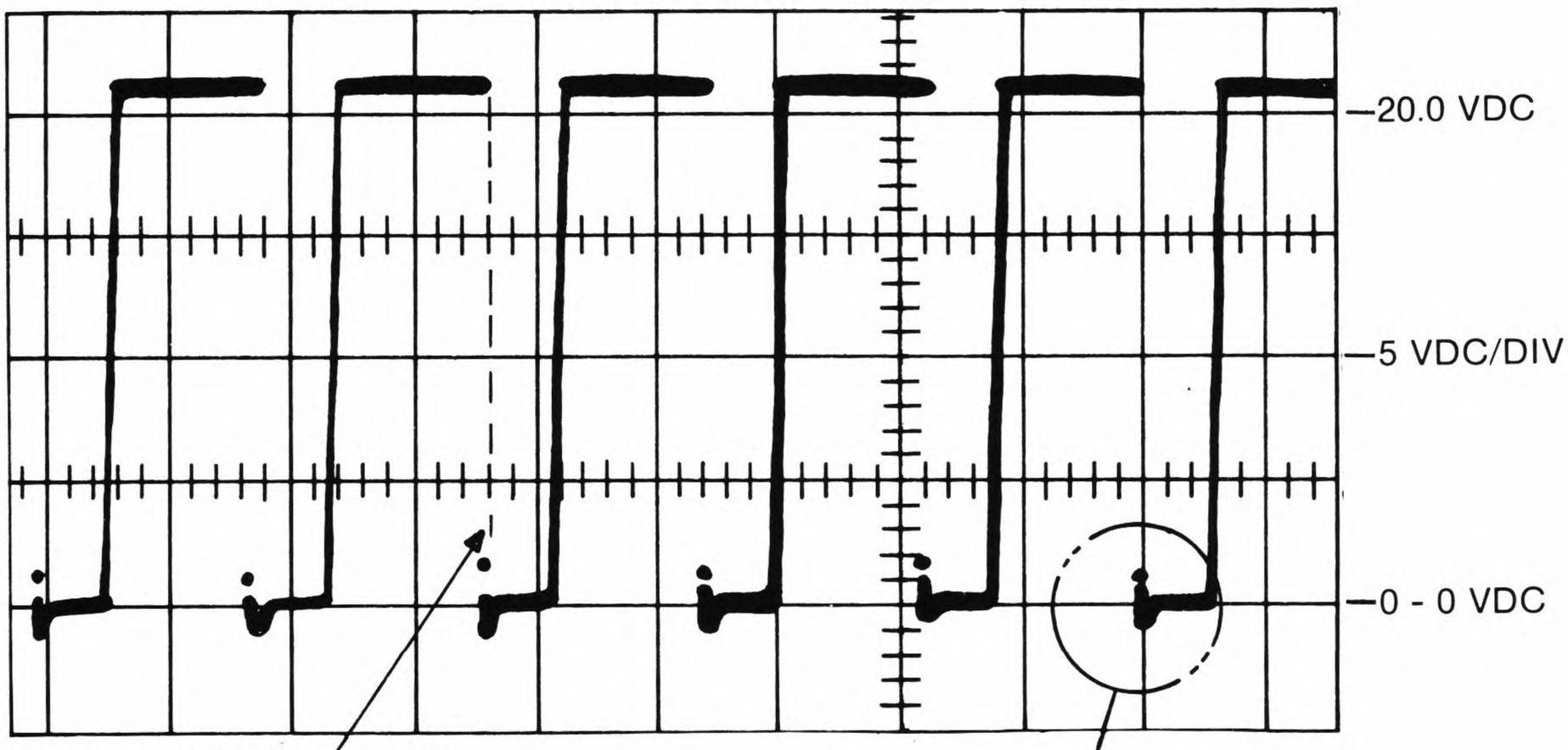
Scope Setting: Voltage — 5 VDC/Div; Time — 10MS/Div.

Test RPM: Timing speed note pattern. Reduce to 125 rpm for B2 and B3.

Voltage: 16-24 VDC

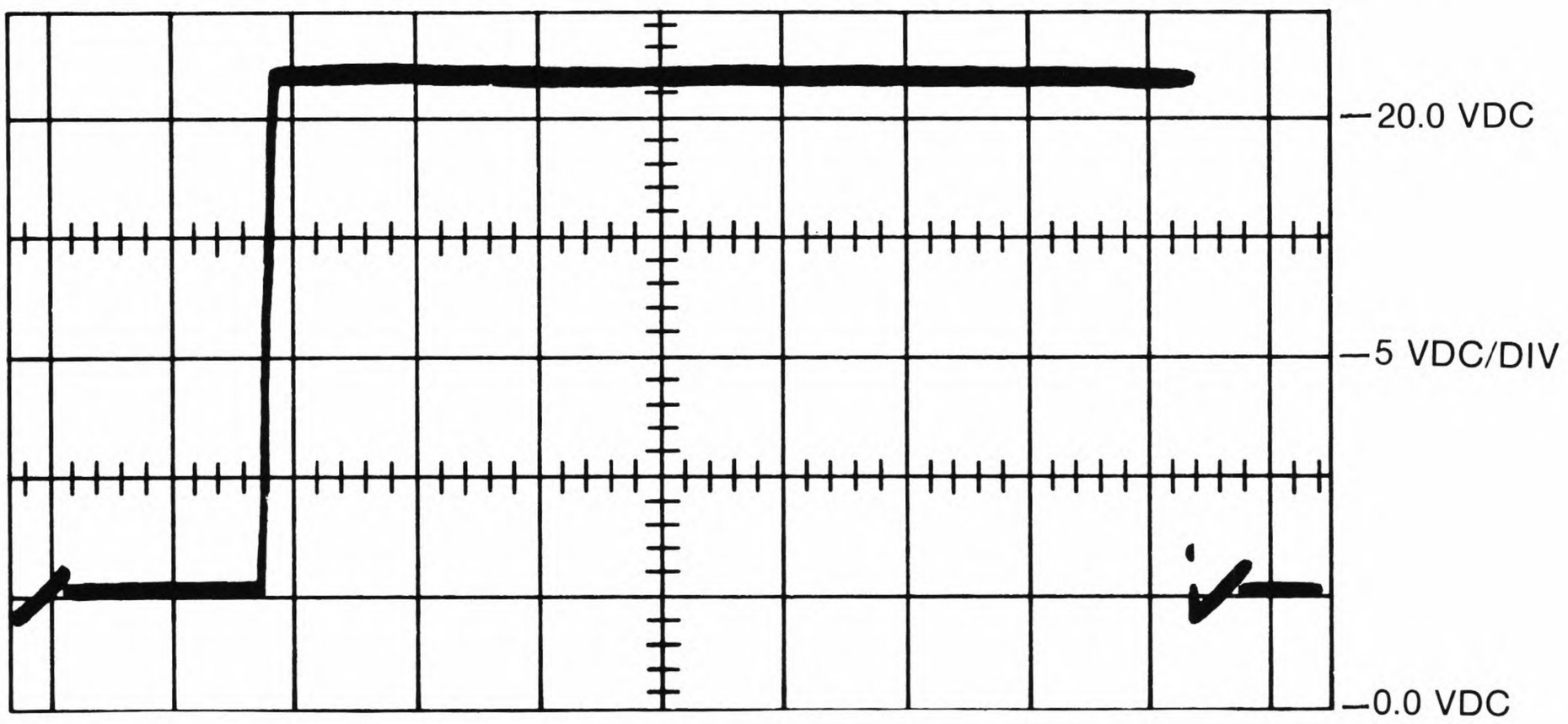
The top of the trace must not bend over prior to discharge.

Must be rectangular and evenly spaced with even firing engines or every other one for odd firing engines.



B-1

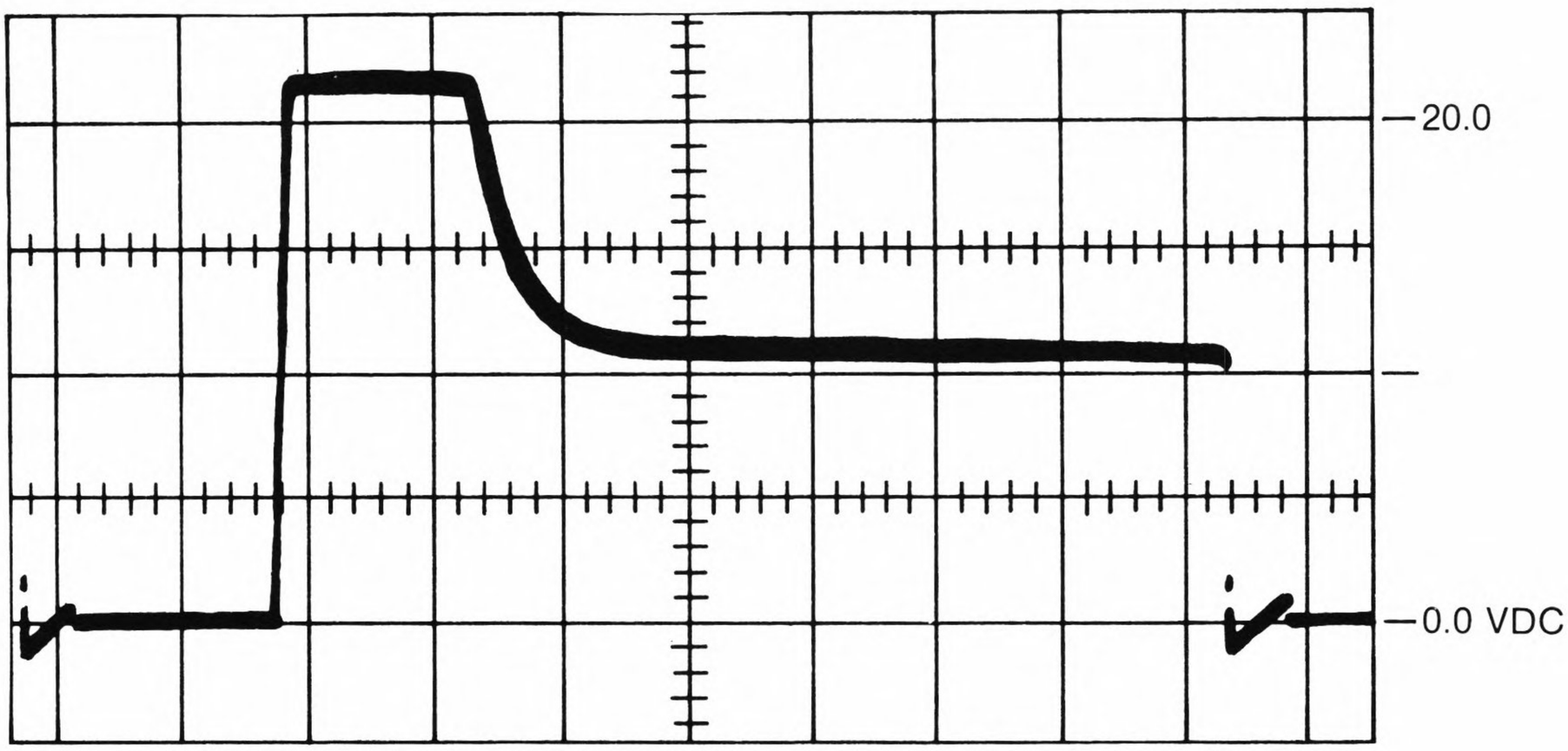
Correct Pattern as Magneto Stops



NOTE: (A) The sharp almost invisible trailing edge (right hand part).
(B) The top of the trace does not "bend" over prior to discharge.
(C) The almost rectangular shape of the trace.

B2

Defective Pattern as Magneto Stops



Possible Defects (A) A leaky trigger SCR
(B) A leaky 20 volt zener

B-3

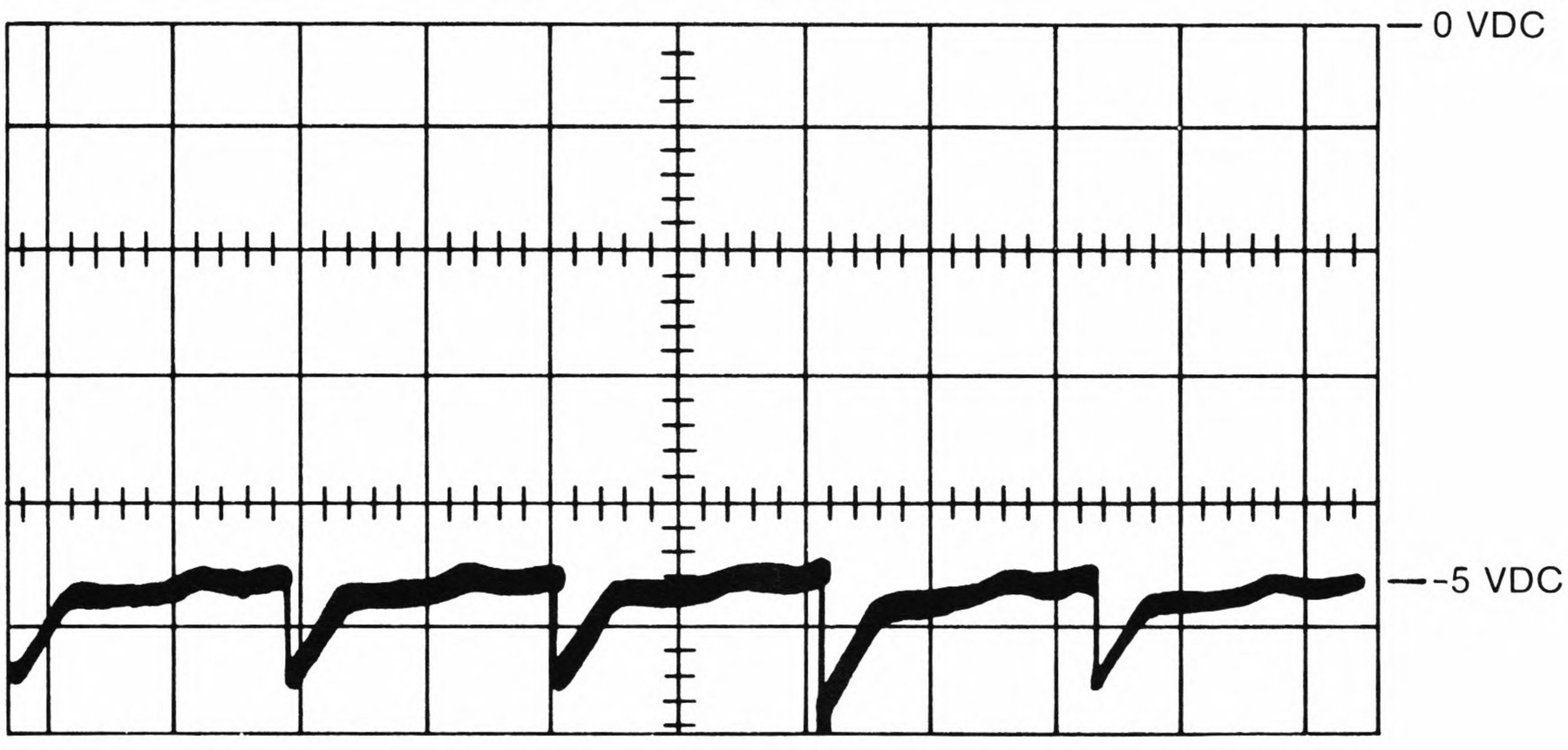
Connection:
Voltage probe to White/yellow or white/orange
C11 Distributor Board — 8 or less cylinders
E1 Auxiliary Board 10-12 cylinder

Scope Setting: Voltage — 1 V/Div; Time — 10MS/Div.

Test RPM: Timing rpm — Decrease speed until only two of the voltage traces fill the screen

Voltage: Average between highest and lowest should be 2.15 to 4.5 VDC
1.75 to 2.50 VDC 12 cylinder

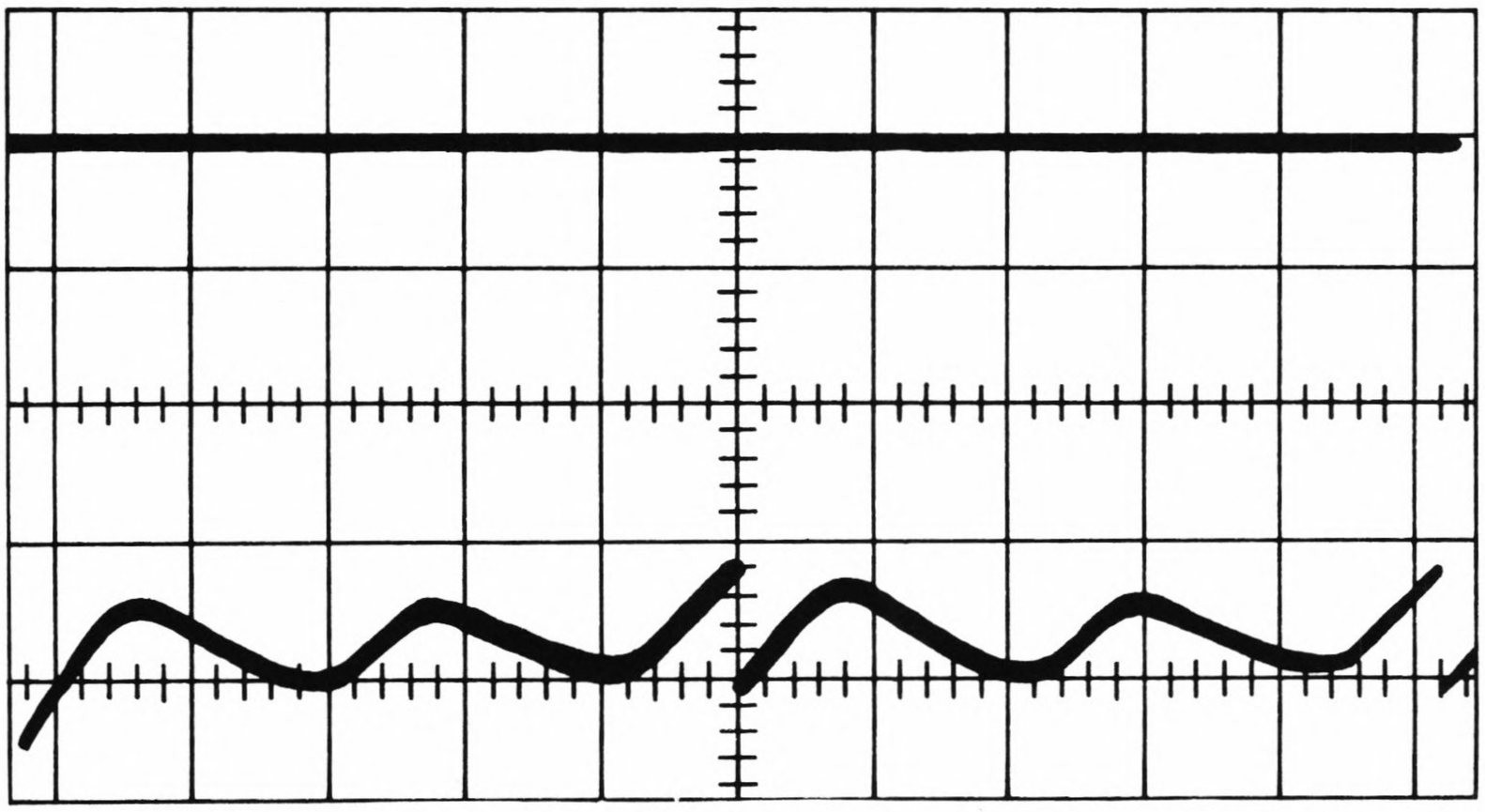
PROPER TRACE
Low Speed 5-Cylinder



C-1

Slow test stand until two of the voltage traces fill screen. A valley must exist between each of the traces.

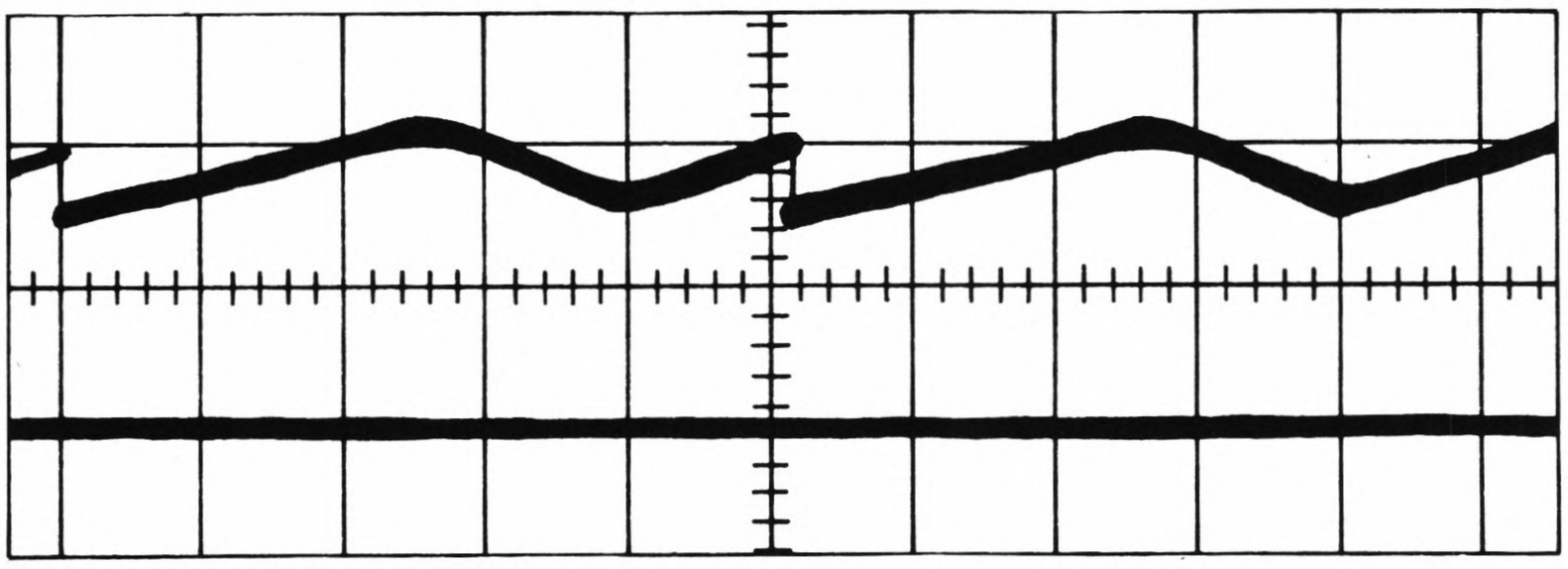
PROPER TRACE
LOW SPEED 5-CYLINDER

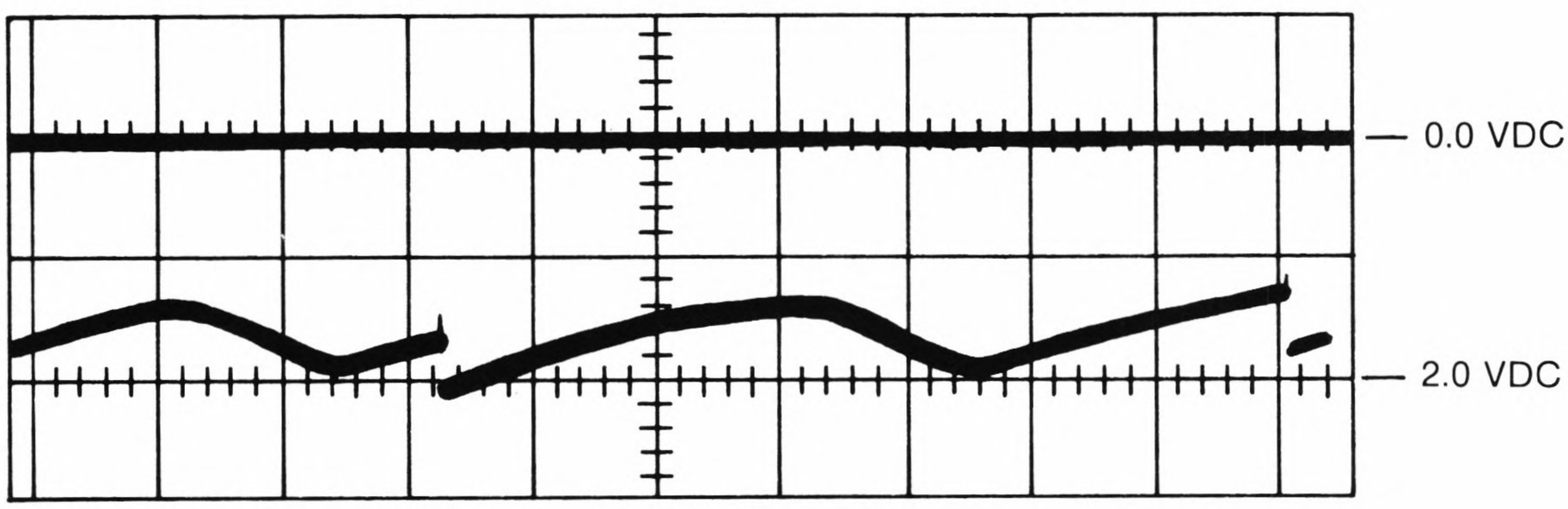


Note:
Two valleys exist
between traces

C-2

PROPER TRACE
ALL 6, 8, 10 and 12-CYLINDER EVEN FIRING UNITS





Negative Bias — Proper Trace
All Odd Firing Units

C-3

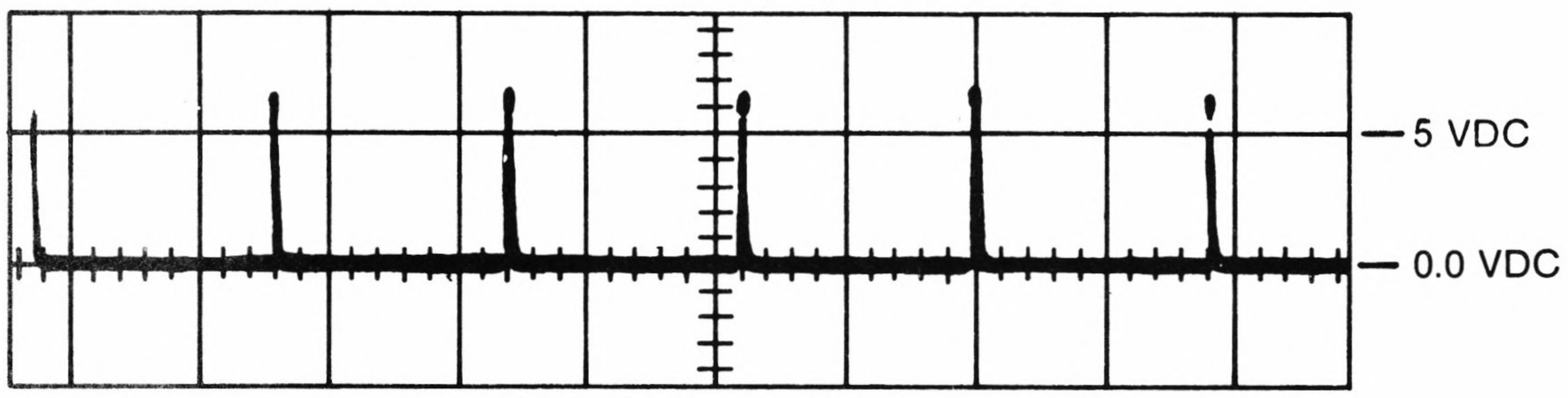
Connections:
Voltage probe to white/gray (E8 on 10 and 12-cylinder models) or PC strip on 8 or less cylinders on distributor board. PC is any solder strip in the distributor board where the top of the probe can make contact.

Ground to white/green

Test RPM: Timing Speed

Voltage Specification: Peak Voltage
More than 3 VDC
Less than 9 VDC

Scope Setting: Voltage — 5 V/Div; Time Base — 10 MS/Div.



D1

Explanation of Following Wave Forms
Fig. 1 thru Fig. 6 Capacitor Volts Common to White/Green Voltage Probe to Ground
Fig. 7 thru Fig. 11 20 Volt Supply Common to White/Green Voltage Probe to Ground
Fig. 12 thru Fig. 16 Bias Supply Common to White/Green Voltage Probe to White/Green or White/Orange
Fig. 17 thru Fig. 22 Power Bias Common to White/Green Voltage Probe to White/Green or Top PC Track

SCOPE PERFORMANCE TRACE — SCSA MAGNETO

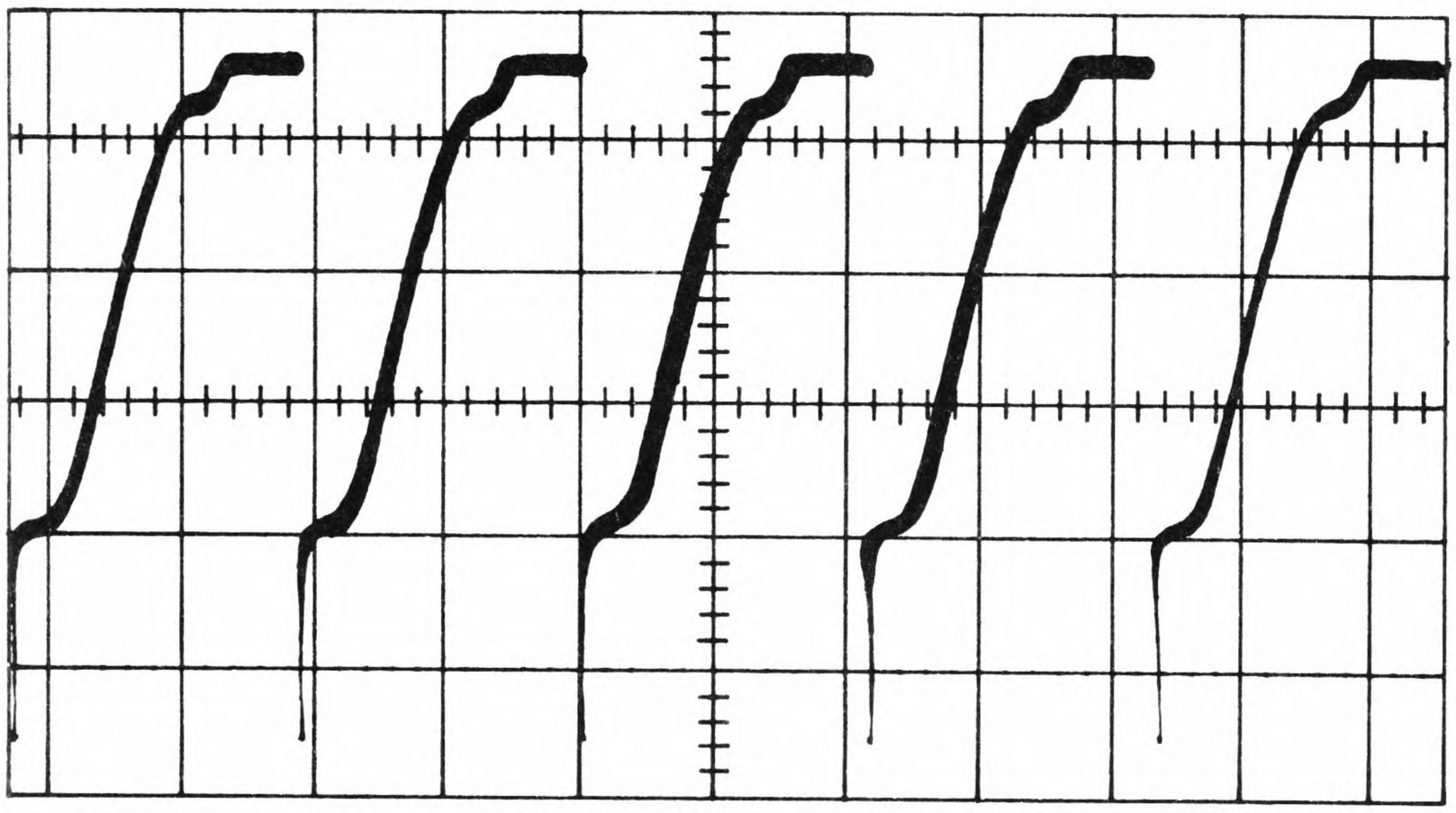


Figure 1
Properly Timed
Low Speed
5-cylinder

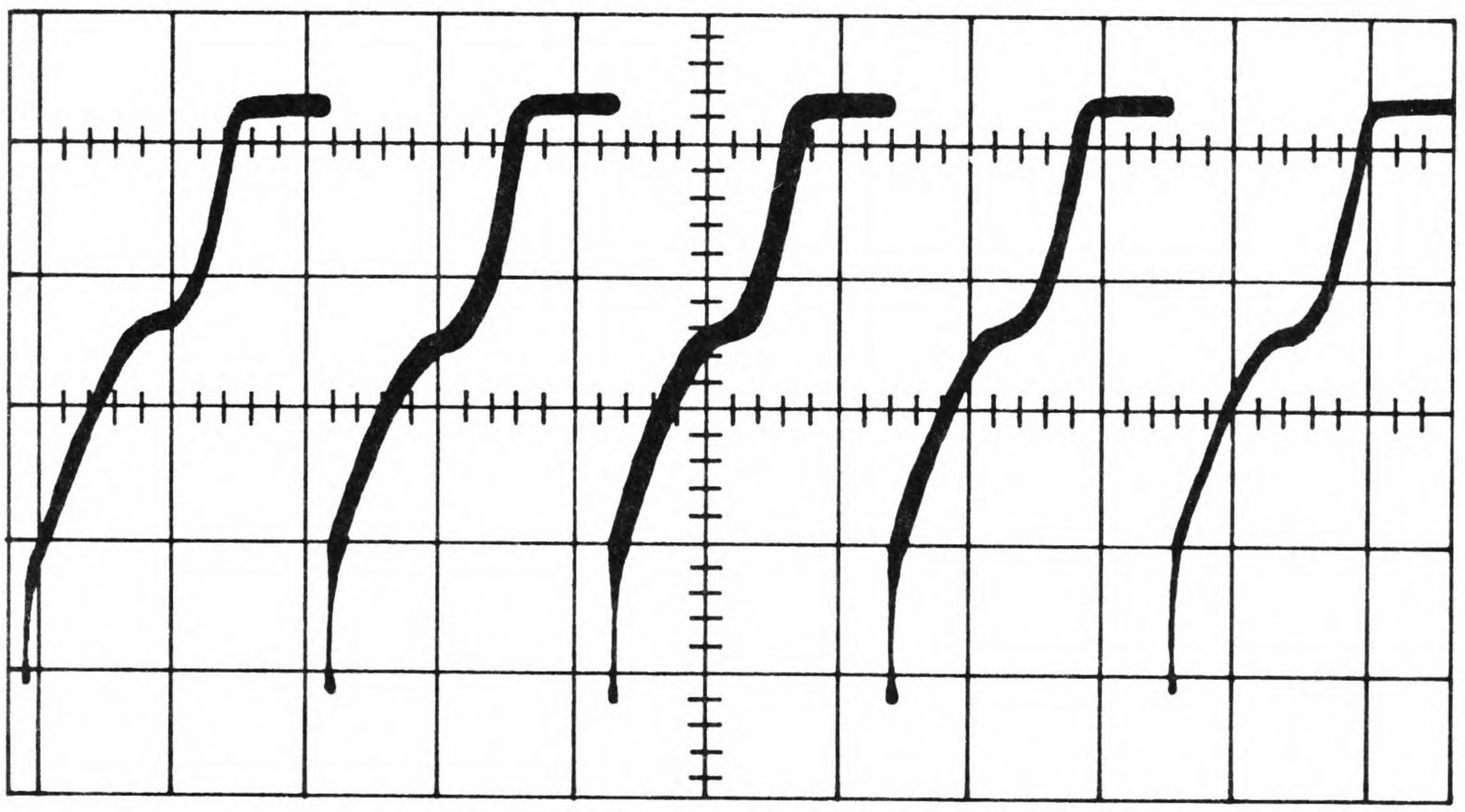


Figure 2
Properly Timed
High Speed
5-cylinder

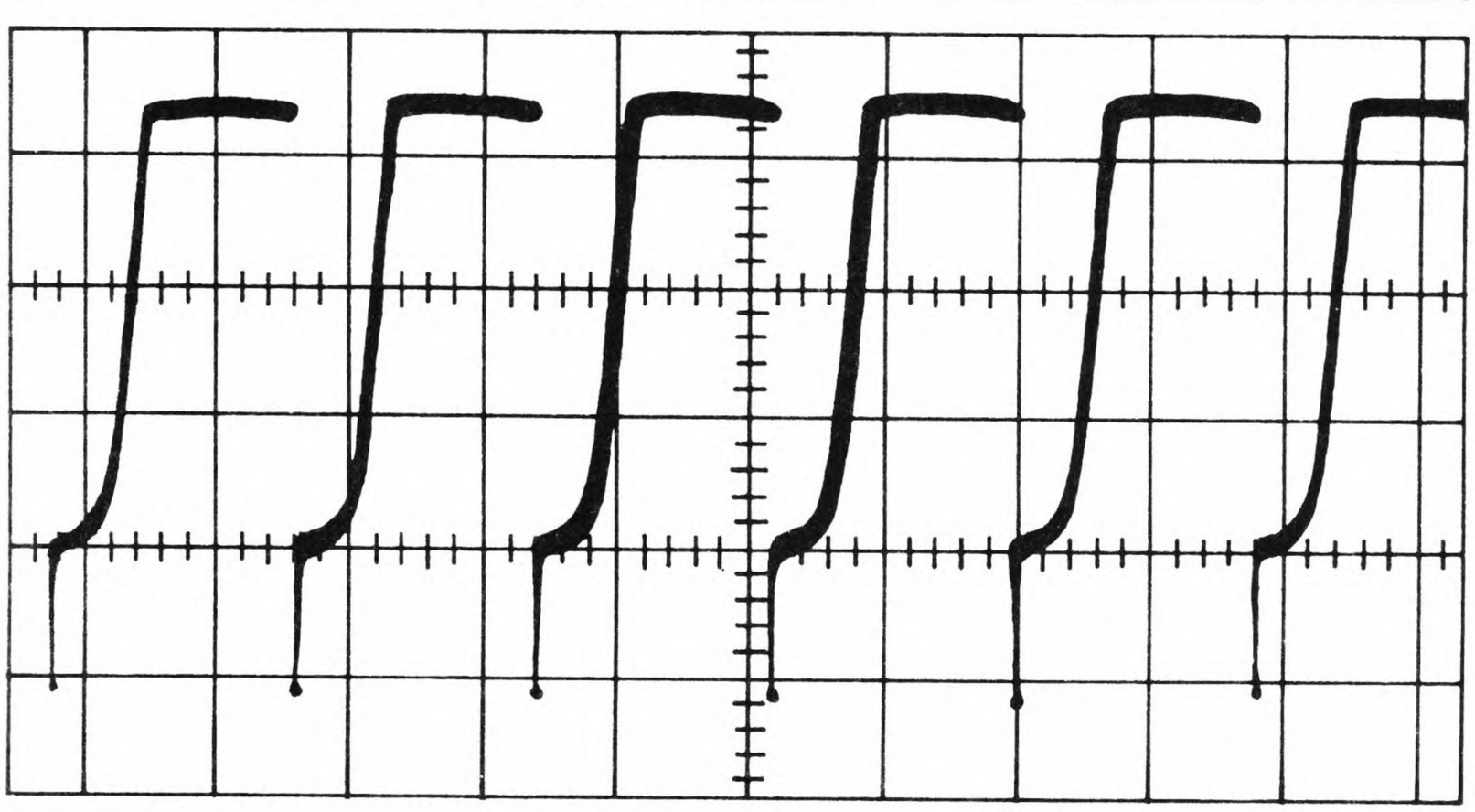


Figure 3
Properly Timed
6-cylinder

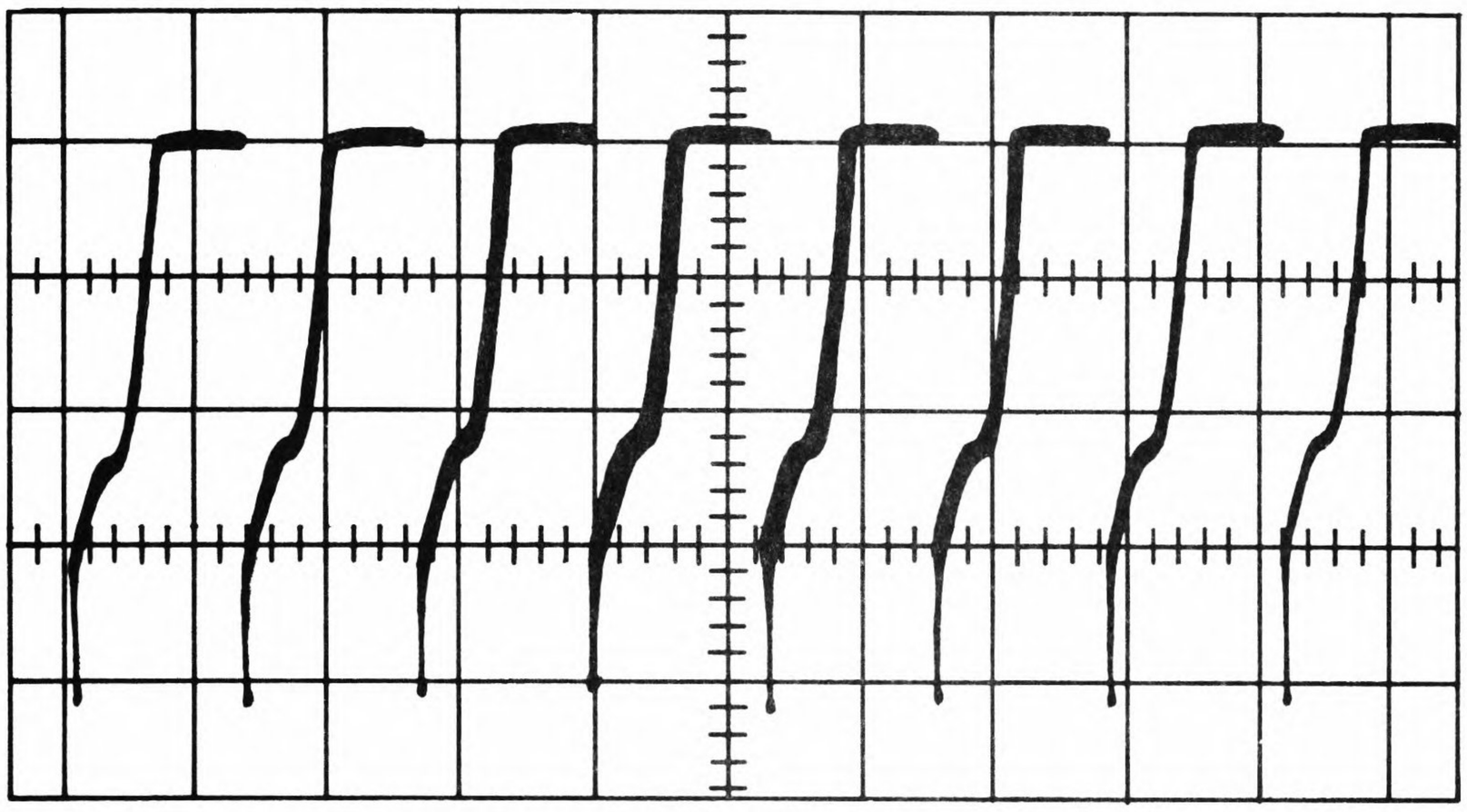


Figure 4
Properly Timed
Even Firing
8-cylinder

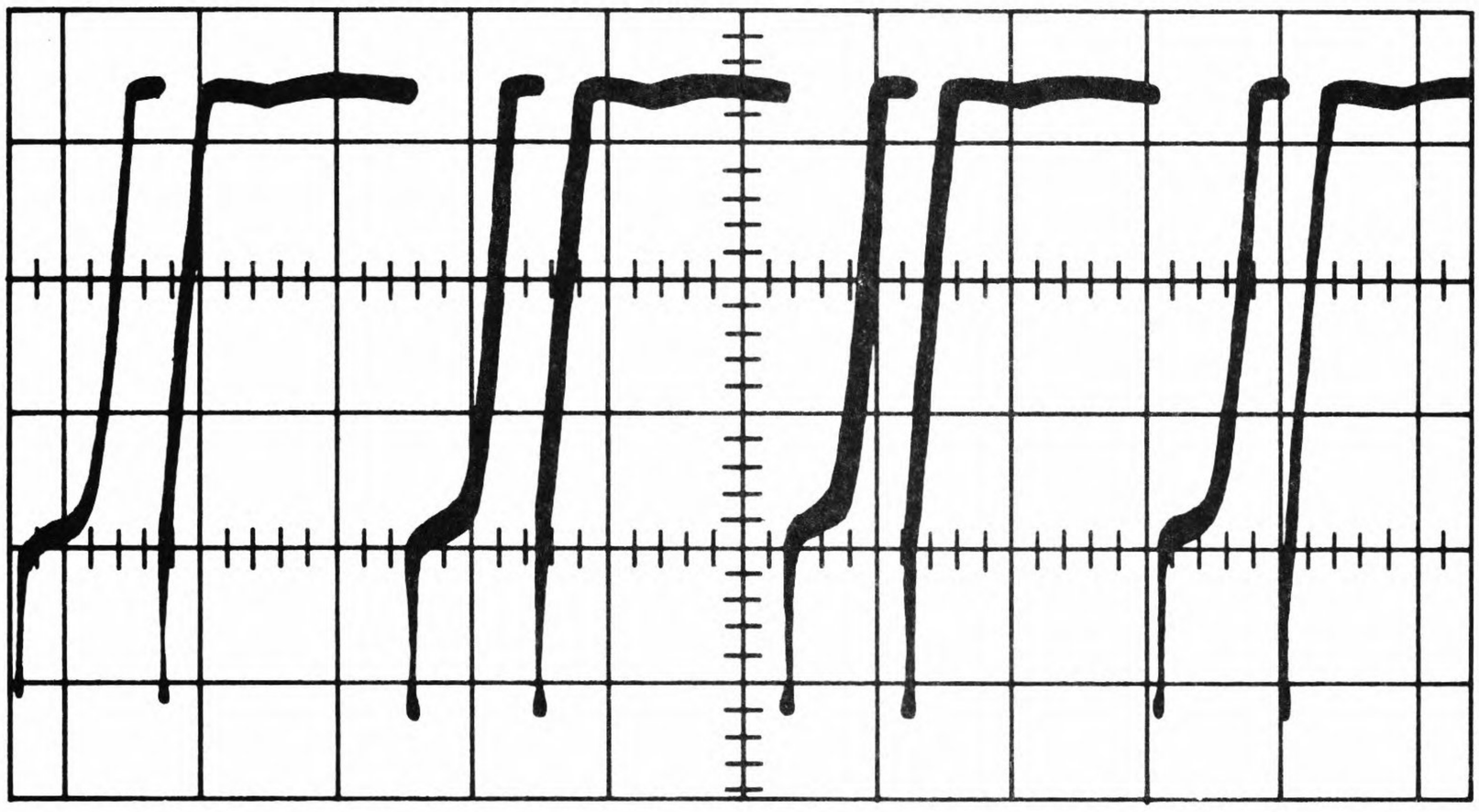


Figure 5
Properly Timed
Odd Firing
8-cylinder

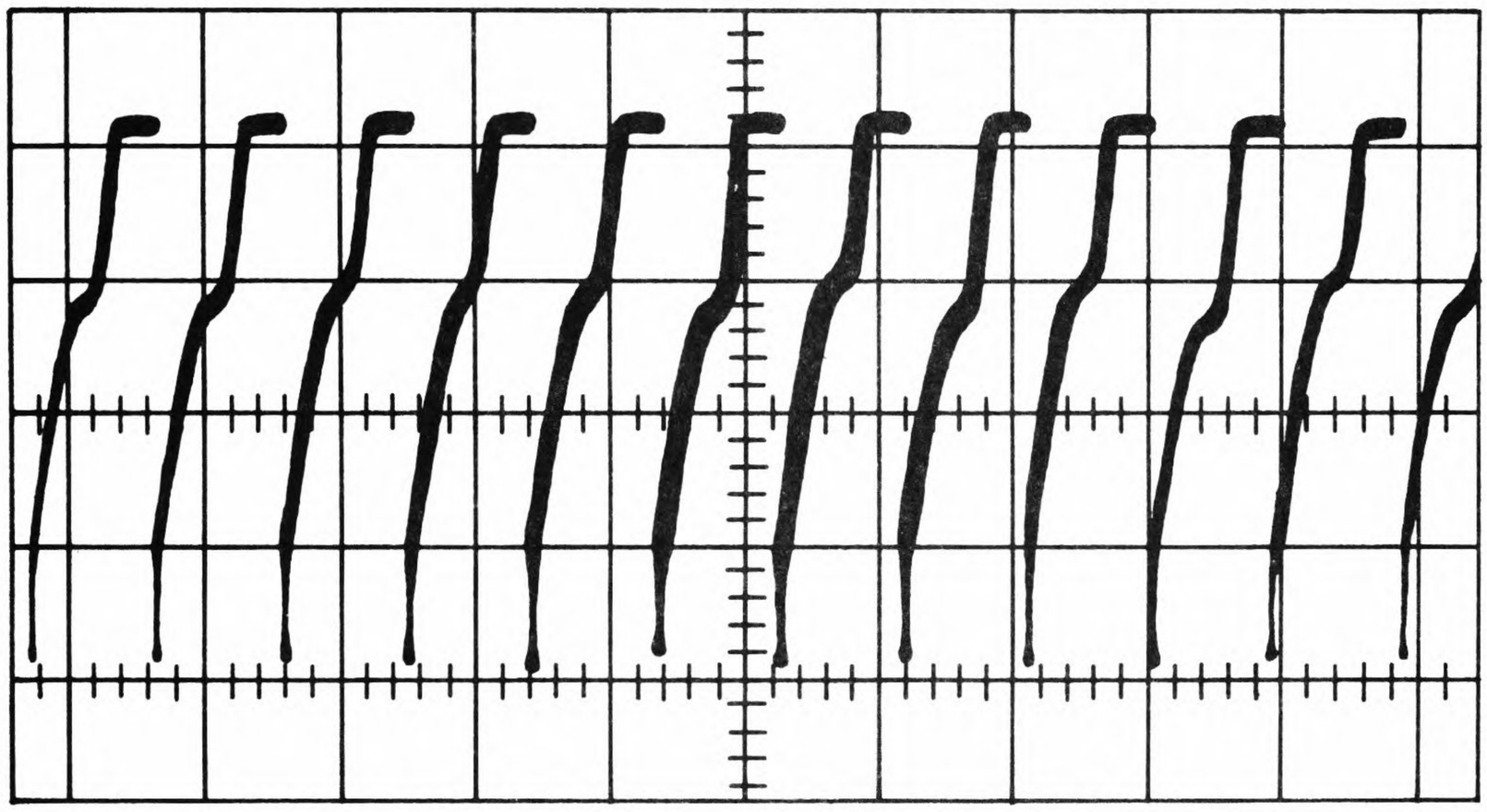


Figure 6
Properly Timed
12-cylinder

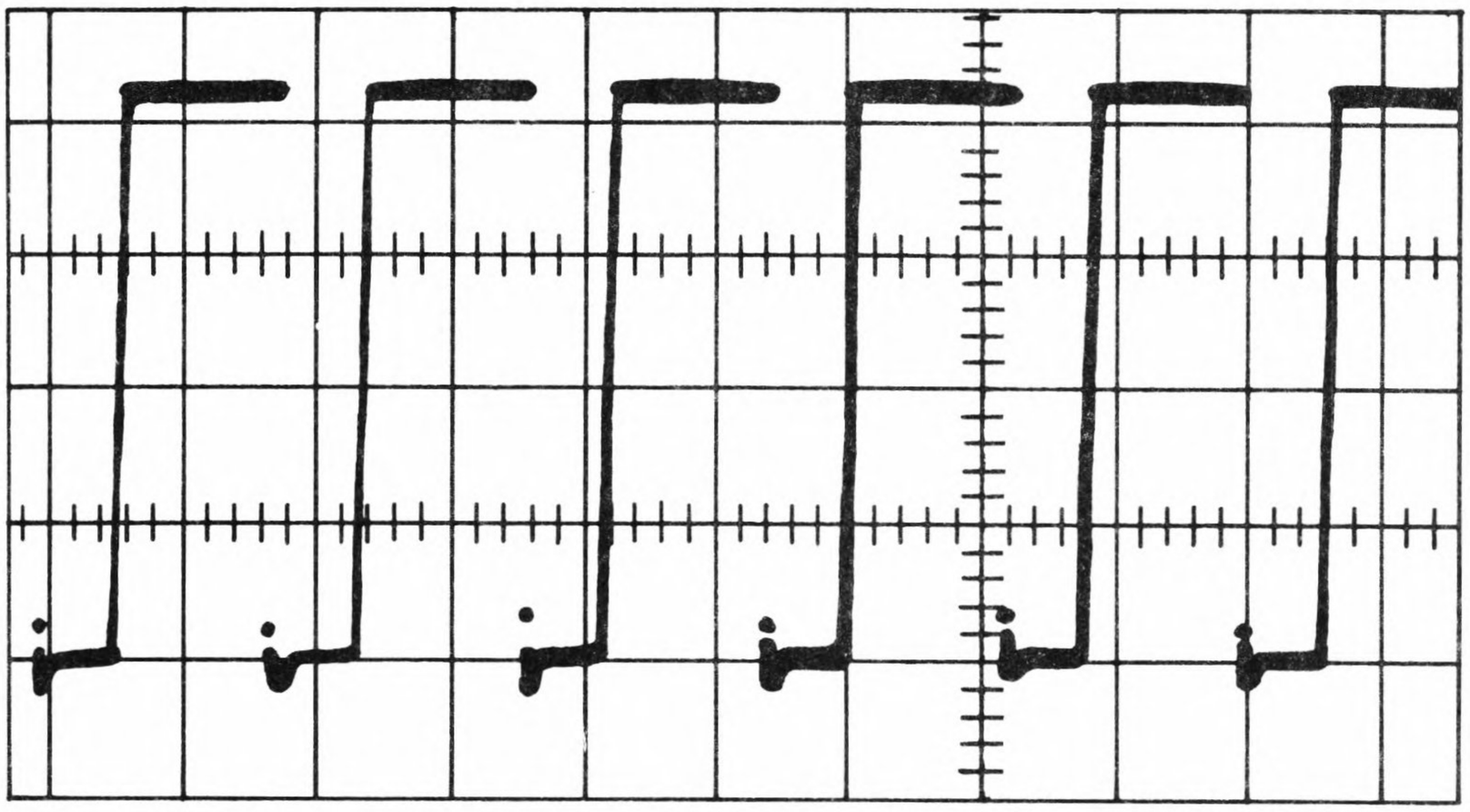


Figure 7
Correct Trigger
SCR Voltage Trace
5-cylinder

5 VDC/DIV

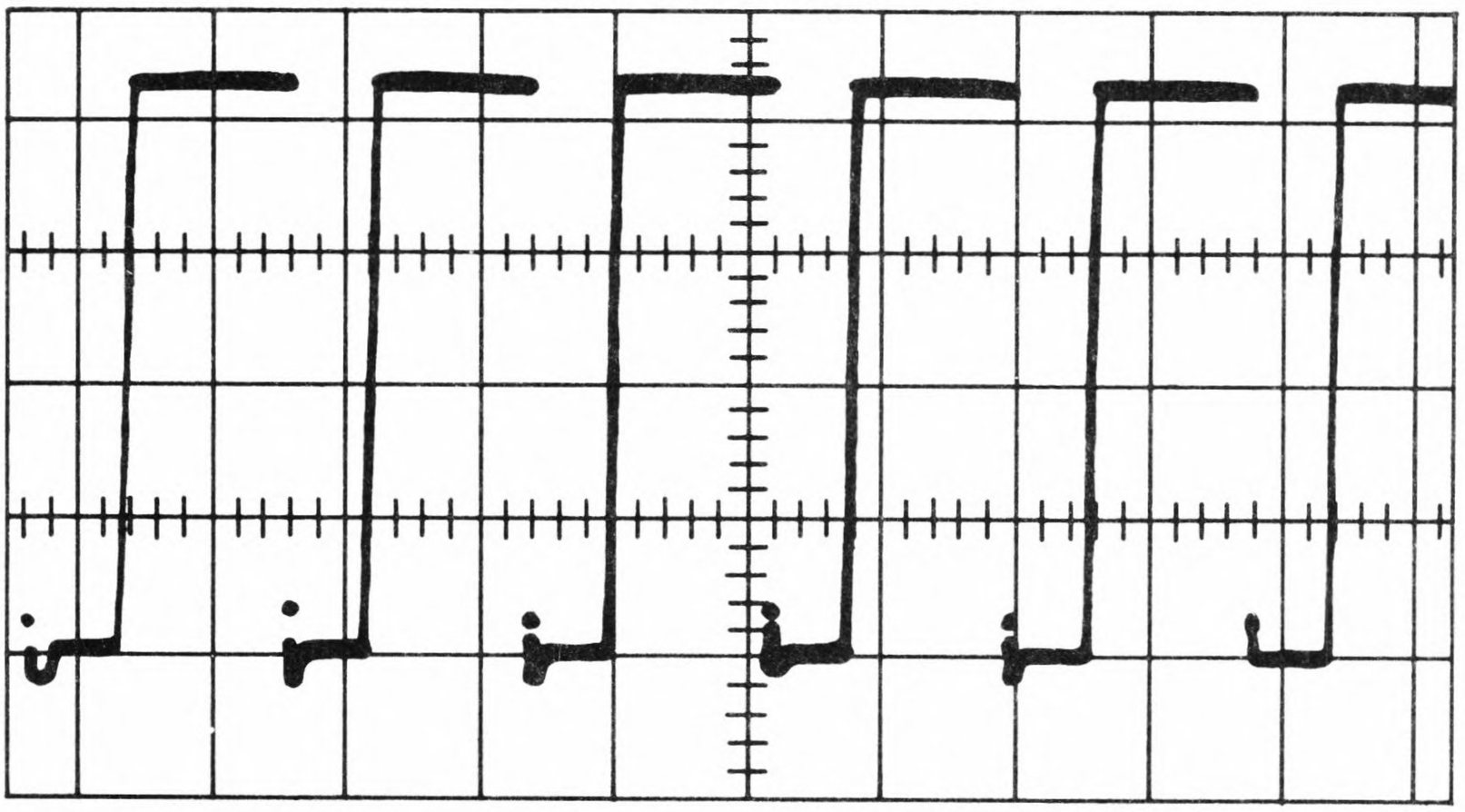


Figure 8
Correct Trigger
SCR Voltage Trace
6-cylinder

5 VDC/DIV

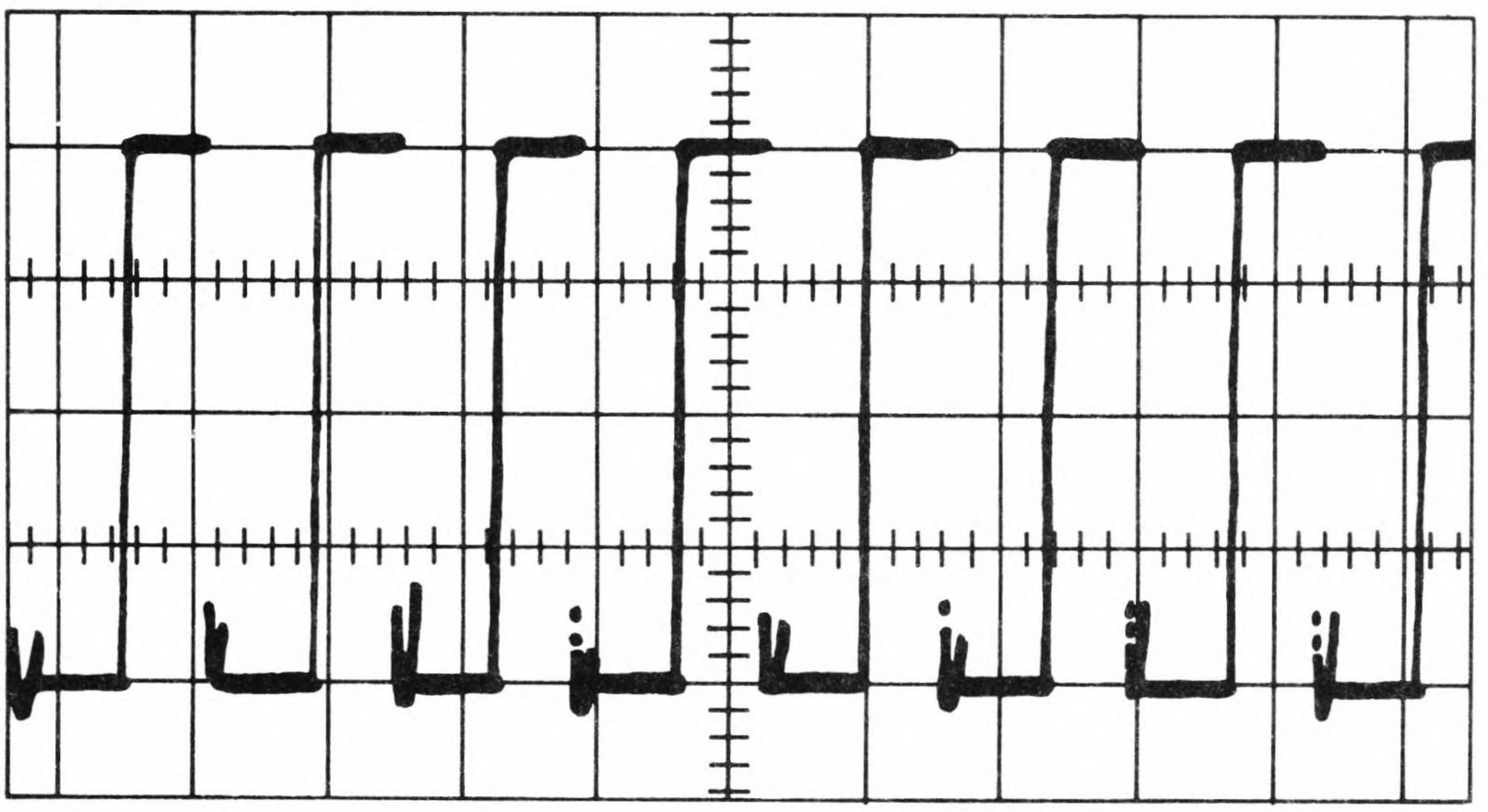


Figure 9
Correct Trigger
SCR Voltage Trace
Even Firing
8-cylinder

5 VDC/DIV

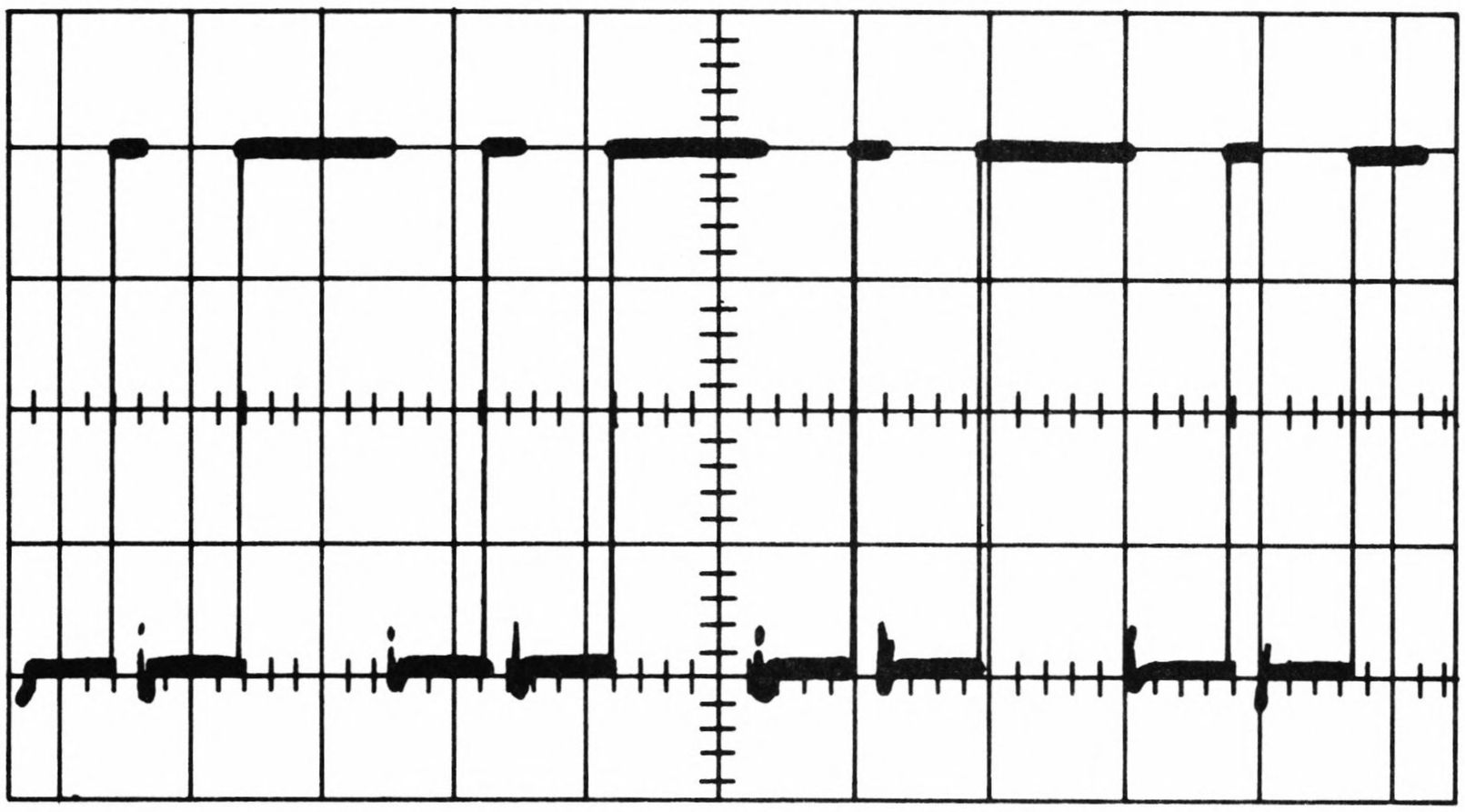


Figure 10
Correct Trigger
SCR Voltage Trace
Odd Firing
8-cylinder

5 VDC/DIV

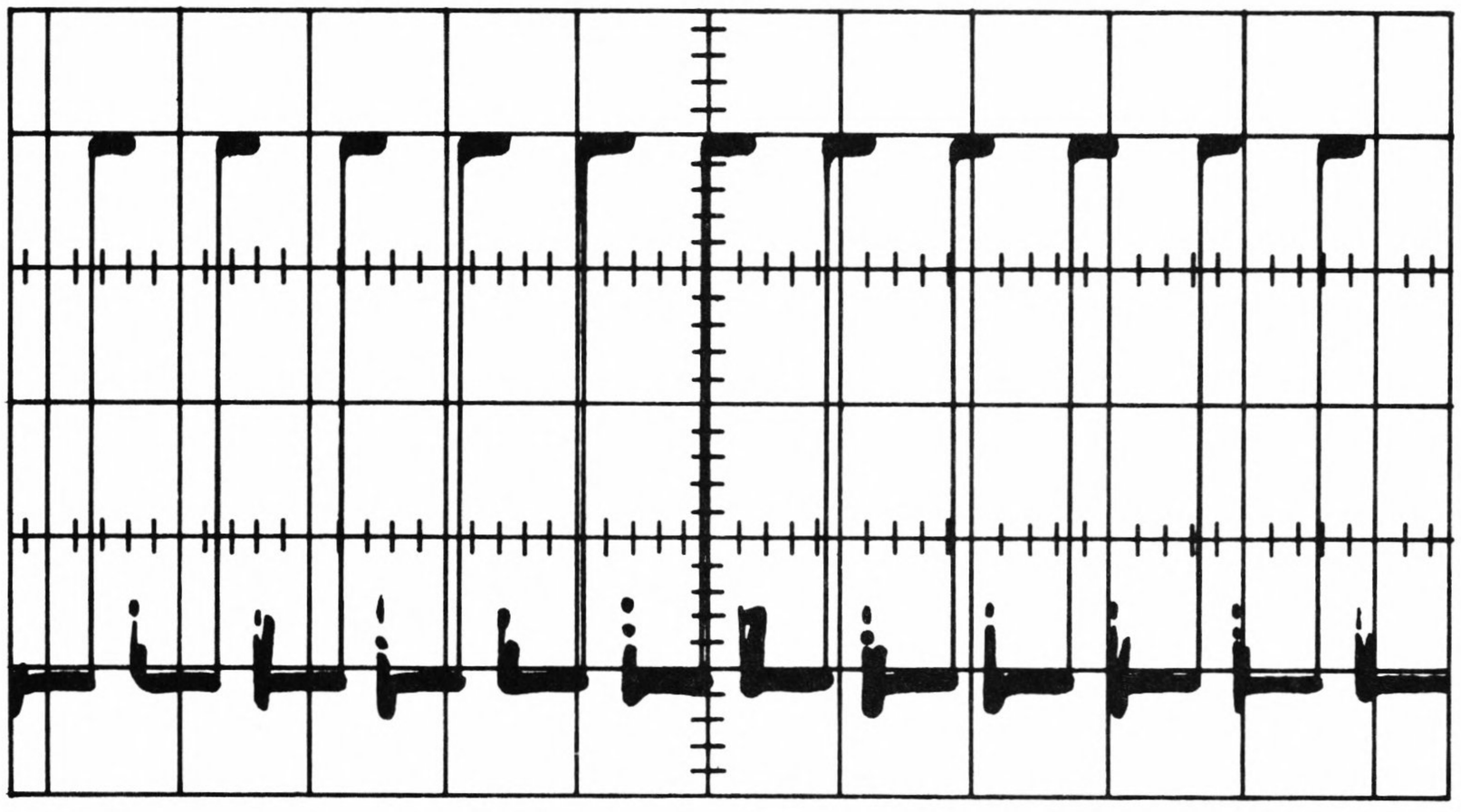


Figure 11
Correct Trigger
SCR Voltage Trace
12-cylinder

5 VDC/DIV

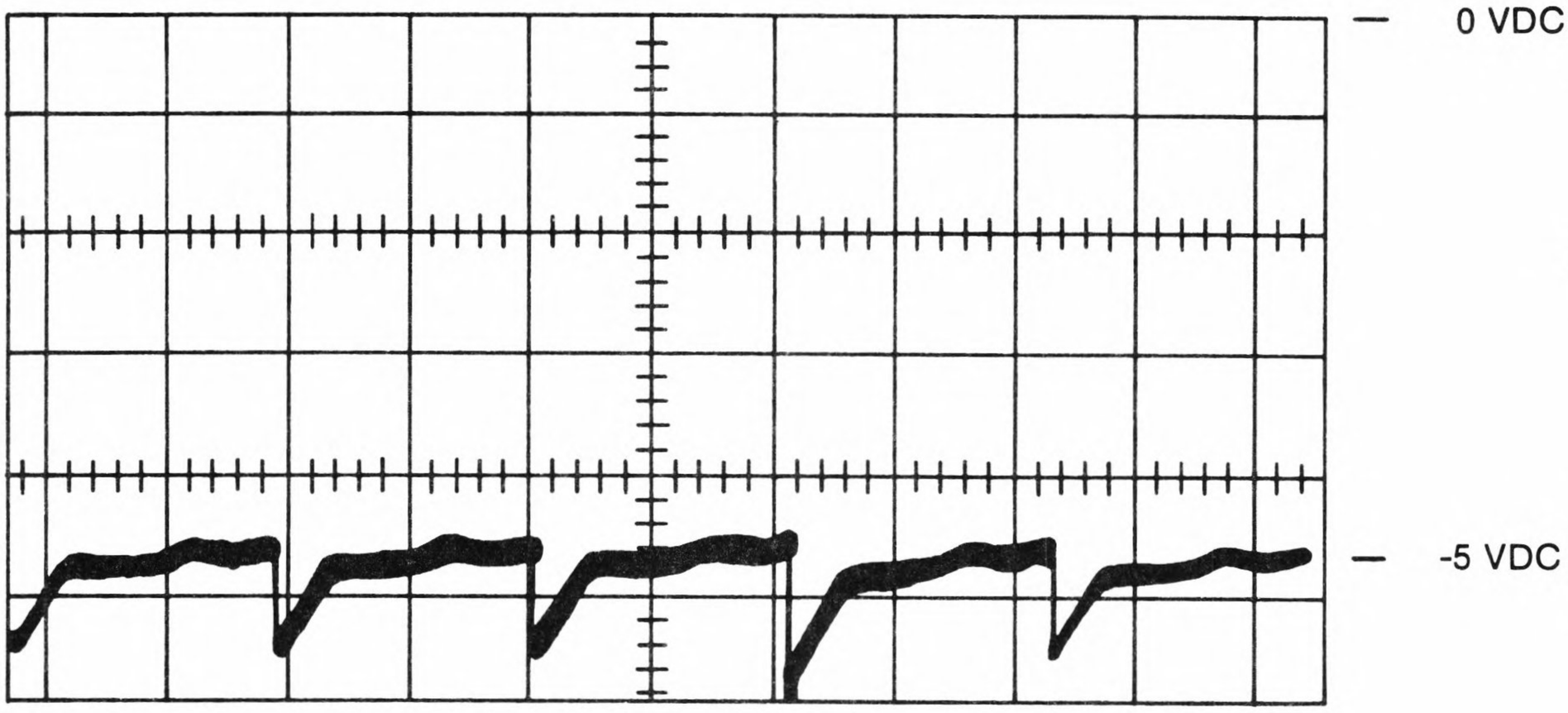


Figure 12
Proper Trace
Low Speed
5-cylinder

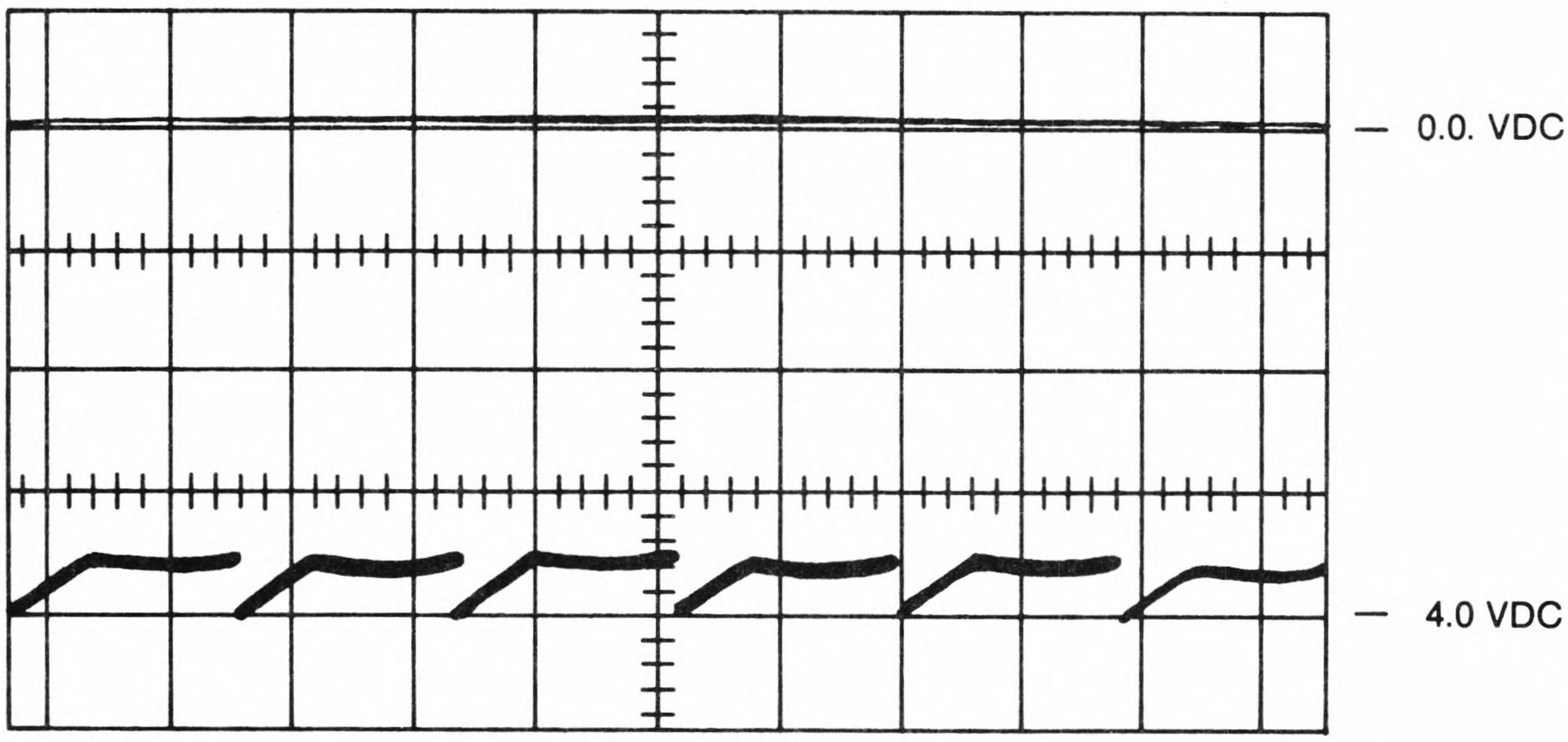


Figure 13
Proper Trace
6-cylinder

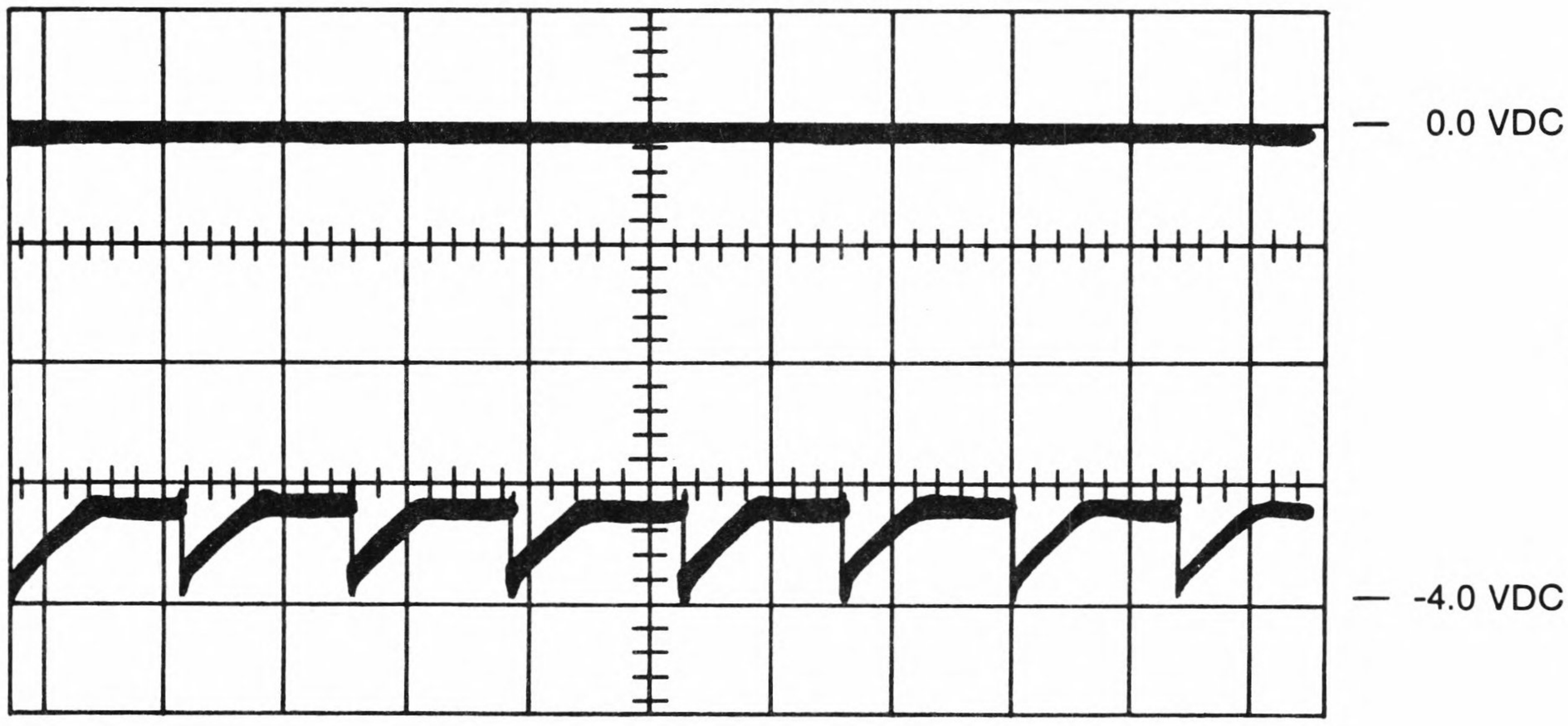


Figure 14
Proper Trace
Even Firing
8-cylinder

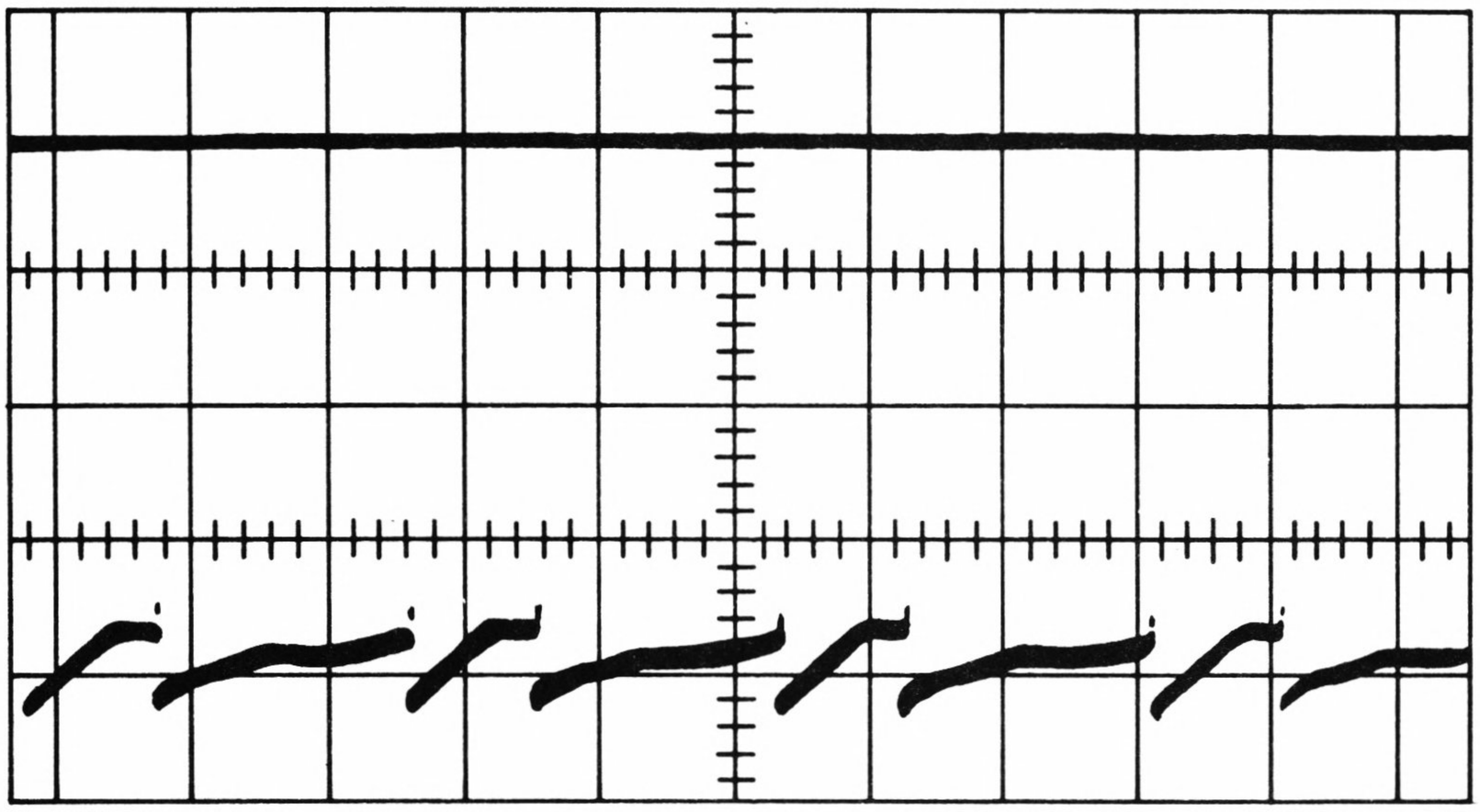


Figure 15
Proper Trace
Odd Firing
8-cylinder

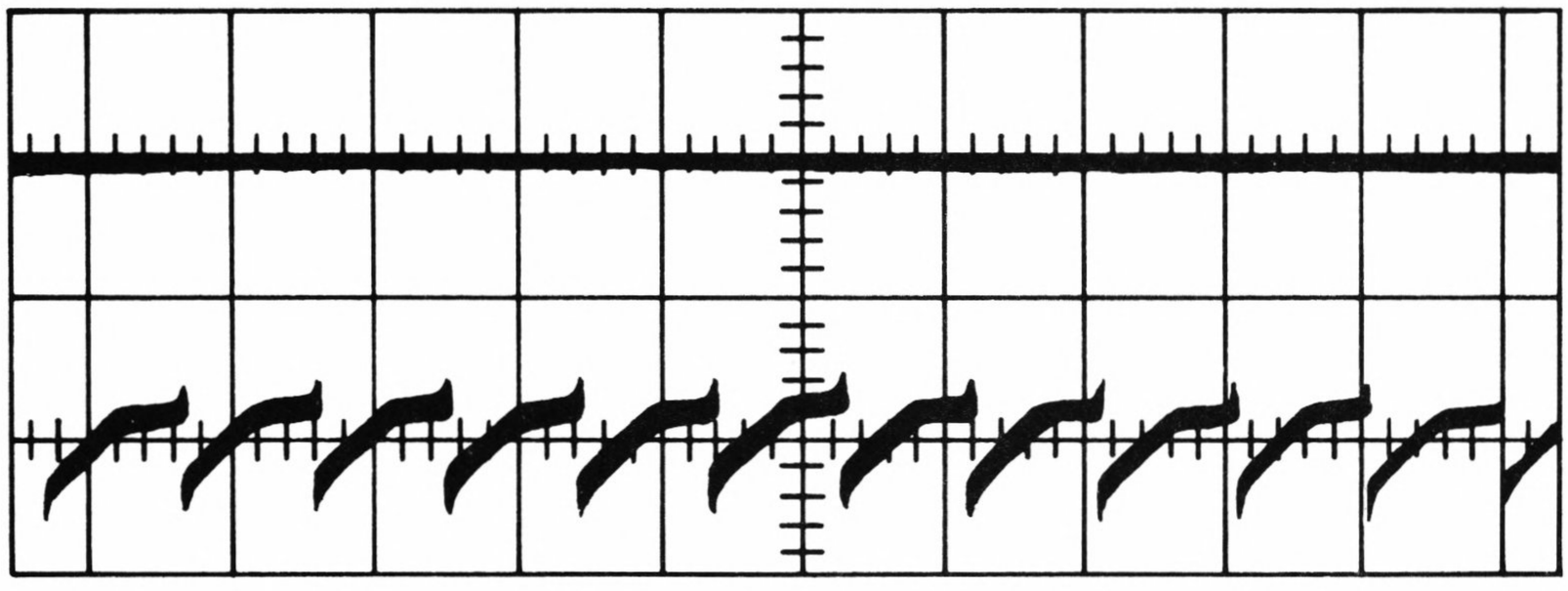


Figure 16
Proper Trace
12-cylinder

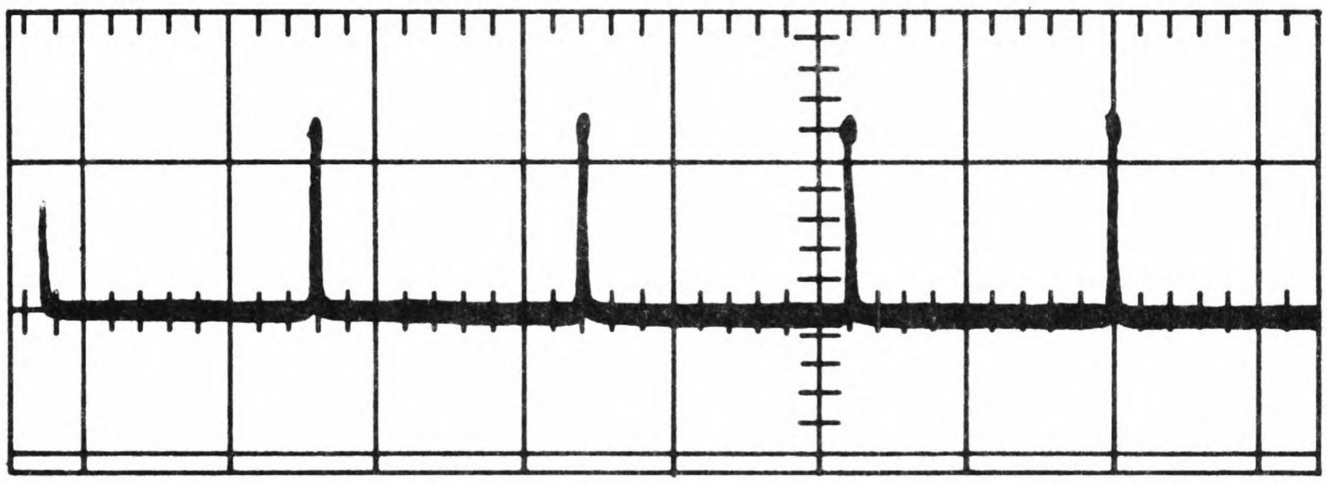


Figure 18 Proper Trace — All 5-cylinder Units

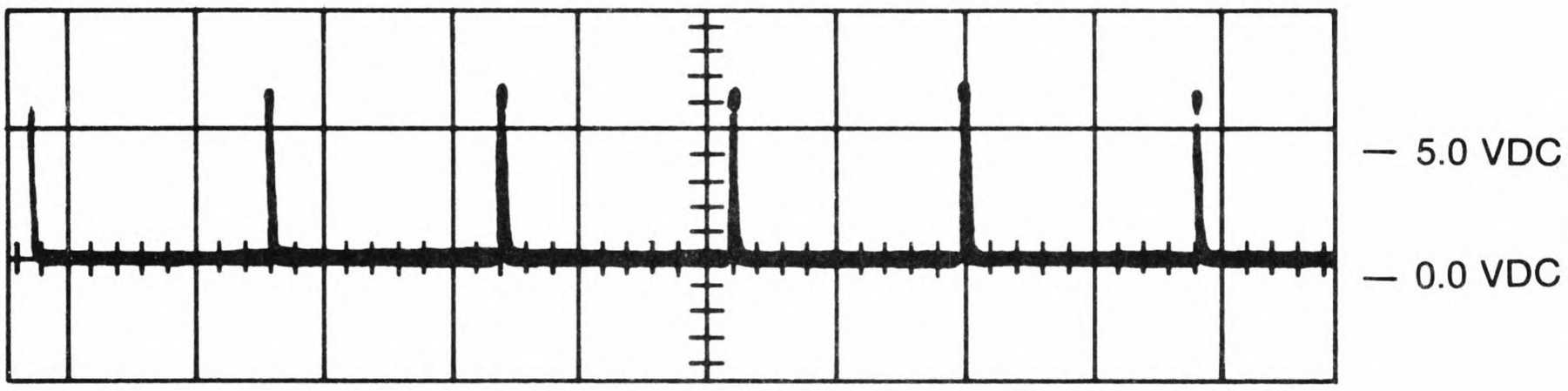


Figure 19 Proper Trace — All 6-cylinder Units

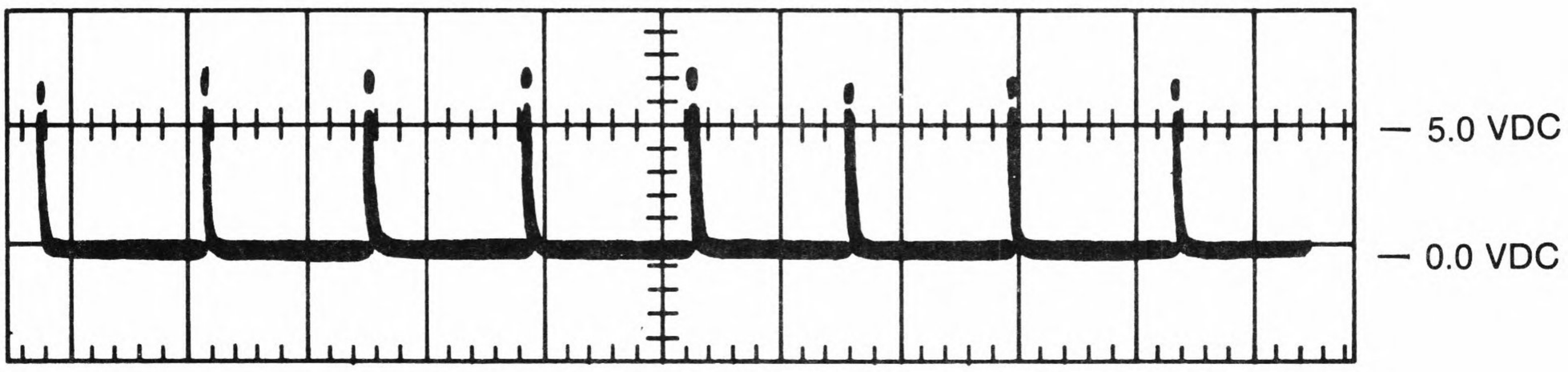


Figure 20 Proper Trace — Even Firing 8-cylinder Units

Figure 21 Proper Trace — Odd Firing 8-cylinder Units
NOTE: The long and short spacings may be interchanged

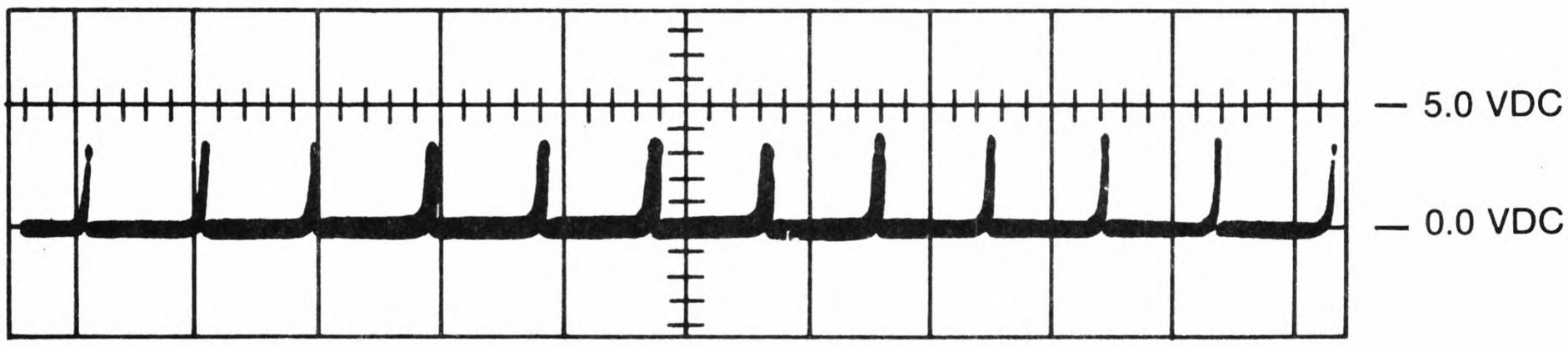


Figure 22 Proper Trace — 12-cylinder Units