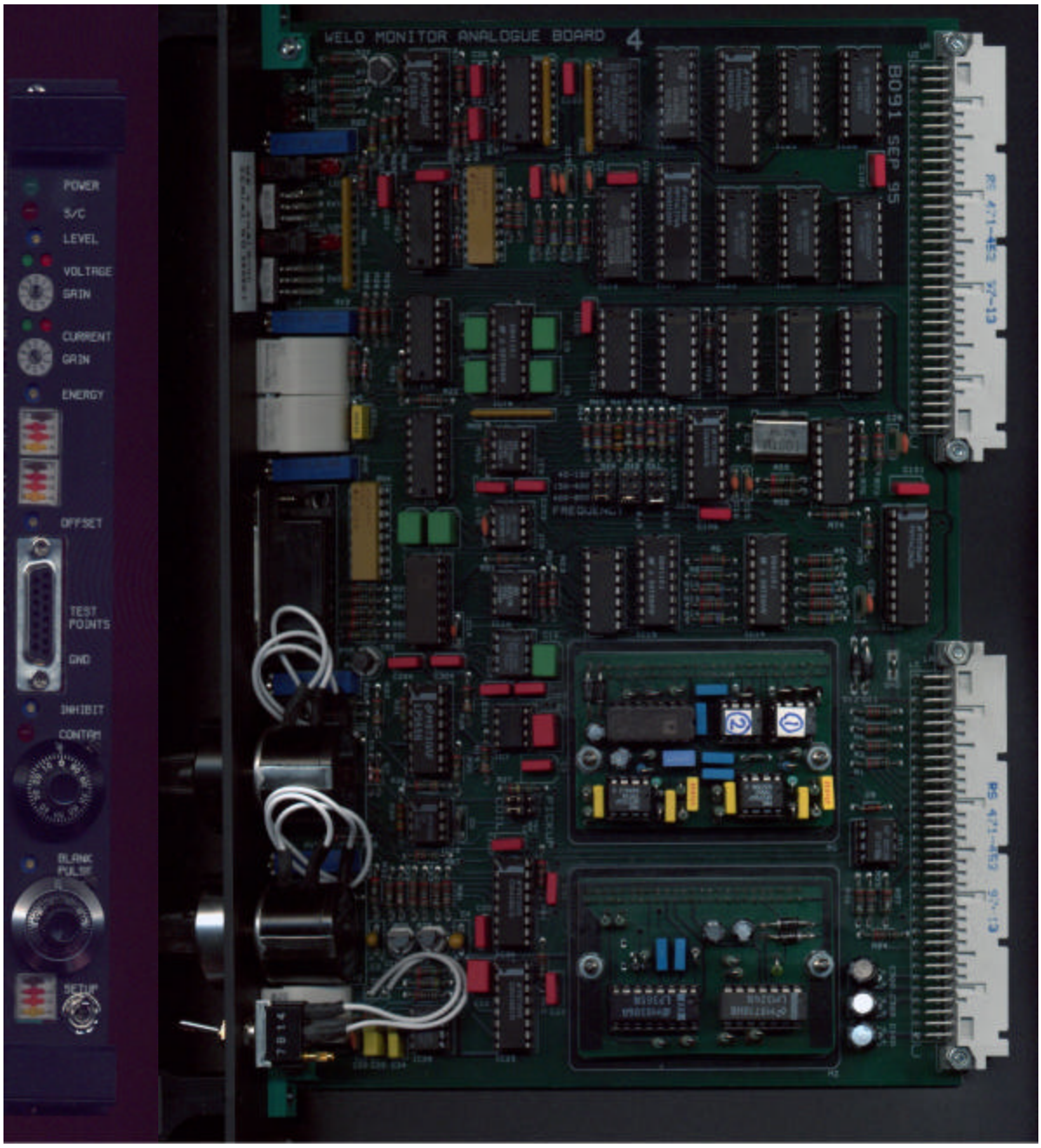
ADJUSTMENT INSTRUCTIONS - VERTEX MK.IV ANALOGUE BOARD



The Vertex Mk.IV Analogue Board for the WM-3 series of weld monitors is a plug-in replacement for earlier versions of the Analogue Board. It offers improved performance and maintainability. With its optional current pickup it can be used on lines equipped with the new 'Unisoud' power supply. This is the only way the Monitor can continue to be used when the Unisoud power supply is fitted.

If the Mk.IV is being used on a line which has a standard type of 'Search Coil' pickup, it is only necessary to replace the earlier board with the new Mk. IV. Make sure that the link settings for links 1 and 2 are set to the left ('COIL') in this case. DO NOT PULL OUT OR REPLACE ANY MONITOR BOARD WITH THE MONITOR SWITCHED ON!

It may be necessary to experiment with the polarity of the Search Coil connections to obtain normal results when making adjustments. This is most easily done by reversing the connections at the Search Coil itself.

If the line is to use the newer technology Current Pickup (optional on lines with traditional power supplies, mandatory on Unisoud-equipped lines) set links 1,2 to the right (PICKUP), and follow the installation instructions for the current pickup given below. The adjustment instructions below assume that the board (and current pickup, if used) have been correctly installed.

Refer to the diagram of front panel controls to identify the various switches, potentiometers and indicator lights. If replacing a previously installed Mk. IV board, review the present settings for your installation and make the new board the same. If a control is not mentioned below, its setting does not affect the performance of this board when used in your application.

NOTE: It is not necessary, nor is it advisable to attempt to adjust the board with it mounted on an extender card. Doing so exposes the sensitive circuitry to the high level of electromagnetic interference from any Unisoud-equipped welder.

Turn the display board output switch 'off' to disable the reject station, and switch the integral interface board output off to prevent the monitor from cutting the weld current while you are making adjustments. Working from the top of the front panel downwards, check the following conditions:

a.) The 'Power On' L.E.D. must be illuminated, if the weld monitor power is on.

b.) The 'S/C' (short circuit) L.E.D. should be off. Because of the difficulty in making this adjustment unless the welder insulation has just been replaced, we recommend that this circuit be desensitized by adjusting the potentiometer fully counter-clockwise (this is a multi-turn potentiometer).

c.) Adjust the welder to make good cans. While the welder is making cans, turn the 'Voltage' rotary switch around from 0 to 9, using a suitable small screwdriver. Turn the switch down from 9 until only the green L.E.D. above this switch is lit, then turn it down one more position.

d.) Use the same procedure to adjust the 'Current' switch. If the ‘Overrange’ L.E.D. is illuminated on the adjacent Display Board, reduce each of the voltage and current switches by one or more positions until it is off.

e.) Using a suitable screwdriver, adjust the 'Energy' potentiometer while watching the Quality Coefficient display on the Display Board. When you adjust this control from fully counter-clockwise to fully clockwise while making cans, you should see that the Quality Coefficient number enters a 'dip' area around the middle of the range - it falls, remains low for perhaps a couple of turns of the 'Energy' potentiometer, then climbs quickly back to about the same level as it was before. Adjust the 'Energy' control until the displayed number is at its lowest value between the two high end points. The *optimum* point is where the numbers just begin to rise quickly while turning the control clockwise.

f.) Adjust the Contamination Level Control in the same way as for the Mk.III Analogue Board.

g.) Adjust the Blanking Pulse width and delay in the same way as for the Mk.III Analogue Board.

The setup or 'tuning' of the Analogue Board is now complete. Turn the display board output switch 'on' to enable the reject station, and switch the integral interface board output on. Proceed to adjust the Comparator Board settings for best production monitoring.

Analogue Board Mk.IV - Typical Settings

Voltage Rotary Switch - to suit situation, preferably mid-range (2-7)
Current Rotary Switch - as above

Upper Slide Switches Settings

1 (Left on upgraded board, otherwise Right)
Left = Power Monitoring Right = Energy Monitoring
2 (Right) Not used
3 (Right) Not used
D (As needed) Invert polarity of B89/NS1-1 signal input ('sync signal' for blanking pulse)

1	(Right)	L = To end of seam	R = Contam. current shutdown 22ms.
B	(Left)	L = During Blanking Pulse	R = Contam. inhibit variable (with CONTAM pot)
C	(Right)	L = Contam. signal from voltage	R = From energy waveform
D	(Left)	L = As set on switch above	R = From power waveform (disregard switch setting above)

Lower Slide Switches

A	(Left)	L = Blanking Pulse delay on pot	R = Sync signal extend on pot
B	(Left)	L = Blanking Pulse adjustable	R = BP length fixed (= sync signal)
3	(Right)	L = Extend sync signal	R = Fixed sync signal
4	(Right)	L = Coarse BP delay adjust	R = Fine BP delay adjust

On Board Jumper Links - BE SURE TO SET THESE CORRECTLY TO AVOID DAMAGE TO THE BOARD OR CURRENT PICKUP

LK2 Left)
LK1 Left) These settings correspond to the 'SEARCH COIL' Setting

LK2 Right)
LK1 Right) These settings correspond to the 'CURRENT PICKUP' Setting

The three 'FREQUENCY' links are to be set on the appropriate row to suit the frequency of the welder.

Test Point Signals

The 15-pin D-type socket on the front panel of the board is numbered in the standard way for this type of socket (see diagram below). Many of the signals correspond to those found on the Mk. III Analogue Board, and their equivalent test point numbers are given. View the signals with an oscilloscope (preferably a dual-channel type), using pin 1 as the ground (0V) reference.

1 Ground (zero volts) reference of Monitor power supply.

3 Voltage-to-frequency converter signal to be adjusted with 'ENERGY' pot when the top slide switch is in the Right (Energy) position. To be adjusted with the 'OFFSET' pot when the slide switch is in the Left (Power) position. Equivalent to TP22 on Mk.III Analogue Board.

4 Divider signal equivalent to TP27 on Mk.III Analogue Board.

5 Integrator signal.

6 Multiplier signal (TP25).

7 Filtered, amplified Voltage input signal (TP26).

8 Voltage input signal (TP23).

10 Reference level for Contamination Failure detector.

11 Contam Inhibit Pulse (TP28). Adjust Duration with 'INHIBIT' screwdriver pot.

12 Zero Crossing signal.

13 Phase shifted Current input signal (TP24).

14 Filtered, amplified Current input signal.

15 Current input signal (TP21).

INSTALLATION INSTRUCTIONS - VERTEX SEMICONDUCTOR CURRENT PICKUP (Part No. WMCPU) FOR USE WITH MK.IV ANALOGUE BOARD

The Vertex WMCPU Current Pickup for the WM-3 series of weld monitors is a replacement for the earlier Search Coil. It is mandatory for use with welders equipped with the 'Unisoud' power supply, and offers improved performance when used with all other types of bodymaker power supply (rotary converters and solid-state inverters). When used with the Unisoud high-frequency supply, it is paired with the Mk. IV Analogue Board, which has the necessary high-frequency capability.

The Current Pickup is comprised of two elements: the pickup unit which is clamped around the copper current busbar, and the power supply, which is usually mounted inside the Weld Monitor cabinet.

Vertex now supplies an Installation Kit comprising pre-made cables and connectors which greatly simplifies the installation.

Installation.

Read the rest of this section before choosing a position for the small power supply printed circuit board (typically above the main power unit on the back wall of the Monitor cabinet. Drill two holes in the back wall of the Monitor Cabinet (2" spacing, horizontal orientation, 4-40 clearance) to match the spacing of the two mounting pillars of the small Current Pickup (CPU) power supply board. Do not mount the board until you have completed the wiring changes below. Remove the four screws holding the smaller round 8-pin socket to the back wall of the cabinet. Pull the socket completely inside the cabinet and plug the new plug into it. Be sure to rotate the 'bayonet' ring to secure the plug to the socket. Mount the new socket in the back wall to replace the original. The two cables from this socket are connected to the terminal block marked 'V' on the CPU power board (either wire to either terminal, shield wires to ground – see below).

The four-wire cable from the new plug is connected to the four-way terminal strip on the CPU board (red to 12a, yellow to 13a, green to 15a, blue to 17a).

Make a suitable hole in the back wall of the cabinet near the CPU board and mount the six-pin metal socket. The six-core cable is led to the six-way terminal strip on the CPU board. Gently open each terminal in turn by pressing on the spring-loaded white lever with a small-bladed screwdriver. Insert the appropriate color wire as marked on the surface of the CPU board.

Gather the ground wires from the four cables and attach them to a suitable ground point such as the capacitor mounting screw on the main power supply unit.

Connect the +24V and 0V terminals of the CPU to the internal power supply unit of the Monitor using the two-wire cable supplied. BEWARE! the positive and negative wires on the Power Supply unit may be the same color - check which is which before turning on!

Addendum to Setup Instructions for Vertex Mk.IV Analogue Board used with CMB WM-series Weld Monitors installed on Soudronic bodymakers having 'Unisoud' power supplies

Introduction

This document is provided as an extension to the original Instructions which include important details of default switch settings and test point pin signal allocations. It offers a more comprehensive sequence of settings to facilitate the adjustment of 'difficult' installations.

Procedure

1. Refer to the original Instructions for the default switch settings recommended for this Board. Disable the Monitor's Integral Interface Board by setting its switch to the 'OFF' position, and turn off the air supply to the reject station.

2. Refer to the diagrams below for typical waveforms and voltages to be found on the various test point pins on the 15-way connector on the front panel of the Board. Test pin connections are listed on the fourth page of the original Instructions.

3. With the top slide switch on the front panel in the right-hand ('Energy') position, attach an oscilloscope probe to test pin 3 on the 15-way test connector on the front panel of the Analogue board. Work with the 'trigger' control on the 'scope to obtain a stable image of the waveform similar to the one shown on the energy waveform diagram below.

4. Adjust the rotary 'Voltage' switch clockwise from zero until the waveform exhibits a flattened top as the signal exceeds the supply voltage. Back off as necessary to achieve a result just below the setting which flattens the top of the waveform.

5. Repeat as in 4 above for the 'Current' rotary switch. The final result should be a combination of Voltage and Current settings as high as possible without flattening the top of the pin 3 signal waveform.

6. Observe the pin 3 waveform carefully. Adjust the 'energy' multi-turn potentiometer and watch for a lowering of the waveform. The correct adjustment corresponds approximately to the lowest overall magnitude of this waveform. Refer to the diagram to see the two 'tell-tale' points which can be equalized to achieve this. These two points rise and fall alternately – at one point the left-hand point will be higher than the right-hand one, then after adjustment the opposite is the case. The optimum setting is when they are both at the same level.

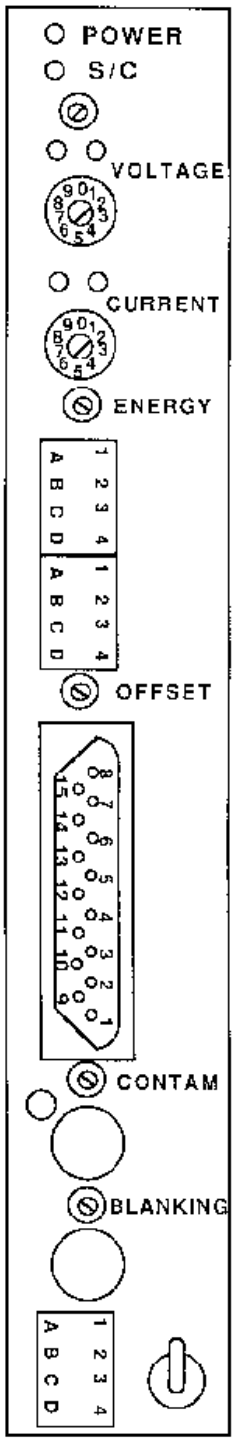
7. Observe the Quality Coefficient number on the Display Board and note its value. Adjust the 'energy' potentiometer referred to above in paragraph 6 and watch for the rise and fall of the display number. Its behaviour should be as described in the original Instructions – after moving the potentiometer counter-clockwise several turns, it should fall while adjusting clockwise. After a moderately steep fall, it should be at a low level close to the number

noted above, then rise more quickly to a higher level. The optimum setting is at the lowest value obtainable. This should be close to the 'balance point' established in 6 above (if not, repeat the procedure and review the changes in the display number). The 'lowest value' setting is preferable to the 'equalized tell-tale points' setting, although they should be close together.

8. If difficulty is experienced in obtaining a satisfactory numeric display by the above procedure, return to the Voltage and Current switch settings after finding the optimum adjustment. It may be possible to raise the Voltage and Current switch settings further without introducing a flattening of the waveform, after which the final stages of the adjustment can be repeated, usually achieving a higher display number.

9. **The following applies to Mk. IV Analogue Boards which have been upgraded**. If you don't know whether your board has been upgraded, please contact Vertex for guidance. Slide the top switch to the left-hand ('Power') setting and note that the waveform is now almost a flat line, typically one or two volts above zero. Adjust the 'Offset' potentiometer to achieve the least possible 'castellation' or jaggedness on the waveform. You should be able to find a smooth waveform midway between jagged waveforms. Note that the Quality Coefficient should be similar in value to the previous Energy setting. For upgraded boards, it is considered preferable to run in the 'Power' mode, which compensates for unbalanced thyristor packs and some other conditions.

MK.IV ANALOGUE PANEL



Short Circuit (S/C) Sensitivity Adjust

Voltage Input Gain Adjust

Current Input Gain Acjust

Energy Mode Adjust

Upper 'DIP' Slide Switches

Waveform Linearity Adjust

15-pin Test Points Socket

Contamination Inhibit Adjust

Contam Fail Level Adjust

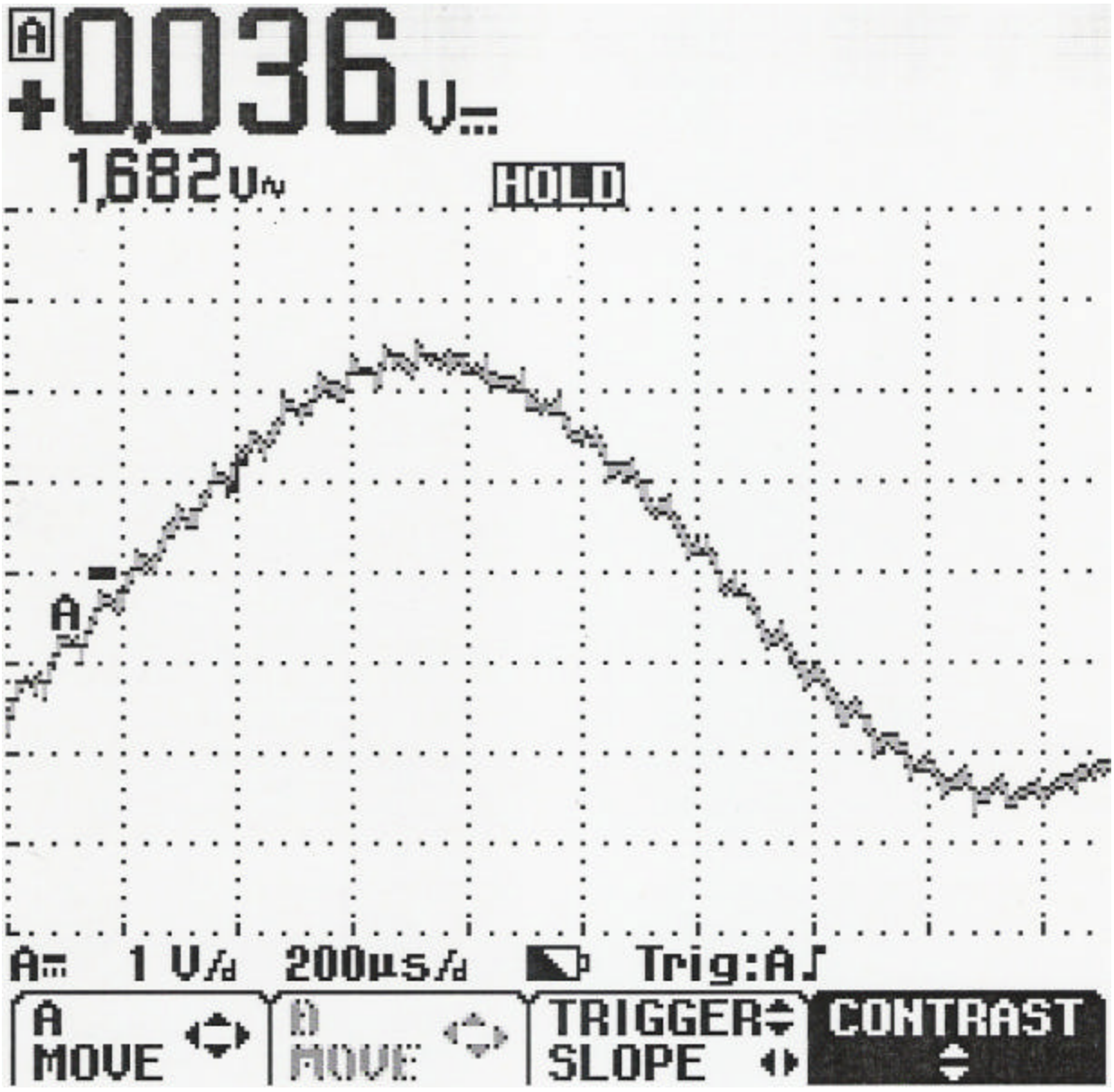
Blanking Pulse Width Adjust

Blanking Pulse Delay Adjust

Lower 'DIP' Slide Switches

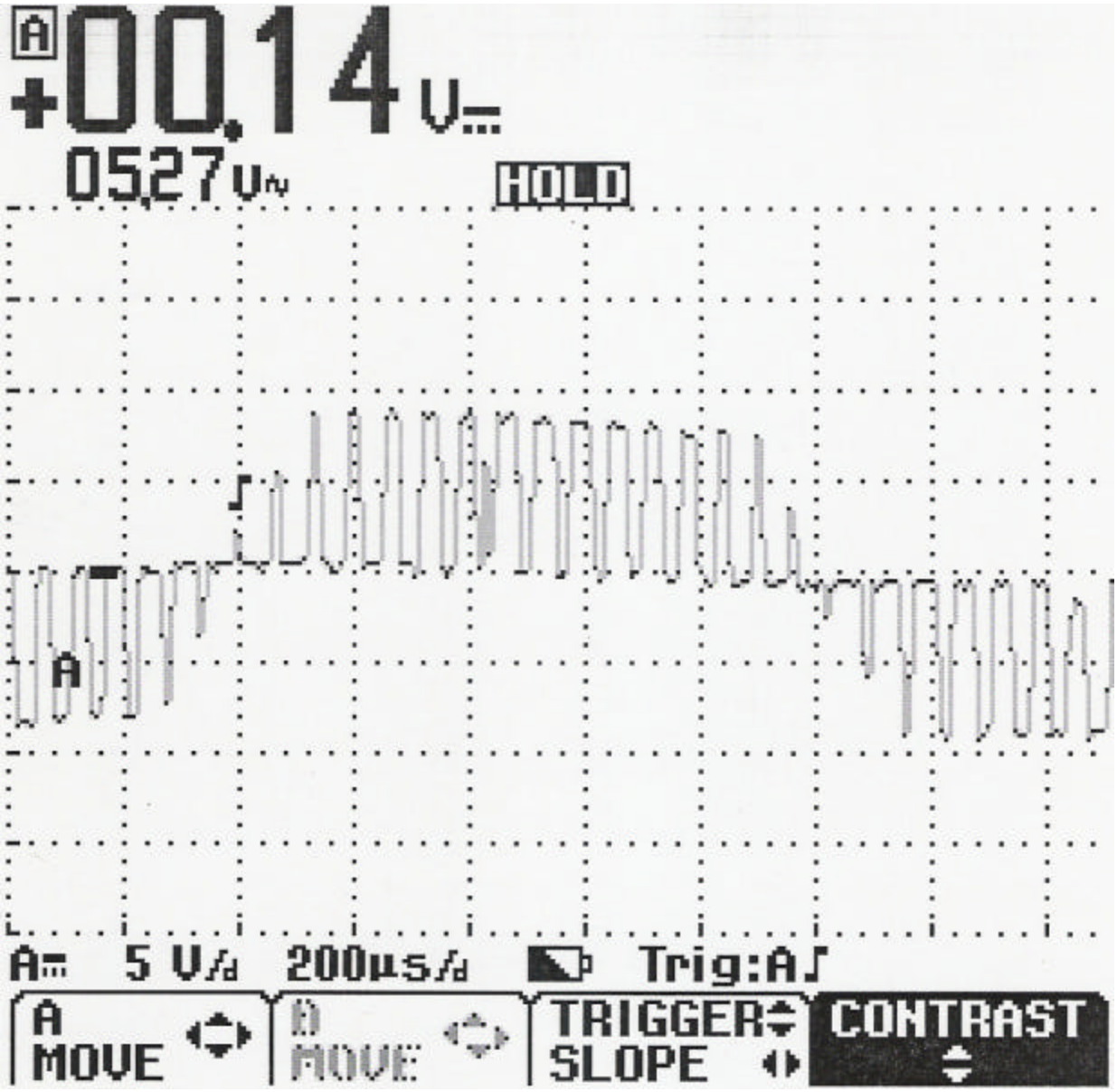
Blanking Pulse Setup Switch

Typical Current Waveform



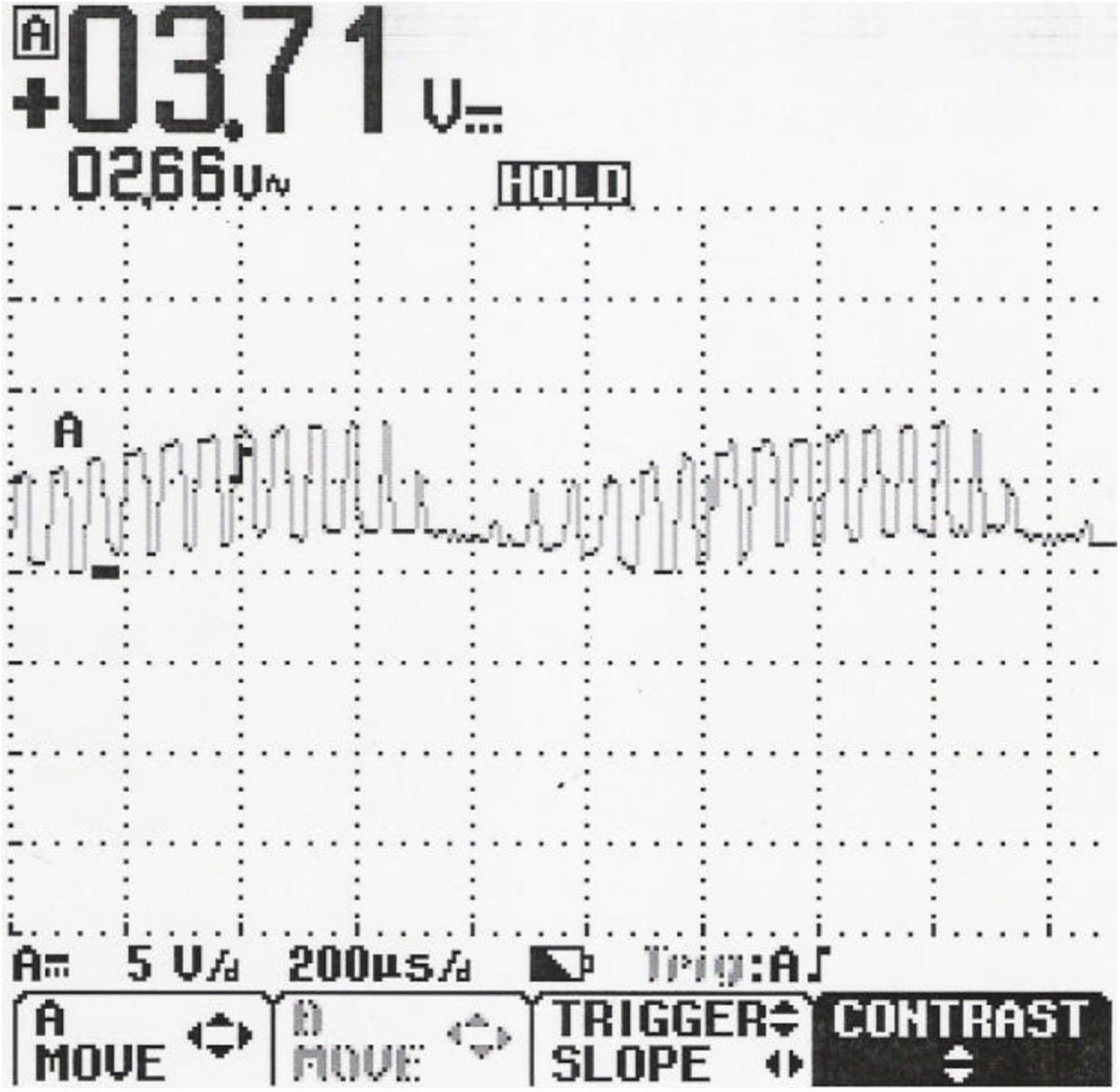
This is a typical waveform visible on test point pin 15. It represents the unmodified current signal, so it does not vary when the Current switch is rotated.

Typical Voltage Waveform



This is a typical waveform visible on test point pin 8 It represents the unmodified voltage signal, so it does not vary when the Voltage switch is rotated.

Typical Energy Waveform



This is a typical waveform visible on test point pin 3. It represents the processed energy waveform, and varies as the ‘Energy’ potentiometer is rotated during the setup procedure.