INIVEN™

INSTRUCTION MANUAL IM-2009

Model IAT ANALOG TRANSMITTER

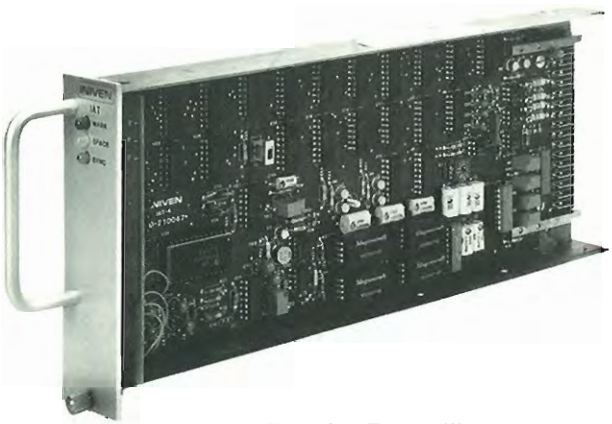


Figure 1. IAT Analog Transmitter

1. DESCRIPTION (See Figure 1)

1.1 The INIVEN™ IAT Analog Transmitter used in conjunction with an INIVEN™ IAR Analog Receiver comprise a 4-channel, high performance, solid-state, analog-digital/digital-analog subsystem. The IAT and IAR provide from 1 to 4 analog variables plus 4 status or alarm conditions to be transmitted over a single INIVEN™ Series 30 FSK Tone Channel.

1.2 The IAT transmits a 24-bit data-word consisting of 12 bits of digitized analog values, 2 bits of channel address, 4 bits of status, and 6 bits of BCH (Bose-Chaudhuri-Hocquenghem) error detection code, followed by a single sync interval. Transmission is three state Return To Zero (RTZ) code structure. Transmission rates are available from 50 to 300 baud, depending on FSK channel bandwidth.

2. SPECIFICATIONS

Analog inputs: 1, 2, 3 or 4.

Input Range: 0-5, 0-10, ± 2.5, ± 5 Vdc strappable. 0-1, 4-20, 10-50, ± 1mA current inputs converted to voltage through external shunt resistors.

Analog Accuracy: .05% @ 25° C
.15% @ -30° TO +60° C

Analog Linearity: .05% @ 25° C
.15% @ -30° TO +60° C

Input Isolation: Flying capacitor.

CMRR: 100 db.

NMRR: 75db standard (R17=R20=100k) @ 60Hz. 43, 58, 92db optional.

Contact Input Voltages: AC or DC voltages. 12 to 48 volts standard. 5 volts or 48 to 130 volts on special order.

Operating Temperature: -30° C to + 60° C (-22° F to 140° F)

Power Requirements: 12 Vdc @ 100mA (not including status input keying).

Operating Humidity: 0-90% non-condensing

Dimensions: See Figure 6

Weight: 1.75 lb. approximately (.79 kg)

3. FEATURES

3.1 Calibration Adjustment—Input voltages accurate within ± 5% may be calibrated to an accuracy ± .024% of full-scale using an internal LED calibration display.

3.2 Contact input isolation—4 opto-coupled with common return, semi isolated. 3 opto-coupled with common isolated return. 2 opto-coupled, fully isolated. (1500 VAC minimum isolation when inputs are powered from separate power supply).

3.3 Output Keying—Open collector to B+ for keying IT-30 FSK transmitter.

3.4 Indicators—Mark, Space and Sync LED indicators mounted on front panel.

4. THEORY OF OPERATION (See Figures 2 and 3)

4.1 The IAT consists of the analog input circuit, precision voltage reference, A/D converter, status input circuit, charge pump, calibration LED display, shift register, BCH code generator, clock control circuit, output stage, and display panel.

4.2 **Analog Input Circuit.** The analog input circuit consists of resistor networks R7, R17, and R20; capacitors C2 through C8; resistors R10, R12, R14, and R16; potentiometers R9, R11, R13, and R15; relays K1 through K4, and U19A connected as a noninverting amplifier using R25 through R27.

4.3 Typically, an analog input voltage applied to input terminals 9 and 10 is routed via scaling potentiometer R9 to calibrate the input level while maintaining a balanced input impedance to both positive and negative input terminals. The low-pass resistor-capacitor network provides filtering to reduce noise. When the input is to be read, relay K1 energizes to apply the potential stored on capacitor C7 to amplifier U19A. U19A amplifies the voltage and applies it to A/D converter U29.

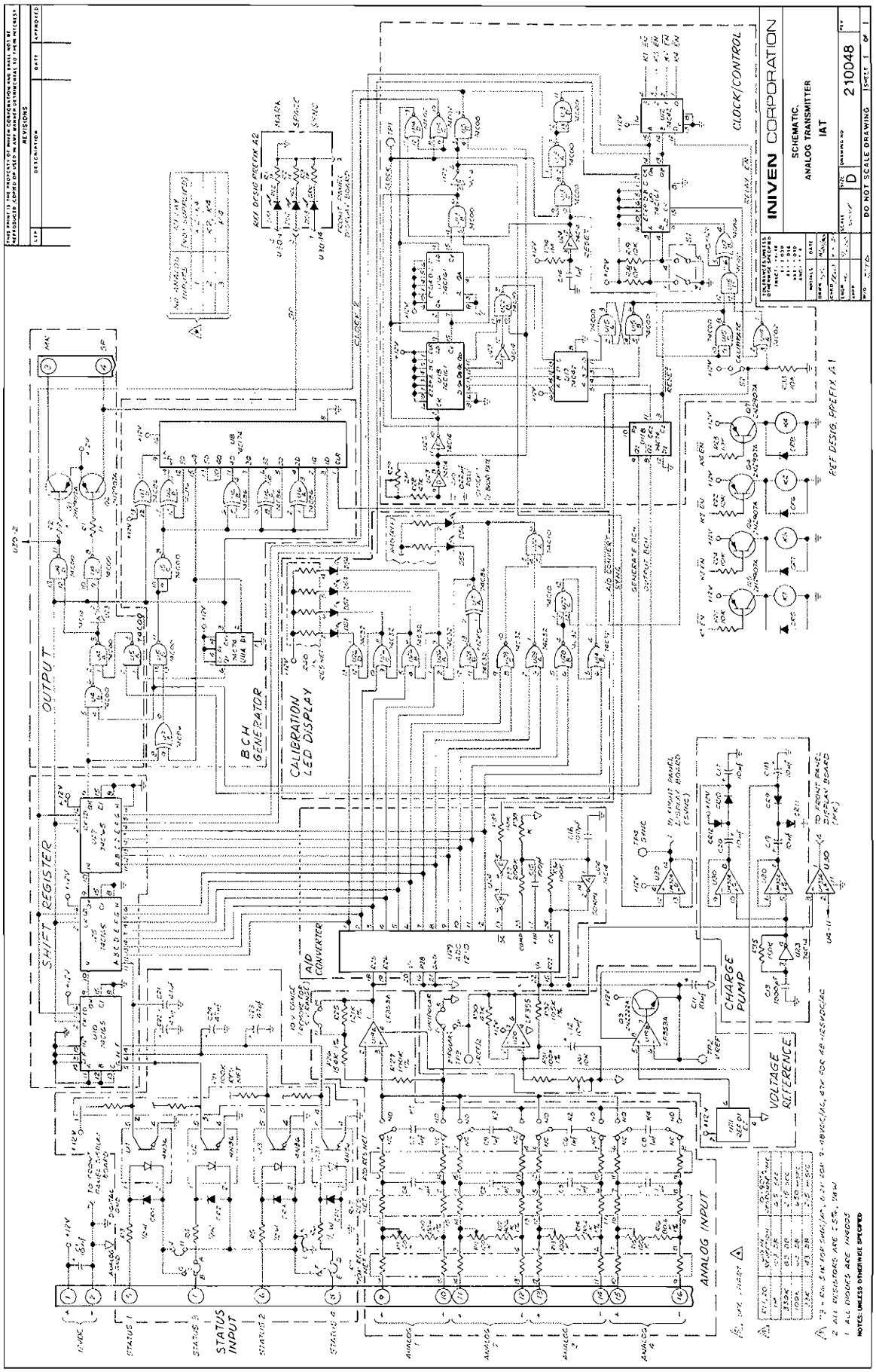


Figure 2. IAT Analog Transmitter—Schematic Diagram

4.4 **Precision Voltage Reference.** The precision voltage reference consists of + 10V precision voltage reference U21, operational amplifiers U20 and U19B, transistor Q3, potentiometer R41, and associated circuitry.

4.5 U21 generates a precise + 10V reference, and U19B and Q3 reproduce that voltage with higher current capability (TP2). This potential is the positive supply and reference for the A/D converter. The potential is also used to generate a precise + 5V reference through resistors R32 and R31, potentiometer R41, and U20 connected as a unity gain amplifier (TP3). The + 5V reference supplies a mid-scale reference for the A/D converter when a bipolar input is used.

4.6 **A/D Converter.** The A/D converter circuit consists of A/D converter U29, inverter U24, and associated circuitry.

4.7 U29 is connected for a 0-10V analog input and produces a 12-bit digital output in complementary binary format (11...11= zero; 00...00= full scale). U24B and U24C with R39 buffer the 0-12V convert command from the clock/control circuit to 0-10V, while U24A, R36, and C16 form a 50-KHz oscillator to provide the clock for U29.

4.8 **Charge Pump.** The charge pump consists of operational amplifiers U30B and U30C, inverter U23, diodes CR9 through CR12, capacitors C17 through C20 and C13, and resistor R35. The pump provides nominally +17 and -7 volts for U19 to allow linear operation and the processing of up to -5 volt inputs. Paragraph 4.9 details U19A supply requirements.

4.9 To ensure that pin 1 of U19 can swing from OV to + 10V, voltages both higher than + 12Vdc and lower than OVdc are required. U23B, R35, and C13 form a 4-KHz oscillator. Current gain is provided by U30C and U30B, to drive the voltage-doubler circuits and provide the necessary power levels.

4.10 Status Input. The status input circuits consists of opto-isolators U1 through U3 and U31, limiting resistors R3 through R6, diodes CR1 through CR4, resistor network R8, and capacitors C21 through C24.

4.11 Typically, a positive potential applied to the input sends current through the light-emitting diode of the opto-isolator, causing its associated photo transistor to conduct, resulting in a LOW voltage at the shift register input. Capacitors C21 through C24 retain the input long enough to allow 60-Hz AC inputs to be used.

4.12 **Shift Register.** The shift register consists of 8-bit parallel-load shift registers U10, U25, and U27. Under control of the clock/control circuit, these registers load the parallel data from the status input and A/D converter circuits and the analog address generated by the control section, and sequentially shift each data-bit to the output and BCH generator circuits.

4.13 **BCH Code Generator.** The BCH code generator consists of flip-flops U8 and U11a; XOR gates U6, U7C, and U7D; and NAND gates U5C and U5D. U6, U8, and U7C comprise the actual BCH generator.

4.14 Under command of the clock/control circuit, U5D halts the input data stream after all the serial data has been accepted from the shift register, and U5C re-inverts the data stream. U7D is also connected as an inverter to provide the proper clock phase. U11A provides a one-clock pulse delay to allow the last data-bit to be output before the first bit of BCH. The BCH code bits are transmitted inverted from the other data bits.

4.15 **Output Circuit.** The output circuit consists of NAND gates U4, transistors Q1 and Q2, resistors R1 and R2, NAND gate U5A, and Schmitt-trigger inverter U23A.

4.16 U4B and U5A are activated by the clock/control circuit to send data or BCH code, respectively to U4A. U4D is activated by a HIGH from U4A, while U4C is activated by a LOW from U4A, through inverter U23A, to produce Mark and Space keying outputs, respectively via transistors Q1 and Q2. The CLOCK 2 connection to U4-13 and U4-10 allows de-activation of both outputs via the clock/control circuits to produce the 3-state output. Q2 drives the SPACE LED on the front panel display, while the U4-11 output is sent to amplifier U30A which drives the MARK LED.

4.17 **Clock/Control Circuits.** The clock/control circuit consists of counters U9, U16, and U18; decoders U12 and U17; flip-flop U11B and associated gates and switches.

4.18 The basic clock is generated by the oscillator formed by U23D, C10, R28, R29, and buffer U23E and is adjusted to one-half the desired baud rate. U16, U18, U13B, U23C, and U14D form a divide-by-25 counter. The counter (U16, U18) is clocked to 1111 1111 binary, and then is reloaded to 1110 0111 binary. U23C is HIGH only on the 25th count and is the SYNC pulse. This pulse is sent to U30D which drives the SYNC LED on the display board and is available at TP4. U14C uses the SYNC and CLOCK pulses to generate the CLOCK 2 signal, which clocks data and BCH code to the output stage, and also disables the output during sync intervals and between data-bits to produce the 3-state code. U5B uses the SYNC pulse along with the inverted clock (U23D) to parallel load data into the shift register.

4.19 U17, U23F, and U22B use outputs from counters U16 and U18 and the clock to generate a series of pulses used to time events. The negative-going pulses occur during the second half of clock periods 2,4,5, and 18 as shown in Figure 3. The first pulse at U17-1, sets the latch formed by U15A and U15B and enables the selected relay. The third pulse, during clock period 5, resets this latch and disables the relay. The pulse at clock period 4 is

used to command the A/D converter to begin its conversion. The trailing edge of the pulse in clock period 18 (U17-5) clocks U11B and generates signals which change the output from shift register data to BCH code. U11B is preset during the sync period to allow data from the shift register to be transmitted.

4.20 The analog address bits, decoded by U12 to determine the selected relay, are generated by U9 in conjunction with switches S1 and S2, parts of U7, U13, U14, U15, and associated circuitry. U9 counts to 1111, clocked by the rising edge of the signal (U5B) that loads the shift registers, and is then reset to a count dependent on the setting of switch S1. The result is a total of from one to four output counts, one for each selected relay. The carry output (U9-15) is HIGH when the count is 1111 and loads the counter via NOR gate U14A, NAND gate U15D, and XOR gate U7B. When calibrate switch S2 is closed, the load input (U9-9) is forced LOW continuously, and the contents of S1 loads into the counter at each clock pulse allowing only the selected relay to be energized for calibration of the chosen channel. Closing S2 also enables the calibration LED display.

4.21 The calibration LED display consists of indicators DS1 through DS6, resistor pack R40, or gates U26, NOR gates U28, and parts of gates U14, U22, and U7.

4.22 When the first seven data-bits from the A/D converter are LOW, and the calibration switch is closed, then U28C, U28A, U28B, and U14B are HIGH. U22A is enabled, lighting DS6, and putting a LOW at U28-11. If data-bit 8 is also LOW, U28-13 is HIGH, and U7A is LOW, lighting DS5 and enabling the next stage, and so on.

5. INSTALLATION

5.1 **Unpacking.** Unpacking and handling of the IAT Analog Transmitter should be consistent with procedures used in handling electronic equipment.

5.2 **Inspection.** Visually inspect the analog transmitter for damage from rough handling and faulty packing. Visually inspect for:

(1) Loose wires
(2) Deformation in the frame
(3) Faceplate damage
(4) Evidence of moisture or condensation within the units.
(5) Loose hardware or parts which evidence improper handling.

5.3 **Mechanical Installation.** The IAT is shipped with the terminal block plugged into the rear of each unit with four 6-32 screws partially installed. The IAT Analog Transmitter is normally mounted in standard INIVEN™ Tone Frames.

5.4 Install the IAT as follows:

(1) Leave terminal block plugged in, as shipped, on rear of unit.
(2) Remove four 6-32 screws from terminal block.
(3) While inserting IAT into tone frame align captive screw at bottom of face-plate with mounting hole in frame.
(4) Secure IAT to frame using captive screw on faceplate.
(5) At rear of frame, use 6-32 screws removed in step (2) to secure terminal block to tone frame.

The IAT can now be removed and re-installed in frame using the front panel captive screw.

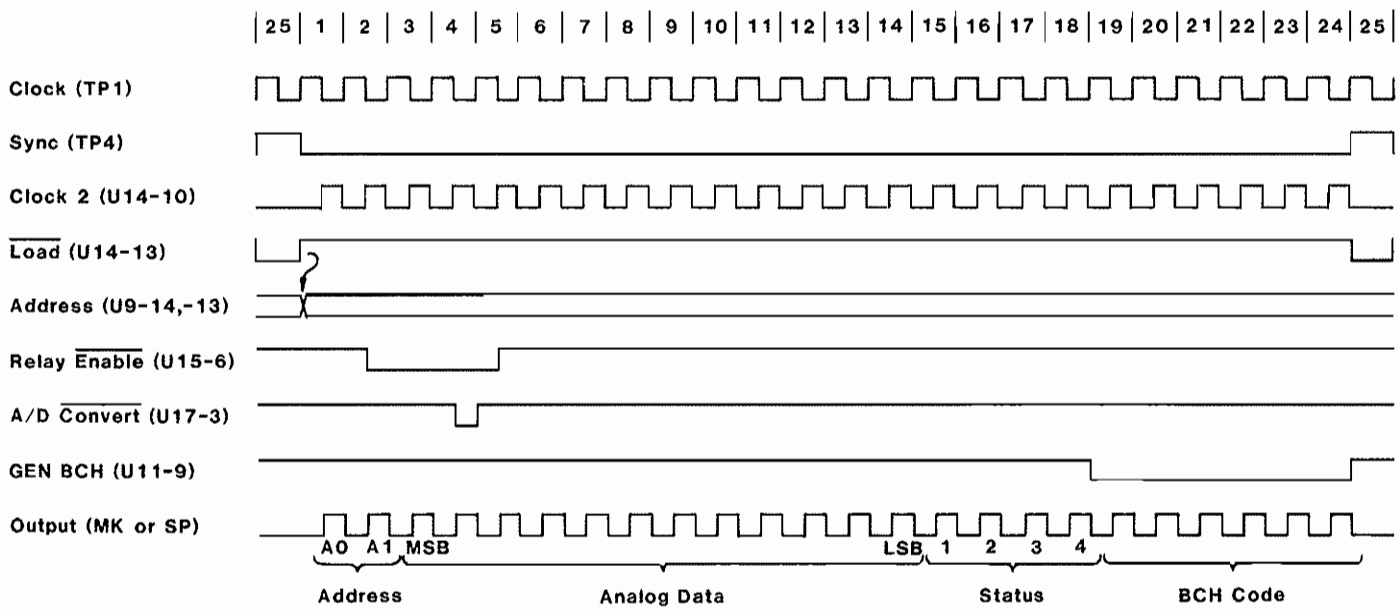


Figure 3. IAT Analog Transmitter—Timing Diagram

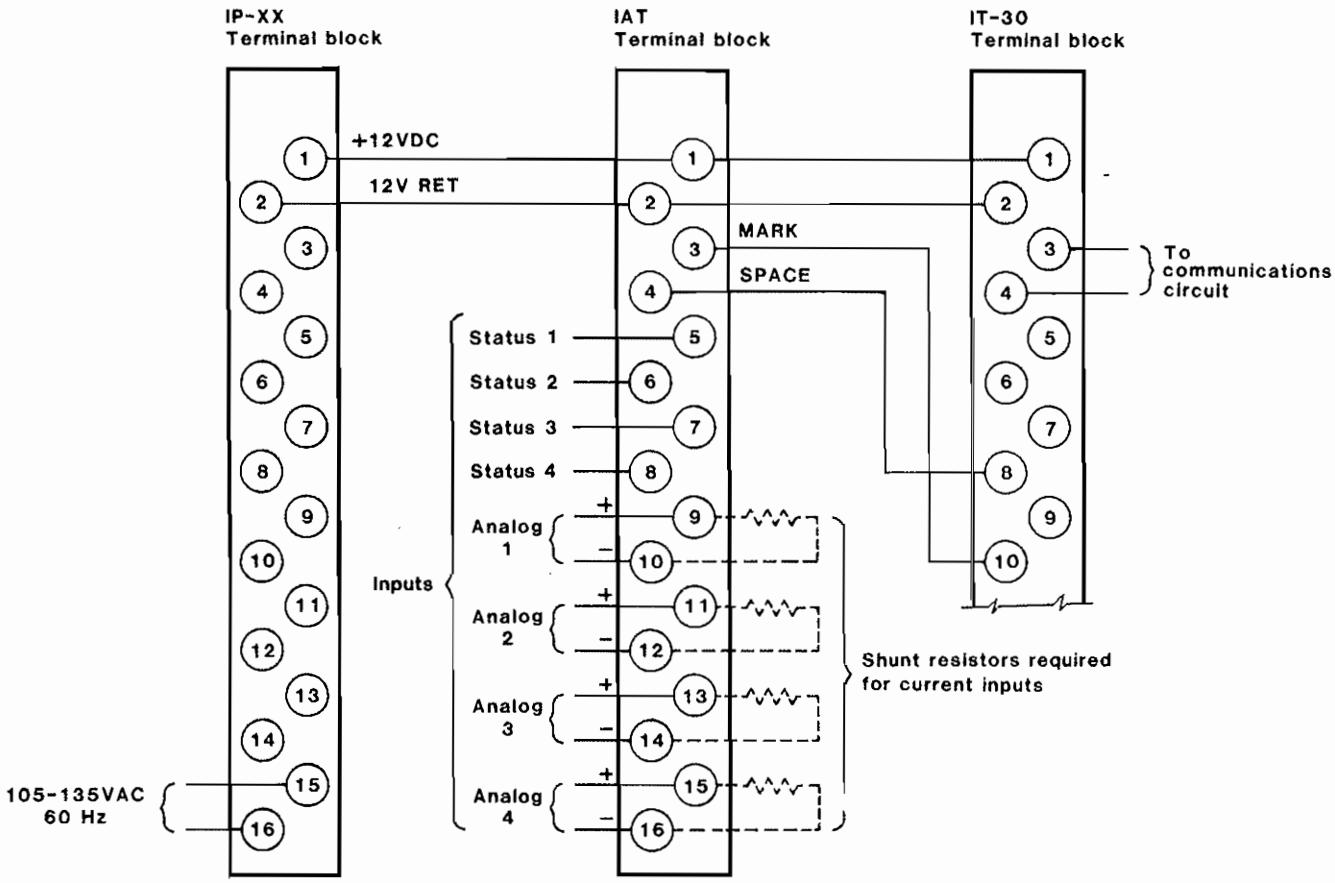


Figure 4. Electrical Installation

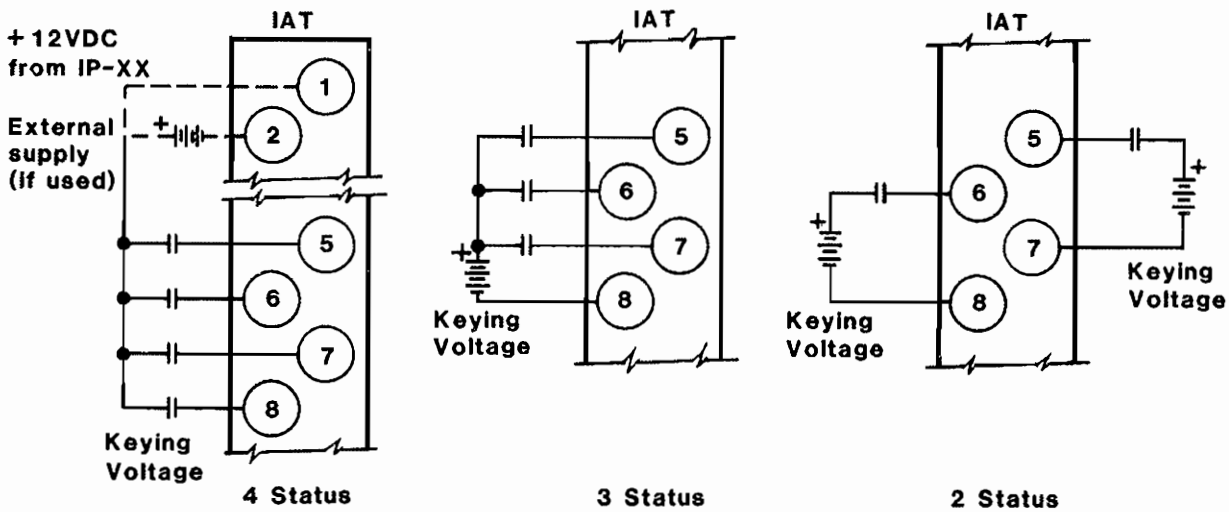


Figure 5. Status Input Isolation—Electrical Connections

5.5 **Electrical installation.** All electrical connections are made to the terminal block at the rear of the frame (see Figures 4 and 5) and Table 5-1.

Table 5-1 Terminal Block Connections

TERMINAL	FUNCTION
1	Positive (+) side of 12 Vdc power supply input.
2	Negative (-) side of 12 Vdc power supply input.
5 through 8	Status inputs 1 through 4.
9 through 16	Analog inputs 1 through 4.

5.6 The IAT accepts 2, 3, or 4 status inputs depending on the degree of isolation required. The keying voltage determines the value of internal series current-limiting resistors R3-R6, as listed in Table 5-2. Each status input can have a different series resistor for a different keying voltage, if required.

Table 5-2

Keying Voltage	Series Resistor		
5 volts	2.7k	1/2w	5%
9-48 volts	5.6k	1/2w	5%
48-125 volts	36k	1w	5%

5.7 Table 5-3 gives the jumper positions for each status configuration while Figure 5 shows the terminal connections for the three cases. Four opto-coupled inputs with common return provide semi isolation. Three opto-coupled inputs sharing a common isolated return provide full isolation from the IAT. Two opto-coupled inputs with separate isolated returns provide full isolation from the IAT and from each other.

Table 5-3

	JUMPER					
NO. OF STATUS	A-B	B-C	D-E	E-F	J-H	K-L
4	X		X		X	X
3	X		cut	X	X	cut
2	cut	X	cut	X	cut	cut

X = Jumper installed
cut = Cut etch

5.8 **Current inputs.** The IAT accepts input voltage levels of 0-5, 0-10, ± 2.5, and ± 5 volts, for full scale digital output, depending on internal jumper selection. Current inputs require an external shunt resistor to produce the appropriate voltage range. Table 5-4 gives shunt resistor values for common current levels. Inputs, for example 4-20 mA, can be accommodated by selecting the shunt resistor for the corresponding full-scale voltage input, in this case 0-20 mA. For other current ranges, compute the resistor value by using Ohm's law, R=E/I, where E is the full-scale voltage desired and I is the full-scale input current. The input impedance of the IAT exceeds 100K ohms and may normally be neglected. The shunt resistor should be a low temperature coefficient type.

Table 5-4

Current	0-10V	0-5V	± 5V	± 2.5V
0-1 mA	10KΩ	5KΩ		
± 1 mA			5KΩ	2.5KΩ
0-20 mA	500Ω	250Ω		
0-50 mA	200Ω	100Ω		

5.9 **Electrical Grounding.** It is recommended that the chassis of each tone unit be grounded to reduce ground loop interference effects. When the tone unit is housed in a standard INIVEN™ Tone frame, a good earth-ground to the rack or other equipment, in which the frame is installed, is sufficient. When the individual tone units are operated out of the frame, each tone unit chassis should be connected to earth-ground.

5.10 Station batteries or other power supplies with grounded negative or positive leads can be employed in place of standard INIVEN™ Power Supplies.

5.11 **Input Range Modification.** The standard configuration of the IAT is for unipolar inputs with 10V range (0-10V). Bipolar inputs and inputs with a range of 5V can be accommodated by cutting the appropriate etched jumper on printed circuit board A1 (see Figure 7) and installing the appropriate jumper wires, as listed in Table 5-5. For bipolar ranges, set TP4 on printed circuit board A1 (Figure 7) to + 5 volts ± .001 volt with respect to terminal 2 using potentiometer R41. This setting is made at the factory and should not require readjustment in the field. All four analog inputs must be scaled to the same range.

Table 5-5

Input	Install Jumpers	Remove
0-10V	M-N, P-S	
0-5V	P-S	M-N
± 5V	M-N, P-R	P-S
± 2.5V	P-R	P-S, M-N

5.12 **60Hz Rejection.** The input normal mode (60 Hz) rejection is directly related to the input time constant. Resistor networks R17 and R20 on printed circuit board A1 (Figure 7) control both parameters as indicated in Table 5-6. The response time should be selected to be not longer than the update interval of Table 5-7, 1300ms is standard. If 1 channel is selected only 470ms results in faster updating. Table 5-7 gives update times for various baud rates and number of analog channels. For update intervals of less than 650 milliseconds a similar modification should be made to the matching IAR Analog Receiver.

Table 5-6

R17, R20	NMRR (60Hz)	0-90% Response Time
330K	92db	3-9 sec.
100k	75db	1300ms
33k	58db	470ms
15k	43db	215ms

Table 5-7

Baud Rate	Update Interval 1 CHAN	2 CHAN	3 CHAN	4 CHAN
50	1 sec	2 sec	3 sec	4 sec
60	833 msec	1.66 sec	2.5 sec	3.33
85	588 msec	1.18 sec	1.76 sec	2.35 sec
120	417 msec	833 msec	1.25 sec	1.66 sec
140	357 msec	714 msec	1.07 sec	1.43 sec
150	333 msec	667 msec	1 sec	1.33 sec
240	208 msec	417 msec	624 msec	833 msec
300	167 msec	333 msec	500 msec	667 msec

5.13 **Calibration Adjustment.**

5.14 The IAT input may be adjusted to an accuracy of ± 1 bit (0.024% of full-scale). The following equipment is required to perform the calibration adjustment.

Extender Module INIVEN Model IE-5

5.15 **Adjustment Procedures.** Adjust the IAT input calibration as follows:

(1) Loosen captive retaining screw and remove IAT from frame.

(2) Plug IAT into Extender Module.

(3) Install Extender Module in space vacated by IAT.

(4) Set channel select switch on printed circuit board A1 (Figure 7) to the associated number of the channel to be calibrated minus 1. Position 0-3 of S1 corresponds to analog channels 1-4 respectively.

(5) Set CAL/OPER switch S2 to CAL.

(6) Connect (+) terminal of analog input channel being calibrated to TP2 and (-) side to the circuit common.

(7) Adjust the associated input potentiometer (R9/CH1, R11/CH2, R13/CH3, and R15/CH4) counter clockwise until LED DS1 extinguishes.

(8) Slowly rotate the associated potentiometer until LED 1 illuminates indicating 100% of full scale. Do this over a several second time period. Be sure not to increase the pot rotation once the 100% DS1 LED is illuminated or error will be introduced. For certainty, hunt back and forth with the pot so that DS1 is just on, a flickering is acceptable if it exceeds 50% duty. NOTE: It takes the system several seconds to stabilize after any large pot rotation, and less time for smaller rotations.

LED	INPUT
DS6	99.24% of full scale
DS5	99.63% of full scale
DS4	99.83% of full scale
DS3	99.93% of full scale
DS2	99.98% of full scale
DS1	100% of full scale

(9) Repeat steps 4, 6, and 7 for each channel to be calibrated.

(10) Set CAL/OPER switch to OPER.

(11) Set channel select switch S1 to the number associated with the number of channels being used.

(12) Remove Extender Module from frame and unplug IAT from Extender Module.

(13) Install IAT in frame and secure with captive screw.

5.16 **Clock Adjustment.**

5.17 The module you have purchased has been set to the desired baud rate and does not normally require readjustment unless it is desired to change the baud rate. The following equipment is required to adjust the clock.

Extender Module INIVEN Model IE-5
Frequency Counter Fluke Model 1900A (or equiv.)

5.18 **Adjustment Procedure.** Adjust the IAT clock frequency as follows:

(1) Loosen captive retaining screw and remove IAT from frame.

(2) Plug IAT into Extender Module.

(3) Install Extender Module in space vacated by IAT.

(4) Ground Frequency Counter to terminal 2 of connector on printed circuit board A1 (see Figure 7) and connect test probe to TP1.

(5) Frequency Counter should indicate a frequency of one-half (1/2) the baud rate, if not, proceed to step 6.

(6) Rotate adjustment screw on potentiometer R29 to obtain desired frequency indication on the Frequency Counter.

(7) Disconnect Frequency Counter from IAT.

(8) Remove Extender Module from frame and unplug IAT from extender Module.

(9) Install IAT in frame and secure with captive screw.

6. MAINTENANCE

6.1 The module you have purchased has been thoroughly inspected and tested in accordance with our specifications. The module does not require preventive maintenance.

6.2 Sections 6 of the associated FSK receiver and transmitter manuals contain maintenance and malfunction isolation check procedures for systems, receivers, and transmitters. Use those procedures as the first step in isolating troubles. When use of those procedures fails to locate the cause of the malfunction or the trouble is known to be in the IAT, refer to Section 4 of this manual for detailed theory of operation and the referenced schematics as an aid in signal tracing.

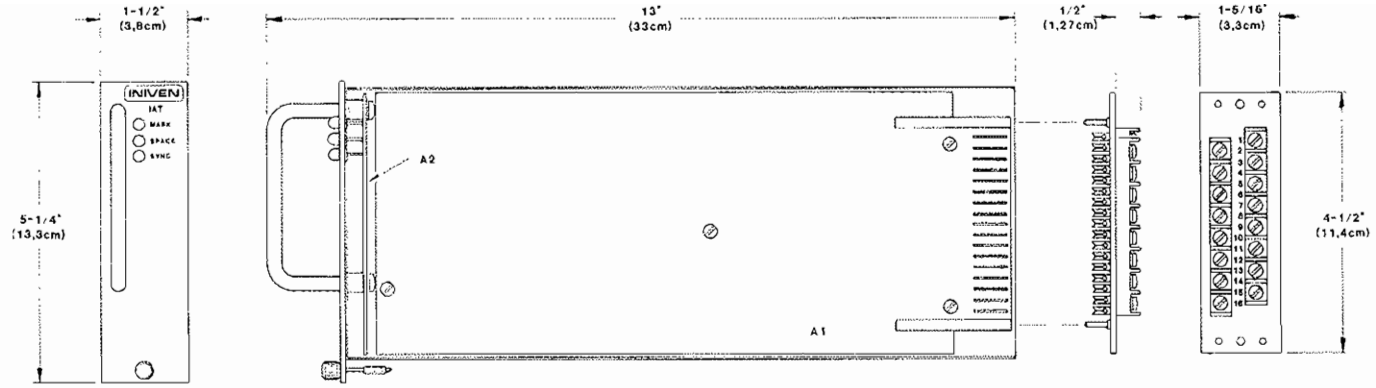


Figure 6. IAT Analog Transmitter—Dimensions and Component Identification

REF DESIG	DESCRIPTION	QTY	PART NUMBER	MFR
	IAT ANALOG TRANSMITTER ASSEMBLY		CC1180-XX	INIVEN
	• HANDLE	1	230-18AL832C	Promptus Elec.
	• FACEPLATE	1	06B1180-01N	INIVEN
	• SCREW, Captive	1	08A1088-01N	INIVEN
	• TERMINAL BLOCK ASSEMBLY	1	CC1102-00	INIVEN
A1	• PRINTED CIRCUIT BOARD ASSY (See Figure 7 for breakdown)	1	09D1180-01N	INIVEN
A2	• PRINTED CIRCUIT BOARD ASSY (See Figure 8 for breakdown)	1	09B1180-02N	INIVEN

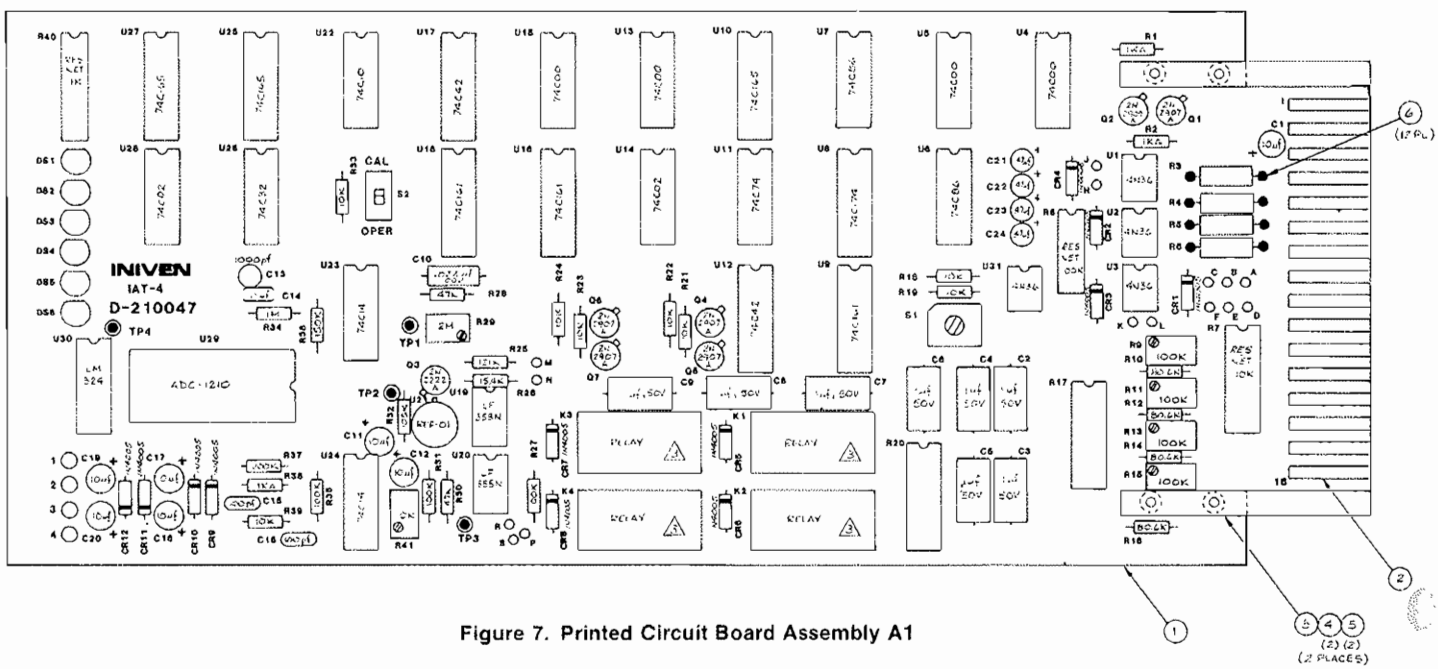


Figure 7. Printed Circuit Board Assembly A1

7. PARTS LIST

The following parts list is included to facilitate maintenance of the IAT, Analog Transmitter. All parts are listed in order of their reference designators, as applicable. Figure 6 depicts the parts for the major components of the IAT. Figures 7 and 8 exhibit the parts for printed circuit board assemblies A1 and A2, respectively.

7.1 IAT ANALOG TRANSMITTER. (See Figure 6)

REF DESIG	DESCRIPTION	QTY	PART NUMBER	MFR
	PRINTED CIRCUIT BOARD ASSEMBLY A1			
C1, C11 C12, C17-20	•CAPACITOR, 10uf, 25V, 10%, Tant	7	DT25U106K	
C2-C9	•CAPACITOR, 1uf, 50V, 10%, Metalized Poly	8	MPC33D105K	
C10	•CAPACITOR, .022uf, 100V, 10% Metalized Poly	1	MPC33E223K	
C13	•CAPACITOR, 1000pf, 100V, 20%, Cer	1	KX7R0102K200	
C14	•CAPACITOR, 0.1uf, 100V, 20%, Cer	1	8131651-104M	
C15, C16	•CAPACITOR, 100pf, 100V, 20%, Cer	2	8121COG-101K	
C21-C24	•CAPACITOR, 0.47uf, 35V, 20%, Dipped Solid Tant	4	DT35V474M	
CR1-CR12	•DIODE, 1A, 600V	12	1N4005	Motorola
DS1-DS6	•LED, Red	6	521-9212	Dialco
K1-K4	•RELAY, Reed, 2 Form C, 0.1" Lead Spacing	4	662C-121-1	Gordos
	•SOCKET, SIP, 4-Pin	8	CA-04S-10SD	Ckt Assy Corp
Q1, Q2, Q4-Q7	•TRANSISTOR	6	2N2907A	Motorola
Q3	•TRANSISTOR	1	2N2222A	Motorola
R1, R2, R38	•RESISTOR, 1K, 1/4W, 5%	3	RCF07J102	
R3-R6	•RESISTOR,	4		
R7	•RESISTOR NETWORK, 10K, DIP (16-Pin)	1	698-3-10K	Beckman
R8	•RESISTOR NETWORK, 100K, SIP (6-Pin)	1	783-1-100K	Beckman
R9, R11, R13, R15	•RESISTOR, Variable, 100K, 20 Turn	4	3299W-1-104	Bourns
R10, R12, R14, R16	•RESISTOR, 80.6K, 1/8W, 1%	4	RN55C8062F	
R17, R20	•RESISTOR NETWORK, DIP, (16-Pin)	2	**	
	•SOCKET, DIP, 16 Pin	2	EA-16-9-1	EBY
R18, R19, R21-R24, R33, R39	•RESISTOR, 10K, 1/4W, 5%	8	RCF07J103	
R25	•RESISTOR, 121K, 1/8W, 1%	1	RN55C1213F	
R26	•RESISTOR, 15.4K, 1/8W, 1%	1	RN55C1542F	
R27, R31	•RESISTOR, 100K, 1/8W, 1%	2	RN55C1003F	
R28, R30	•RESISTOR, 47K, 1/4W, 5%	2	RCF07J473	
R29	•RESISTOR, Variable, 2 Meg, 20 Turn	1	3299W-1-205	Bourns
R32	•RESISTOR, 105K, 1/8W, 1%	1	RN55C1053F	
R34	•RESISTOR, 1 Meg, 1/4W, 5%	1	RCF07J105	
R35	•RESISTOR, 150K, 1/4W, 5%	1	RCF07J154	
R36	•RESISTOR, 100K, 1/4W, 5%	1	RCF07J104	
R37	•RESISTOR, 200K, 1/4W, 5%	1	RCF07J204	
R40	•RESISTOR NETWORK, 1K, SIP (8-Pin)	1	4308R101-102	
R41	•RESISTOR, Variable, 10K, 20 Turn	1	3299W-1-103	Bourns
S1	•SWITCH, 1 Pole, BCD, 10 pos DIP	1	230002G	EECO
S2	•SWITCH, SPST Slide, Flush	1	TSS11AG-1-PC	Alcoswitch
U1-U3, U31	•PHOTON COUPLED ISOLATOR	4	4N36	General Electric
U4, U5, U13, U15	•NAND GATE, 2-Input, Quad	4	MM74C00N	Nat'l Semiconductor
U6, U7	•XOR GATE, 2-Input, Quad	2	MM74C86N	Nat'l Semiconductor
U8	•FLIP-FLOP, Hex D	1	MM74C174N	Nat'l Semiconductor
U9, U16, U18	•BINARY COUNTER, Direct Clear	3	MM74C161N	Nat'l Semiconductor
U10, U25, U27	•SHIFT REGISTER, 8-Bit, Parallel Load	3	MM74C165N	Nat'l Semiconductor
U11	•FLIP-FLOP, Dual D	1	MM74C74N	Nat'l Semiconductor
U12, U17	•DECODER, BCD-to-Decimal	2	MM74C42N	Nat'l Semiconductor
U14, U28	•NOR GATE, 2-Input, Quad	2	MM74C02N	Nat'l Semiconductor
U19	•AMPLIFIER, Operational, JFET Input, Dual	1	LF353A	Nat'l Semiconductor
U20	•AMPLIFIER, Operational, JFET Input	1	LF355N	Nat'l Semiconductor
U21	•VOLTAGE REFERENCE + 10V, Precision	1	REF-01EJ	PMI
U22	•NAND GATE, 3-Input, Triple	1	MM74C10N	Nat'l Semiconductor
U23, U24	•Schmitt-Trigger Inverter, Hex	2	MM74C14N	Nat'l Semiconductor
U26	•OR GATE, 2-Input	1	MM74C32N	Nat'l Semiconductor
U29	•ANALOG-TO-DIGITAL CONVERTER	1	ADC1210HCD	Nat'l Semiconductor
U30	AMPLIFIER, Operational, Low Power, Quad	1	LM324	Nat'l Semiconductor

*For 5 Volt applications 2.7K
For 9-48 Volt applications 5.6K
For 48-125 Volt applications 36K

**For 92 db 60 Hz Rejection 330 K
For 75 db 60 Hz Rejection 100 K
For 58 db 60 Hz Rejection 33 K
For 43 db 60 Hz Rejection 15K

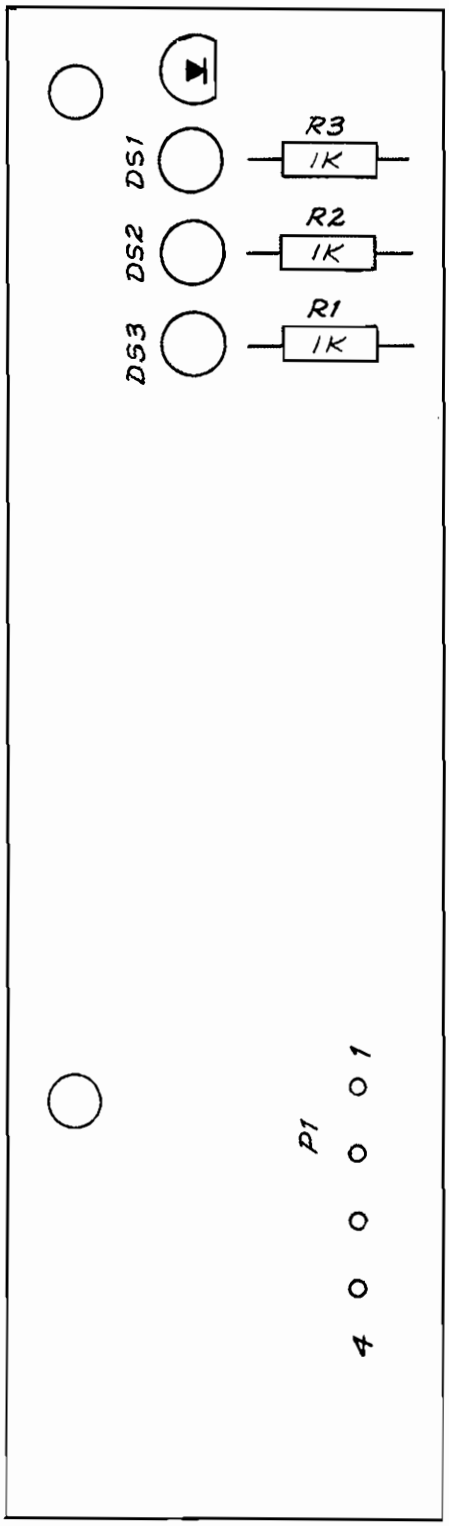


Figure 8. Printed Circuit Board Assembly A2

REF DESIG	DESCRIPTION
	PRINTED CIRCUIT BOARD ASSEMBLY A2
DS1	• LED, Red, 0.190 dia
DS2	• LED, Yellow, 0.190 dia
DS3	• LED, Green, 0.190 dia
R1-R3	• RESISTOR, 1K, 1/4W, 5%

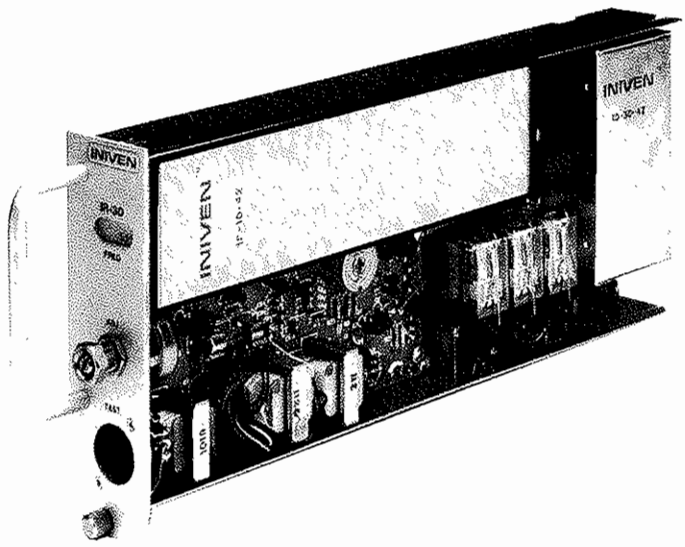
QTY	PART NUMBER	MFR
1	521-9212	Dialco
1	521-9176	Dialco
1	521-9175	Dialco
3	RCF07J102	

8. ORDERING INFORMATION

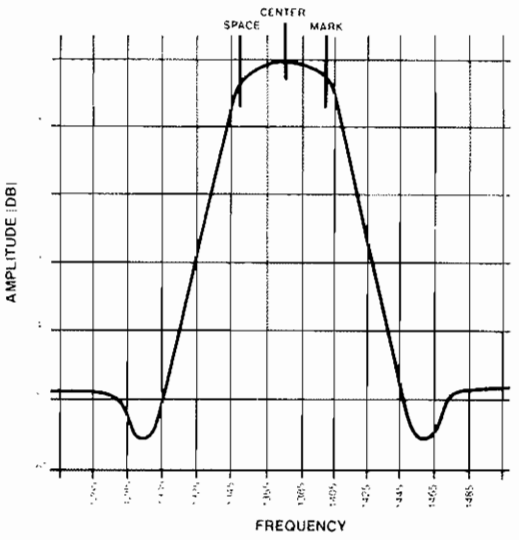
8.1 When ordering please specify:

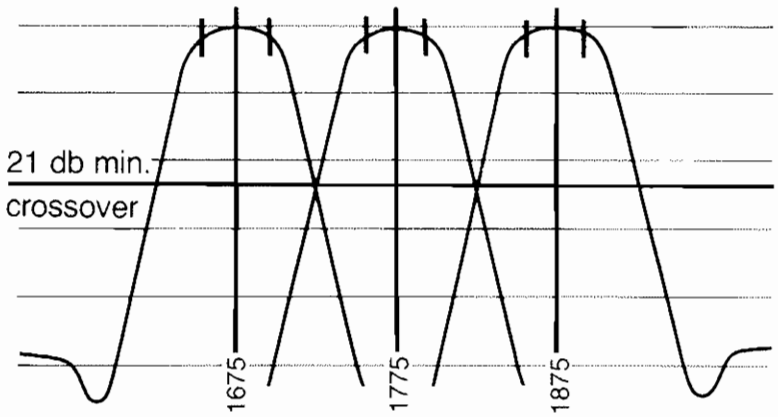
1. Number of channels, i.e. Model Number IAT-3 would specify 3-analog input transmitter.
2. Options: 60 Hz Noise rejection, baud rate, analog input voltage range, status keying voltage.

Only Iniven's unique filter designs reject adjacent channels by a minimum of 45DB. Providing maximum attenuation between adjacent channels.



IF-10 FILTER*



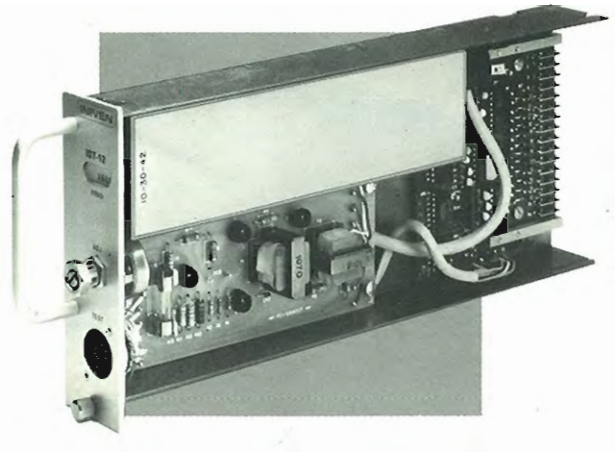


Max adjacent Channel attenuation and max crossover rejection between channels (21 db. min.)

FEATURES

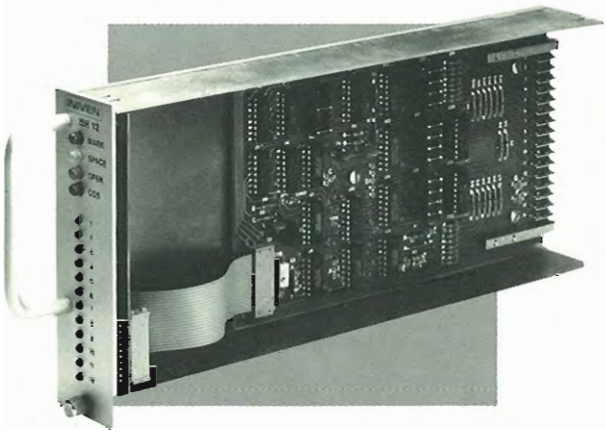
Iniven's unique filter design is the product of 23 years of engineering and development by Conolog, an acknowledged leader in communication system networks. The Iniven filter provides maximum noise rejection from all out of band frequencies.

This standard feature eliminates receiver crosstalk even in the worst case field conditions. Communication reliability with Iniven products provide the convenience of remote site supervision from your master station with unequaled consistent accuracy and security.



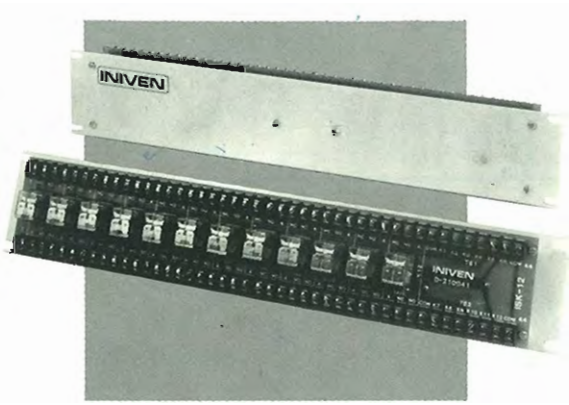
IST-12 FSK SCANNER TRANSMITTER

A time division multiplexing scanner capable of transmitting 12 discrete inputs per single FSK Channel. The IST-12 serializes, converts, and transmits FSK Tone to a remote IR-30/ISR-12 FSK Tone Receiver pair via any voice grade communication circuit.



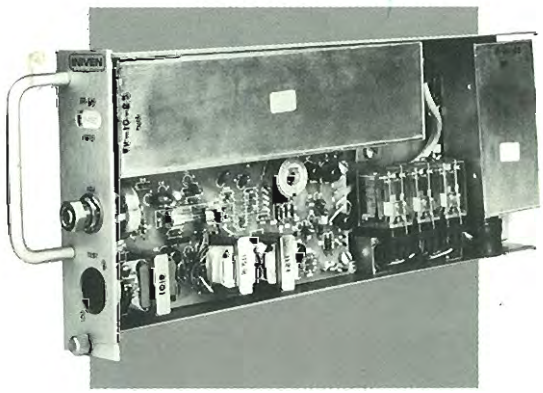
ISR-12 SCANNER RECEIVER

Operating in conjunction with the IR-30 FSK Receiver, the ISR-12 receives and verifies the serialized data transmitted from the remote IST-12. Each discrete output has a respective LED indication and a voltage output which may be used for relay contacts on the ISK-12.



ISK-12 RELAY PANEL

A 19 x 3 15/32 inch standard RETMA rack-mountable panel which is available with INIVEN's standard 12 DPDT plug-in relays. The ISK-12 relays can be activated by the ISR-12 voltage outputs. To provide Form C outputs, 5A @ 29Vdc or 117 Vac.



IR-30 FSK RECEIVER

A frequency-shift-keyed (FSK) Tone Receiver for remote supervisory, telemetry, and data transmission applications. In response to a Mark, Space, or Center tone within its specified pass band, the IR-30 produces 3 separate contact closures (via relays) or voltage outputs (via adapters). Unique filtering provides maximum noise rejection for security in worst case conditions.

INIVEN™ A Subsidiary of Conolog Corporation

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