Flow Sentry® Monitor
Model NFS-1

Part 104 350A

NORDSON CORPORATION • AMHERST, OHIO • USA

ISSUED 11/83 SUPERSEDES

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LITHO U.S.A.

Nordson Corporation
Finishing Equipment Division, Amherst, Ohio 44001

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MODEL NFS-1
FLOW SENTRY CONTROL

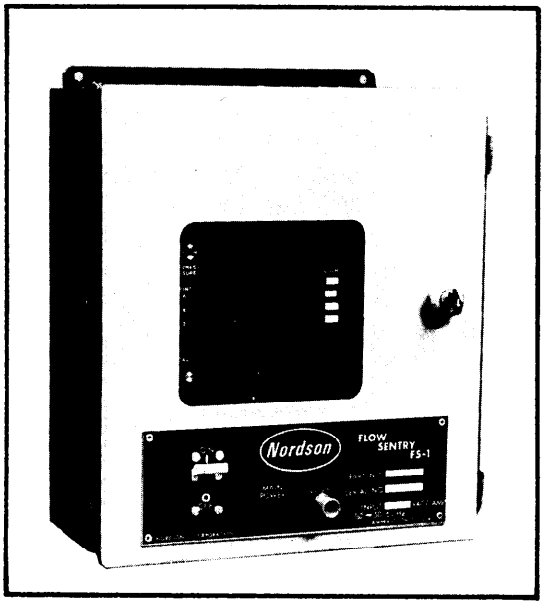

Figure 1 - Model NFS-1 Flow Sentry Control

DESCRIPTION

The Model NFS-1 Flow Sentry is a detection system used in the can industry and high speed container coating operations to monitor flow output and pressure variations. The NFS-1 monitor is designed to activate a signal that would indicate a high or low abnormal flow of the gun due to a worn or clogged nozzle. The unit will also indicate rapid pressure drop by monitoring gun pressure.

The simple and compact design of the NFS-1 offers the capability of monitoring a system having one to four guns and can be interfaced with in-plant process control equipment. The multi-board system makes it easy to optimize serviceability and allows the servicing of one channel while others are still in operation.

SPECIFICATIONS-NFS-1 MONITOR

	U.S.A.	METRIC
Dimensions		
Height	14 inches	35.6 cm
Width	12 inches	30.5 cm
Depth	6 inches	15.25 cm
Weight	22 lbs., 8 oz.	10.2 kg
Ambient Temperature	32°F to 140°F	0°C to 60°C
Electrical Voltage	100V/120V, 200V/240V 50 or 60 Hz	
Max. Current Draw	1 Ampere	

INSTALLATION

General

Mount the A14A gun and timer in desired location. Refer to the A14A manual and the timer manual for proper hook-up and mounting specifications. Run the system as a normal operation prior to the hook-up of the NFS-1 Monitor to insure proper operation of equipment. Shut system off including any electrical input after system operation has been checked out.

Transducer

After mounting the transducer into the A14A gun (see A14A manual), locate the preamp and mount it no more than 18 inches from the A14A gun. The preamp is a device that amplifies the transducer signal from the A14A gun and sends the signal to the NFS-1 Monitor. Take the end of the transducer cable and plug it into the preamp outlet (Figure 2).

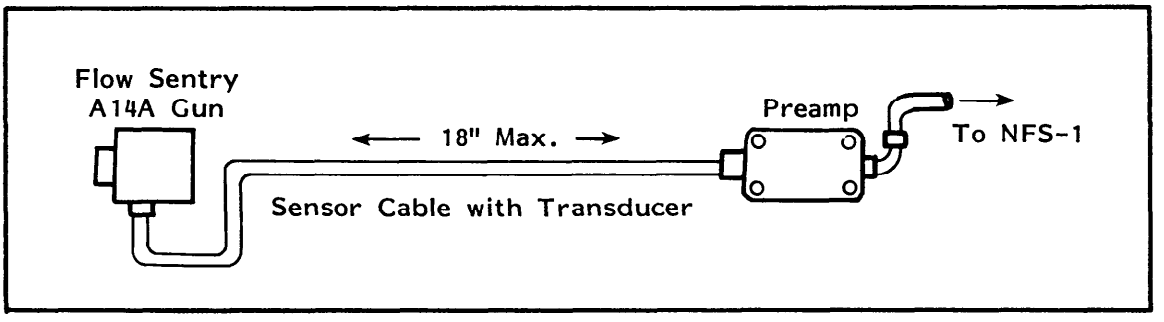

Figure 2

NOTE: Preamp must be ordered separately.

Preamp

Once the transducer has been connected to the preamp, the next step would be to connect the preamp to the NFS-1 Monitor. Figure 3 illustrates the wiring diagram to be utilized on hook-up. It is recommended that 14 to 22 gage stranded wire be used to wire the preamp to the NFS-1. Wires one and two carry the amplified transducer signal to the NFS-1 Monitor and should be twisted together and/or individually shielded from the other wires as well as each other. Shield should be grounded on one end only.

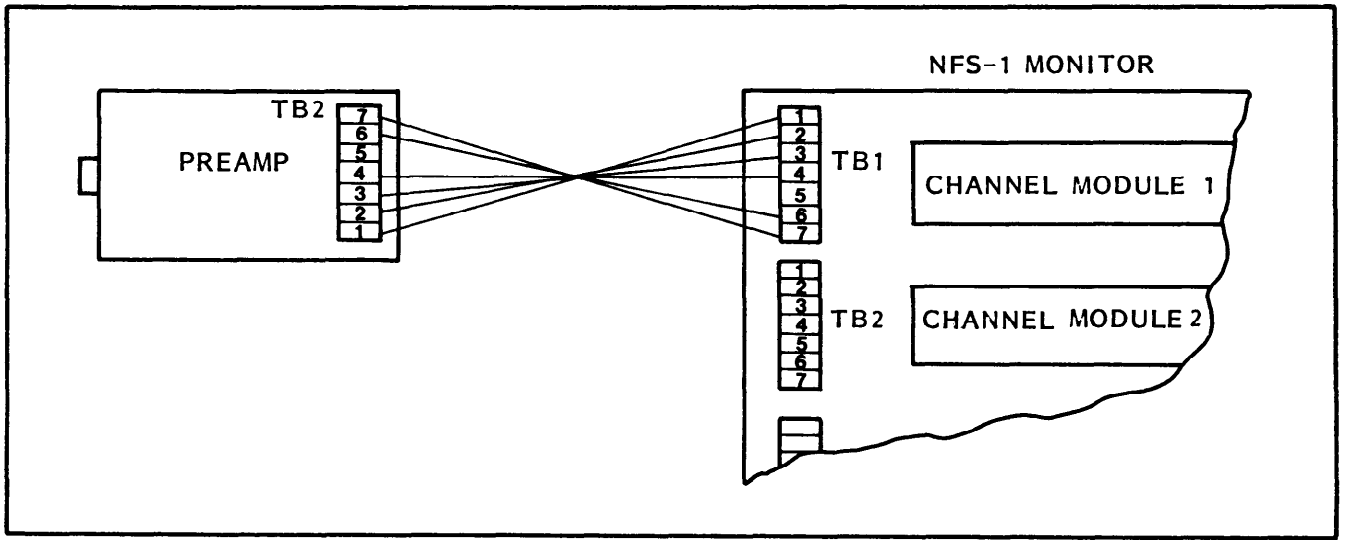

Figure 3

INSTALLATION (Continued)

NOTE: Do not directly expose the NFS-1 Monitor to heat, solvent, or vibration.

An individual preamp and a relay and channel circuit board kit must be ordered for each A14A gun with transducer.

Timer

The NFS-1 Monitor must be hooked up to the timing device in order for it to accurately perform its intended function. Figure 4 illustrates proper electrical hook-up. It is recommended that 14 to 22 gage stranded wire be used. Tap a set of wires into the solenoid coil wires leading to the timer. Tie in the other end of the wires into TB-5 terminal board of the NFS-1 Monitor marked Gun 1, Gun 2, etc. (Figure 5).

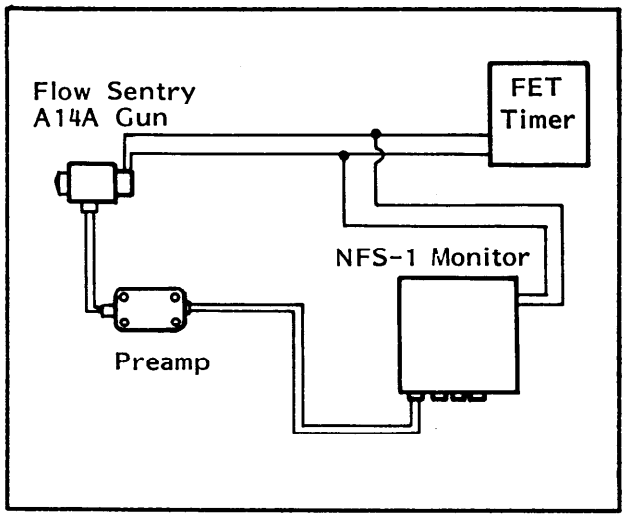

Figure 4

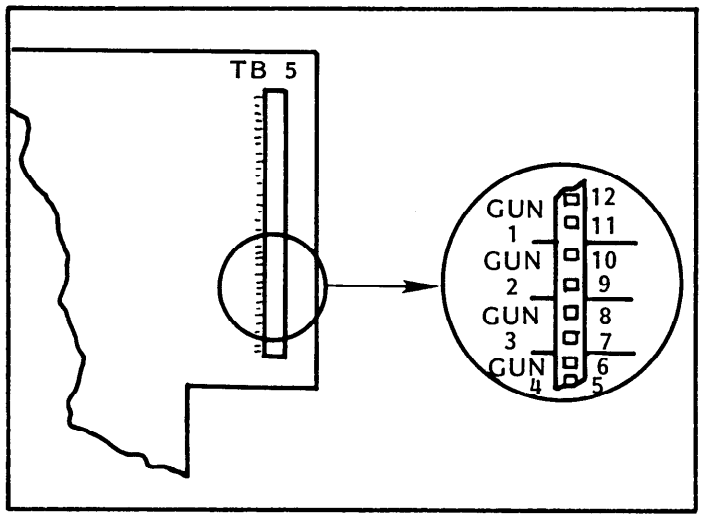

Figure 5

External Alarm

The NFS-1 Monitor is designed to accommodate an external alarm device. Each of one to four gun channels has an individual signal to activate horns, bells, lights or other alarm devices. There are two options to choose from. "Normally Open" (NO) is utilized to activate an external alarm such as light. horn, etc. "Normally Closed" (NC) is utilized to shut down a piece of equipment or to interrupt the flow of cans to the machine and at the same time alert the operator of the malfunction. NO and NC can be used at the same time. Terminal C is the "Common" connection (Figure 6).

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INSTALLATION, (Continued)

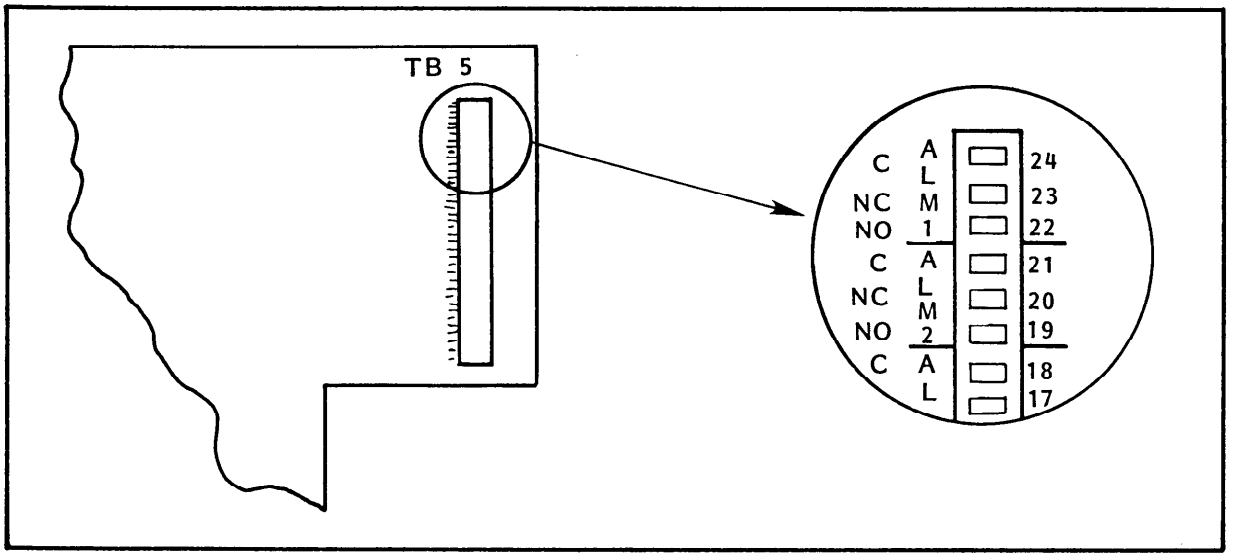

Figure 6

NOTE: Reset button on front cover of NFS-1 Monitor must be reset each time the alarm is activated in order to resume operation.

External alarm limit: (10 amps @ 120 VAC or 30 VDC, 7.5 amps @ 240 VAC)

Intrinsic Safety Device

The NFS-1 Monitor is designed to accommodate an intrinsic safety device. The safety device prevents line spikes of electrical current from bleeding back from the NFS-1 Monitor, through the preamp and to the gun. It is recommended that an intrinsic safety device be used when spraying solvent base material to prevent possible ignition of coating materials. Figure 7 illustrates a wiring diagram. Disconnect the green wire from TB6 - Terminal 4 in the NFS-1 Monitor when using an intrinsic safety device.

The preamp, and A14A Electric Gun are Instrinsically Safe/Securite Intrinseque when CSA Certified safety barriers are used with the following ratings:

Barrier A .....+6VDC, 63MA DC, 83.5 OHM
Barrier B .....+18VDC, 63MA DC, 206 OHM
Barrier C .....-18VDC, 63MA DC, 206 OHM

WARNING: Substitution of components may impair intrinsic safety.

Avertissement: La Substitution De Composants Duet
Comprometter La Securite Intrinseque

INSTALLATION, (Continued)

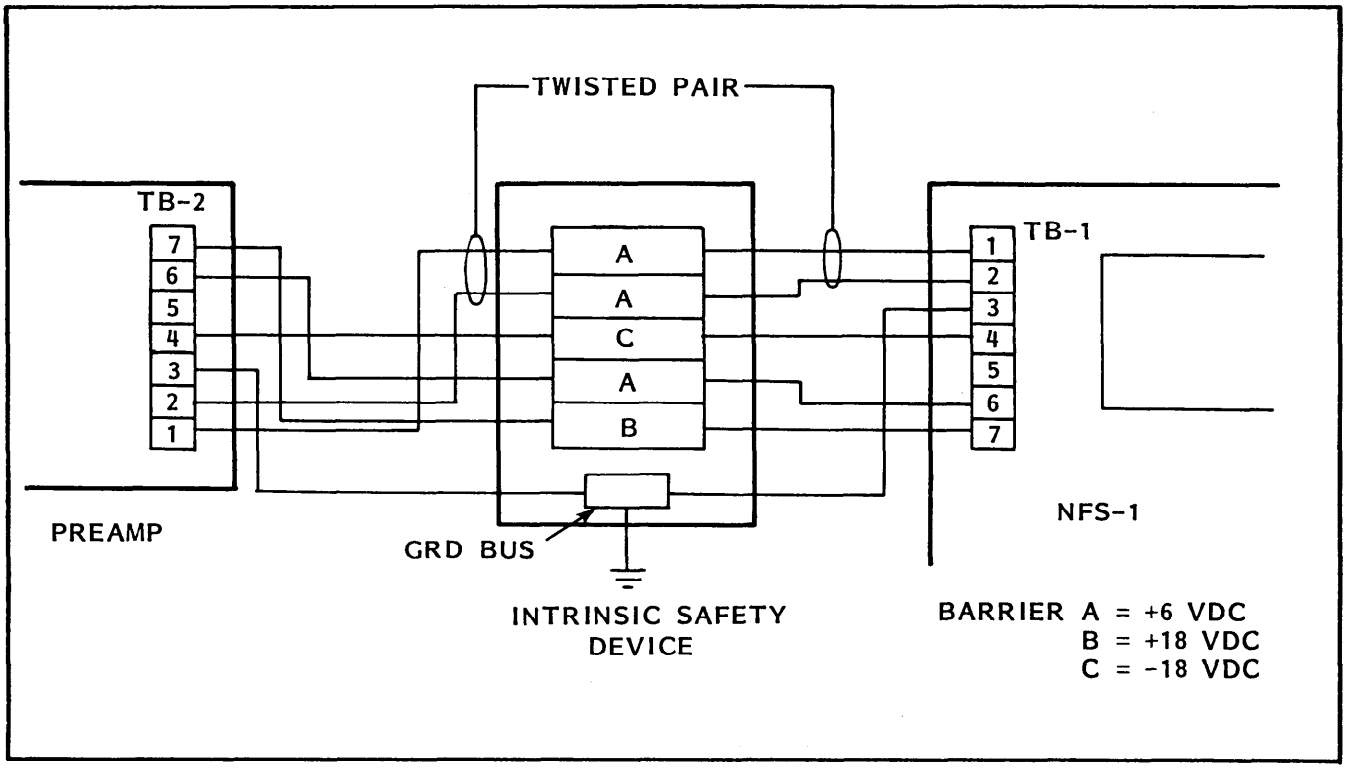

Figure 7

The preamp has a jumper that must be switched when using an intrinsic safety device. The jumper is in the "1" position for normal operation. When used with the intrinsic safety device, you must switch the jumper in the preamp to the "2" position. See Figure 8.

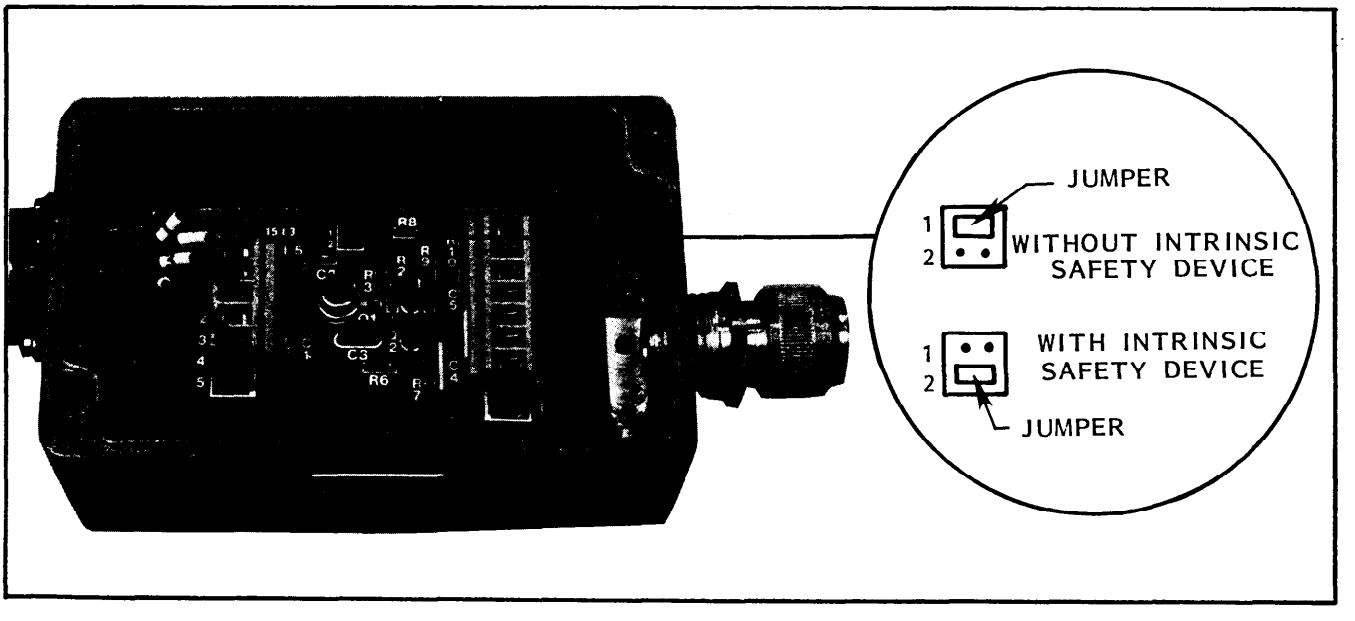

Figure 8

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INSTALLATION, (Continued)

Electrical Input

To make the electrical input connections, follow these steps:

1. Confirm the voltage requirements of the NFS-1 Monitor. Check the nameplate for part number and voltage specification.

   NOTE: Do not field convert the NFS-1 Monitor from one voltage requirement to another.

2. Remove the black cover on the input voltage terminal (Figure 9) to expose the input terminal screws.

3. Hook up the black input line to terminal 1, the white neutral to terminal 2 and the green ground to terminal 3.

4. Replace cover over terminal board.

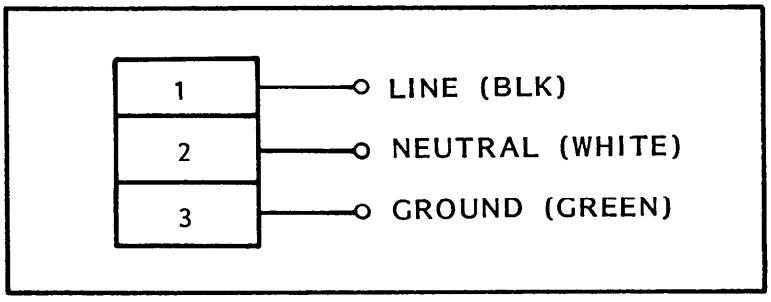

Figure 9

Make certain the NFS-1 cabinet is properly connected to earth ground. Wiring from the NFS-1 to the preamp must be installed in rigid or flexible metal conduit. The conduit must be conductively connected to ground metal of the NFS-1.

To avoid electrical shock during installation and troubleshooting install power isolating device on the service line ahead of the NFS-1 Monitor. Using the device, shut off all power to the timer during installation and service operations.

NOTE: Make sure electrical hook-up is performed by a qualified electrician according to local electrical codes.

OPERATION

Counter and Flow Jumper Selection

Locate the power circuit board inside the NFS-1 Monitor. Select the appropriate count by pushing in the button opposite the number desired. There are four selections to choose from -- 2, 4, 8 and 16. For example, if the 4 is selected, the monitor will activate the alarm when four consecutive cans are improperly sprayed. One good can resets the counter if the trip point (switch selectable) is not exceeded (Figure 10).

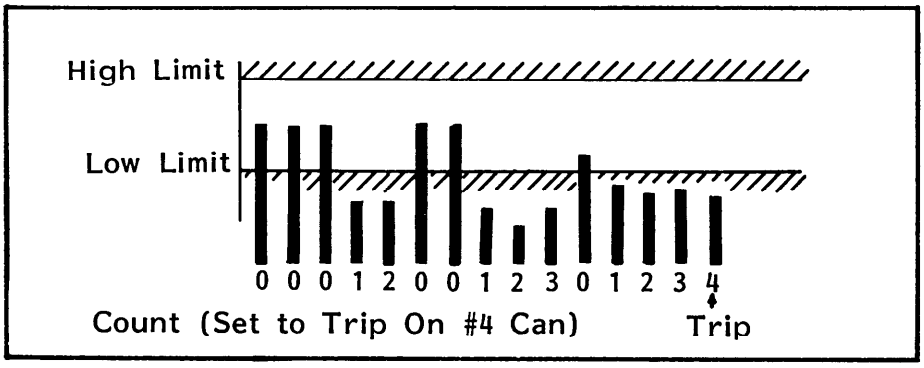

Figure 10

The high flow trip point is automatically fixed at 110% of normal flow. The low flow trip point can be set at 90%, 80%, or 70% of normal flow by moving the jumper on the channel circuit board (Figure 11).

After making sure that all power has been cut off to the NFS-1 Monitor, pull the Channel Circuit Board out from the mother board. Next, simply pull the jumper straight out from its present location and plug it in the desired terminal.

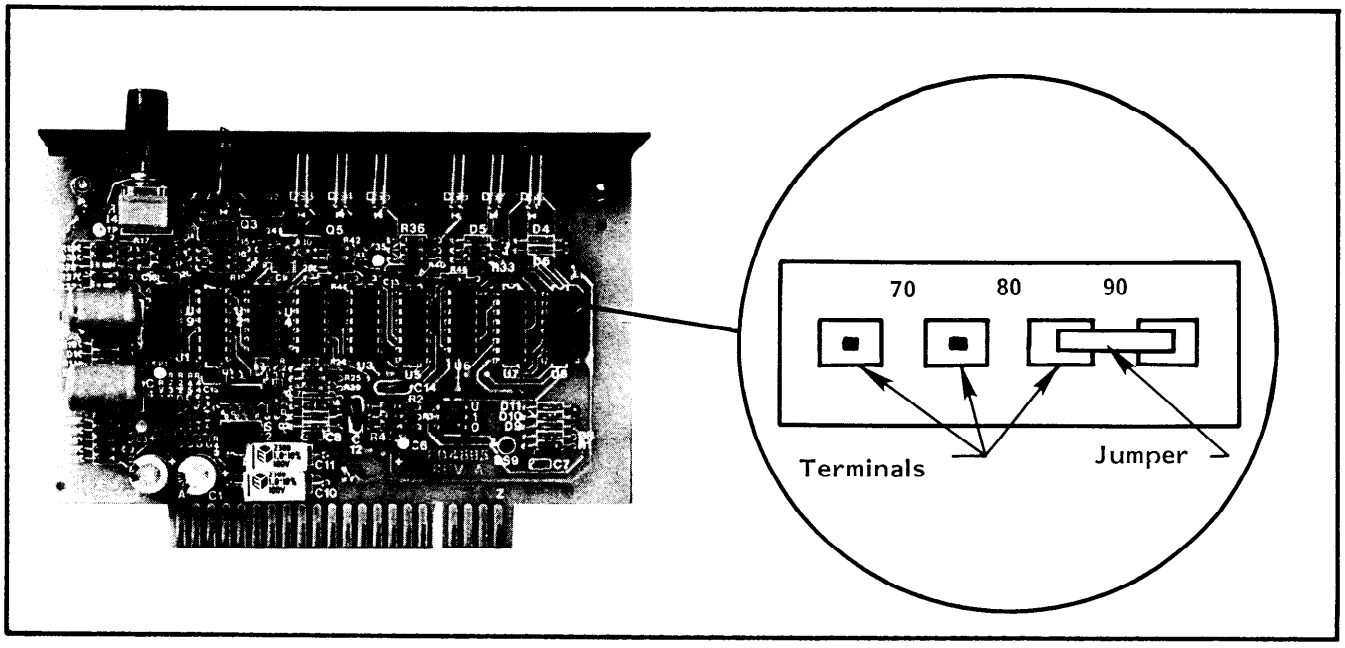

Figure 11

OPERATION, (Continued)

Pressure Jumper Selection

The hydraulic system pressure monitor responds to rapid pressure drops rather than slow changes. The monitor will activate the alarm if the pressure drop falls below the preselected value of the normal operating pressure (Figure 12).

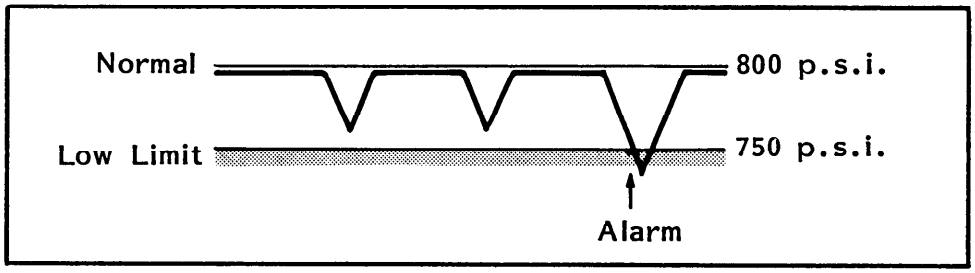

Figure 12

To set the pressure selector, locate the Channel Circuit Board and remove it from the mother board. There are four settings to choose from -- 50 PSI, 100 PSI, 200 PSI and OFF. Locate the jumper (Figure 13) and plug the jumper into the appropriate terminals. Replace the channel circuit board into the mother board.

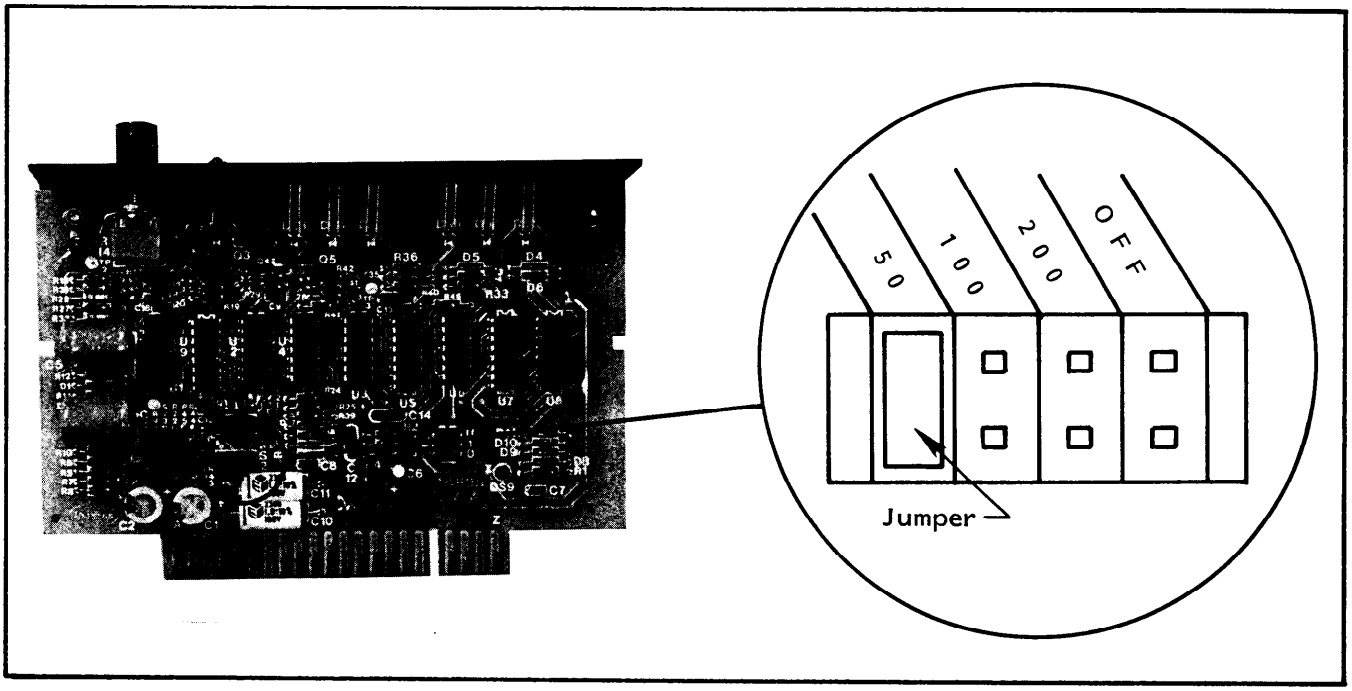

Figure 13

Start-Up

1. Set all jumpers on the Channel Circuit Board to desired settings.
2. Plug Channel Circuit Board into mother board.
3. Turn on power to NFS-1 Monitor.
4. Allow one minute for the NFS-1 Monitor to warm up.
5. Start guns firing.
6. Adjust calibration knob on Channel Circuit Board until calibration lights are of equal intensity.

OPERATION (Continued)

Alarm Analysis

The NFS-1 Monitor is designed as an effective quality control system that senses abnormal conditions in a high speed can coating operation. It performs this function by monitoring the fluid pressure inside the gun. The following information is a list of probable causes for the alarm to engage.

ALARM	PROBABLE CAUSE	CORRECTIVE MEASURE
Low Flow	Nozzle clogging.	Clean or replace nozzle.
	Pump pressure is decreasing.	Check pump for malfunction.
	Gun needle not completely raising off the seat.	Check gun for malfunction.
High Flow	Nozzle worn or broken.	Replace nozzle.
	Pump pressure has increased.	Check pump for malfunction.
	Nozzle nut is leaking.	Check nozzle nut on gun.
Pressure	Pump is cavitating.	Check pump for malfunction.
	Broken Hydraulic lines.	Check hydraulic lines and replace if necessary.
	Ball valve in return line open.	Close ball valve.
	Filter clogging.	Clean or replace filter.
	Worn or dirty ball check in pump.	Check pump for malfunction.
	Pump packings leaking.	Check pump for malfunction.
	Faulty air valve in pump.	Check pump for malfunction.
	Gun needle is not properly seated.	Check gun for malfunction.

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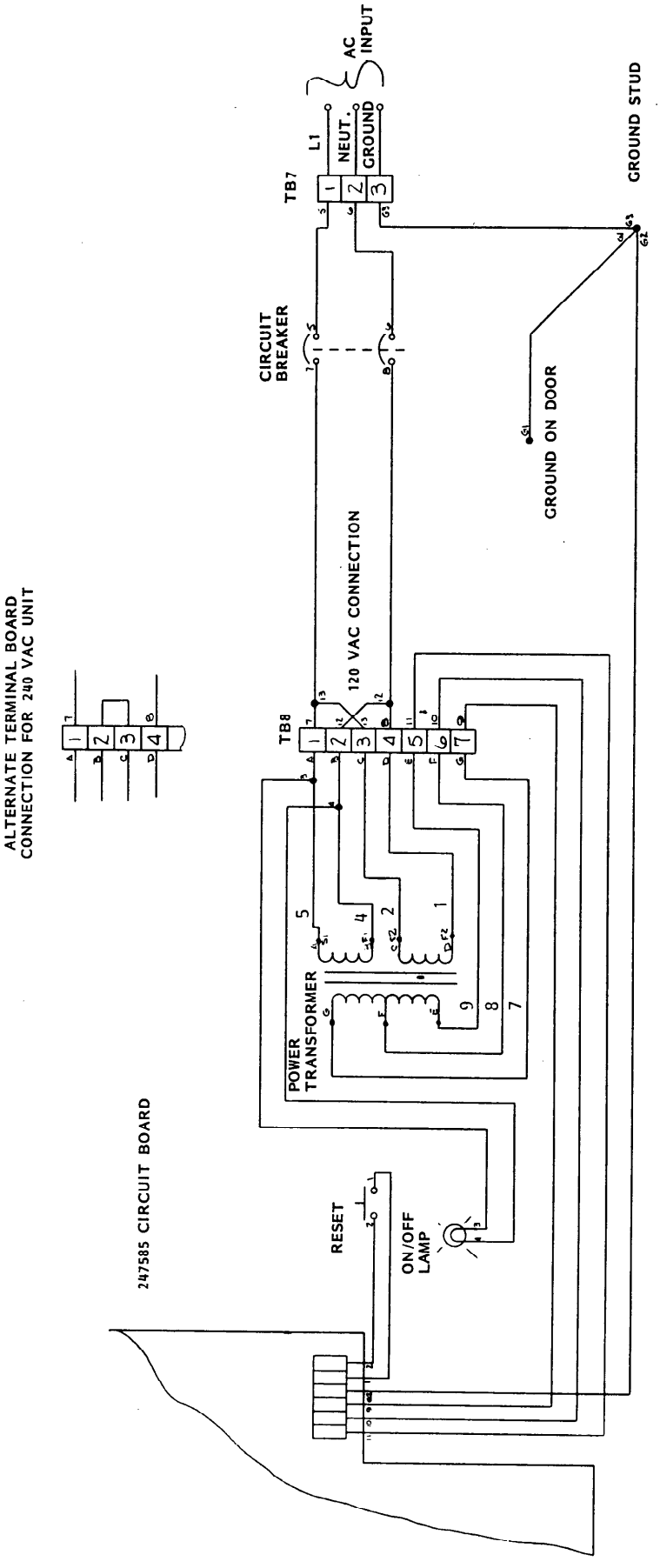
TROUBLESHOOTING

The following chart should be used as a guide to troubleshoot the NFS-1 Monitor.

PROBLEM	PROBABLE CAUSE	CORRECTIVE MEASURE
Low Flow Alarm Engages	Open electrical circuit.	Shut down system and inspect for open circuit.
	Channel board failure.	Replace channel board.
	Preamp board failure.	Replace preamp board.
	Transducer failure.	Replace transducer.
	CO-Plate is oversized or worn.	Check gun for malfunction.
	CO-Plate is oversized.	Check gun for malfunction.
High Flow Alarm Engages	Channel board failure.	Replace channel board.
	CO-Plate clogging.	Check gun for malfunction.
	CO-Plate is undersized.	Check gun for malfunction.
Pressure Alarm Engages	Transducer failure.	Replace transducer.
	Preamp board failure.	Replace preamp board.
	Channel board failure.	Replace channel board.
Calibration Lamps Are OFF	No power to flow sentry.	Check power input.
	Transducer failure.	Replace transducer.
	Preamp failure.	Replace preamp board.
	Channel board failure.	Replace channel board.



Flow Sentry Model NFS-1
Wiring Diagram

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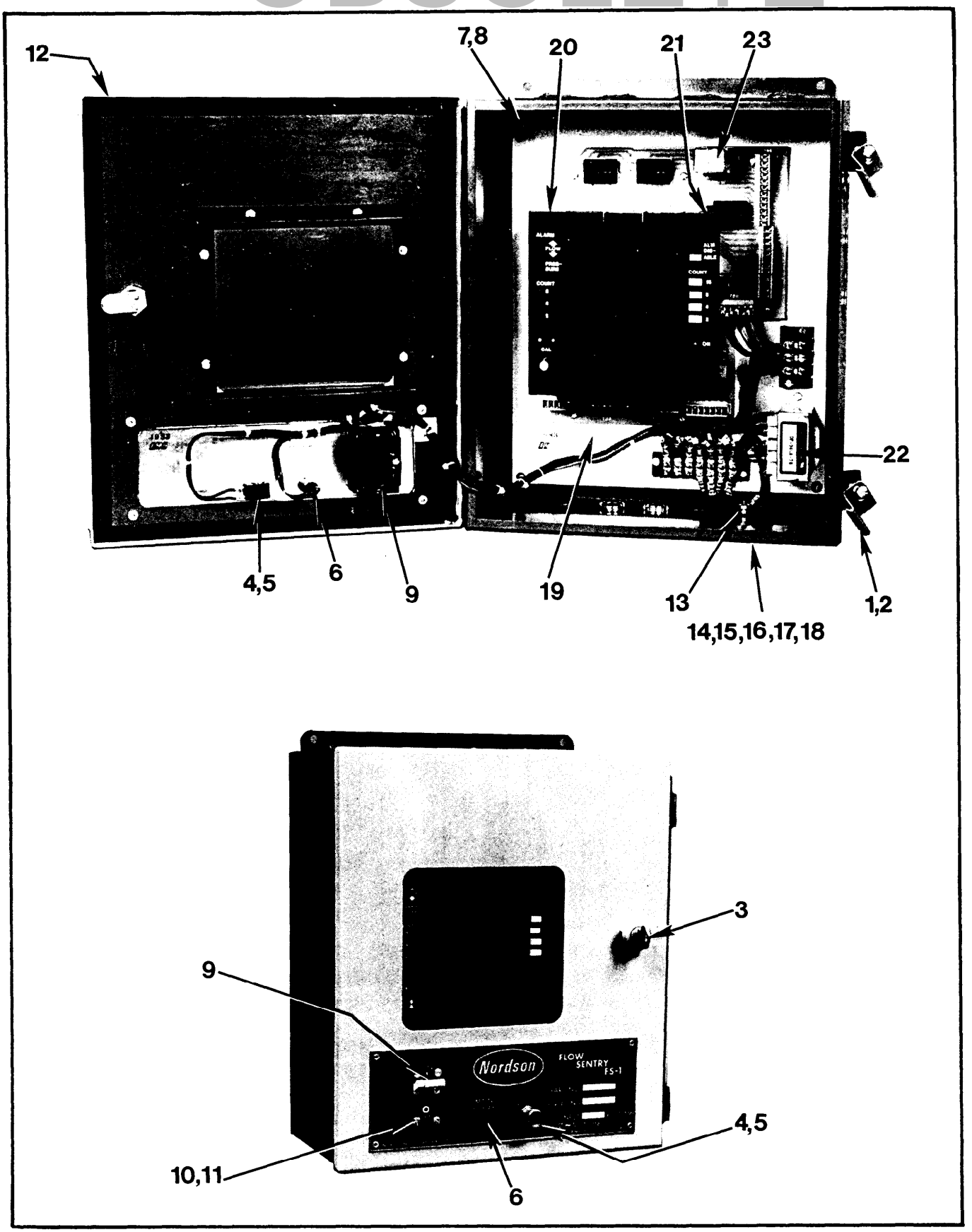

Figure 14 - NFS-1 Monitor

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SUPERSEDES

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NFS-1 MONITOR PARTS LIST

Key	Kit No.	Part No.	Description	Req'd.
–		247 590	Flow Sentry NFS-1 100/120 Volt	–
–		247 591	Flow Sentry NFS-1 200/240 Volt	–
1		242 687	. Latch, Cabinet	2
2		981 232	. Screw, Fil. Hd., 1/4 x 28 x 3/4	2
3		901 587	. Knob, Locking, w/Keys	1
4		937 262	. Switch, Pushbutton	1
5		939 028	. Nut, Dress	1
6		939 265	. Lamp, Indicator, Red, 115V	1
7		983 121	. Washer, Lock #10 Ext. Star	4
8		981 149	. Screw, Rd. Hd., #10-32 x 3/8	4
9		937 263	. Breaker, Circuit	1
10		981 020	. Screw, Pan Hd., #6-32 x 1/4	4
11		983 102	. Washer, Lock Split #6	12
12		242 654	. Gasket, Cabinet	4.2
13		984 101	. Nut, Hex, Mach. #6-32	8
14		240 976	. Clamp, Gnd. w/Wire	1
15		984 129	. Nut, Hex #10-32 Brass	2
16		983 021	. Washer, Flat Brass #10	2
17		983 120	. Washer, Lock, Split #10	2
18		240 674	. Tag, Ground	2
19		–	. Panel, w/Hardware, NFS-1	1
NS		933 203	. Jumper, Terminal Block (200/240V only)	1
21		247 587	. Board, Circuit, Power	1
22		–	. Transformer	1
–	247 679	–	. Kit, Relay & Channel Circuit Baord	–
23		247 741	. . Relay, Subminiature, 12V	1
20		247 586	. . Board, Circuit, Channel	1

RECOMMENDED SPARE PARTS

Key	Kit No.	Part No.	Description
	247 679		Kit, Relay & Channel Circuit Board
23		247 741	. Relay, Subminiature, 12V
24		247 586	. Board, Circuit, Channel
21		247 587	Power Circuit Board

NOTE: The NFS-1 Monitor is equipped for one gun. Additional relays and channel circuit boards (kit 247 679) must be ordered separately for each additional gun.

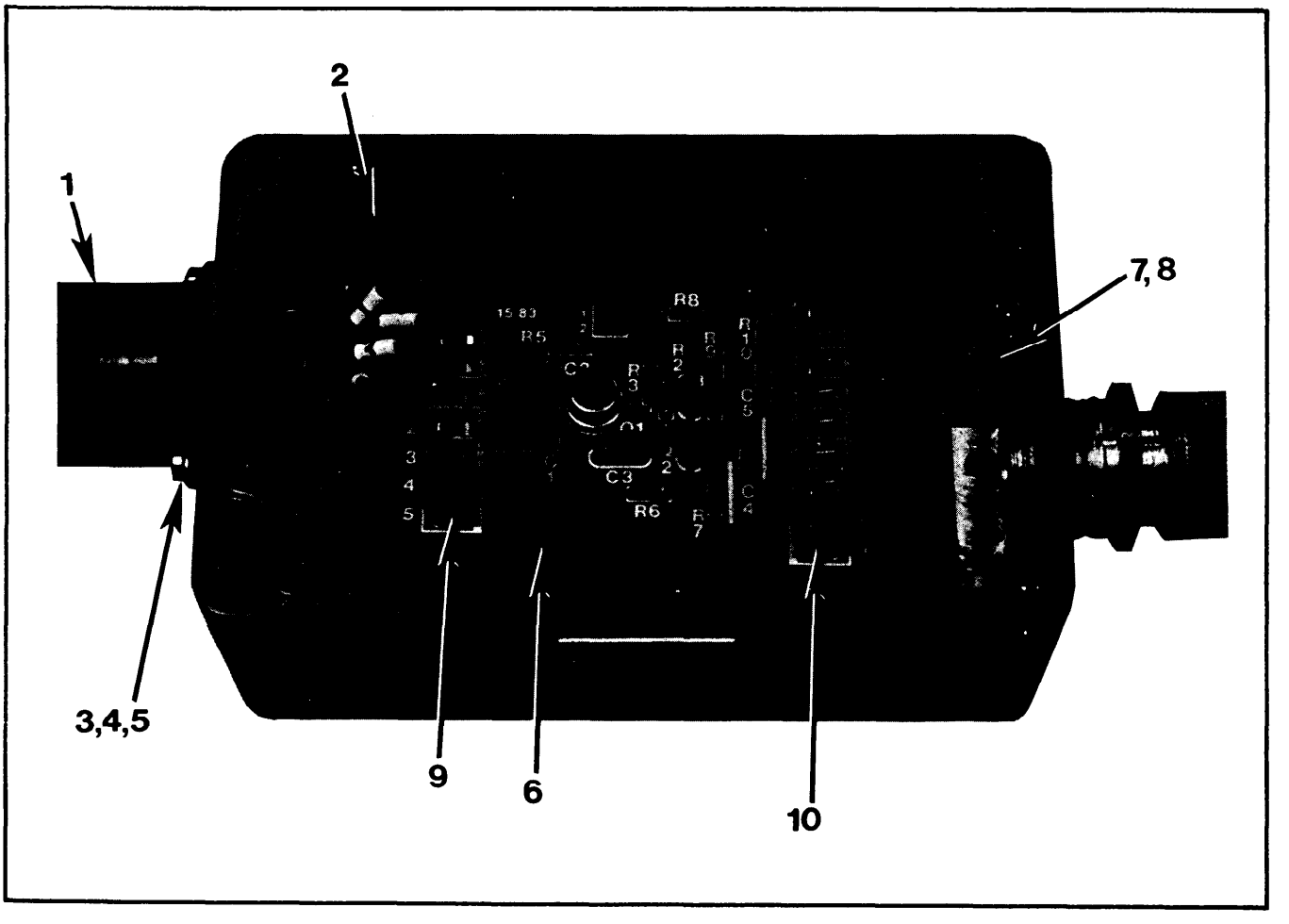

Figure 15 - Preamp

PREAMP PARTS LIST

Key	Part No.	Description	Req'd.
–	247 561	Preamp, NFS-1	–
1	247 562	Receptacle, w/Wires	1
2	–	Enclosure	1
3	982 008	Screw, Fil. Hd., SLT	2
4	983 400	Lockwasher, Split	2
5	983 411	Washer, Flat	2
6	247 588	Board, Circuit, Preamp	1
7	982 096	Screw, Pan Hd., SLT.	2
8	983 416	Lockwasher	2
9	933 343	Connector, Plug, 5 Pin	1
10	933 345	Connector, Plug, 7 Pin	1

RECOMMENDED SPARE PARTS

Key	Part No.	Description
6	247 588	Board, Circuit, Preamp

NOTE: The preamp is not included with the NFS-1 Monitor. The preamp must be ordered separately. One preamp is required for each gun.

OBSOLETE