APSS-1B

OPERATION MANUAL

WITH PARTS LIST
AND BLOCK DIAGRAM

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P/N 0010143000
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IMPORTANT NOTICE

This addendum covers special modifications to the APSS-1B. Units with these modifications operate identically to APSS-1A with the exceptions noted below and are identified on the front panel as APSS-1A and on the serial tag by this marking:

2010575003 APSS-1B non-latching

The following changes have been incorporated in this unit:

1. The frequency range has been changed from 5 to 600 MHz. to 1 to 860 MHz.

2. The audible alarm function has been changed from alarm sounds when Port "B" falls below set level to alarms whenever Port "A" or Port "B" falls below their respective set levels.

Please make note of these changes when reading the APSS-1A manual.

INDEX

I) INTRODUCTION TO APSS-1B

The APSS-1B RF POWER SENSING SWITCH

Features

- Continuously monitors primary and secondary RF sources.
- Automatically switches to secondary source if primary source fails.
- Manual override capability.
- Low insertion loss and high isolation from 5 to 600 MHz.
- Broadband or narrowband signal sensing.

Description

The APSS-1B is a rack-mounted, A/B-type RF switch that automatically switches to a secondary RF source whenever the primary RF source is interrupted. The APSS-1B is compatible with any signal in the 5 to 600 MHz range, making it ideal for redundant RF LAN trunks, RF backups for fiber trunks in CATV systems, and other applications where the continuity of service must be maintained.

In most applications, the primary signal source is connected to Port "A" of the APSS-1B, and the secondary source is connected to Port "B". The RF switch outputs whichever source has been selected , automatically or manually, through Port "C".

The APSS-1B continually compares the signal level at both Ports "A" and "B" to individual level thresholds. When operating in AUTO mode, the source at Port "A" will always be connected to Port "C" as long as the signal level at "A" is equal to, or greater than, the respective user set limit. Should the level of the primary ("A") RF source fall below this limit, the APSS-1B will automatically transfer Port "B" to Port "C" if a valid level exists at Port "B". The APSS-1B will remain in Port "B" even if Port "A" is restored providing the level on Port "B" remains valid. This features prevents toggling if the signal on Port "A" is intermittent. The APSS-1B can be reset to Port "A" by momentarily switching to Port "A" using the manual mode. An audible alarm will sound when the levels on either Port "A" or "B" fall below their preset limits. Front panel LED's and rear panel contact closures indicate when adequate signal levels are present at the "A" and "B" Ports. A front-panel switch allows the operator to manually select Port "A" or "B" regardless of the signal levels at these Ports.

The APSS-1B can monitor signals at all frequencies between 5 and 600 MHz but can be configured to monitor a single frequency, or a range of frequencies, with the addition of a bandpass filter into either monitoring path.

The APSS-1B is housed in a 1 3/4" (1U) rack-mount enclosure and operates from 115 VAC, 230 VAC is available as an option.

II) SPECIFICATIONS

ELECTRICAL:

Rated Frequency Range:	5 to 600 MHz
Operating Input Level:	+35 to +55 dBmV
Impedance:	75 ohms
Insertion Loss:	≤ 1.0 dB to 660 MHz
	≤ 1.25 dB to 750 MHz
	≤ 1.5 dB to 1000 MHz
Return Loss:	≥ 16 dB to 1 GHz
Isolation:	≥ 60 dB to 1 GHz
Maximum Switch time:	15 mSec
Maximum A-B differential delay:	< 200 nSec

MECHANICAL/ENVIRONMENTAL:

Power:	115 or 230 VAC, Internally switch selectable, 50/60 Hz.
Size:	19"W x 1.75"H x 12"D
Weight:	6 lbs.
Options:	Single-frequency filter

III) FUNCTIONAL DESCRIPTIONS:

SIGNAL LEVEL MONITORS:

The APSS-1B contains two level monitoring circuits that individually compare the RF signal levels at Ports "A" and "B" to level limits set by the "A" and "B" THRESHOLD adjustments, located on the front panel. The results of these comparisons control the various functions described below.

As shipped, the APSS-1B's monitor circuits respond to any signals between 5 and 600 MHz, but may be limited to narrow ranges of frequencies by inserting bandpass filters into the "A LOOP" or "B LOOP" on the rear panel.

RF A/B SWITCH:

The RF switch in the APSS-1B can be set to operate in any of 3 modes, selectable by means of the front-panel A/B/AUTO switch:

- AUTO mode, in which the Port selection is determined by the signal levels at Port "A"and "B".

- A mode, in which Port "A" is always selected.

- B mode, in which Port "B" is always selected.

In AUTO mode, the source at Port "A" will always be connected to Port "C" as long as the signal level at "A" is equal to, or greater than, the respective user set limit. Should the level of the primary ("A") RF source fall below this limit, the APSS-1B will automatically transfer Port "B" to Port "C", if a valid level exists at Port "B". The APSS-1B will remain in Port "B" even if Port "A" is restored, providing the level on Port "B" remains valid. This features prevents toggling if the signal on Port "A" is intermittent. To further eliminate chatter at marginal signal levels, the front-panel HYSTERESIS adjustment provides a small amount of overlap between the levels causing the A-to-B and B-to-A transitions.

LOSS-OF-SIGNAL ALARM:

An audible alarm sounds whenever the Input Level at either Port "A" or "B" is below the preset limit or the APSS-1B is used in manual mode. The alarm can be silenced by toggling the front-panel ALARM switch out of the ON position.

FRONT-PANEL LED INDICATORS:

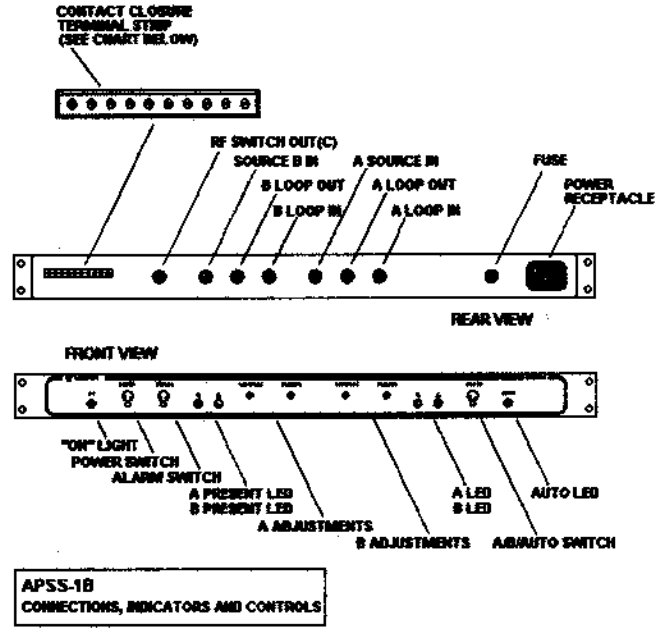
There are 3 LED's associated with the A/B/AUTO switch. The 2 green LED's indicate whether the RF switch is currently set to the A or B condition, regardless of whether it was set manually or automatically. The green LED lights only if the A/B/AUTO switch is in the AUTO position.

Two green LED's indicate whether the levels at Ports "A" and "B", respectively, are equal to, or above, user set levels.

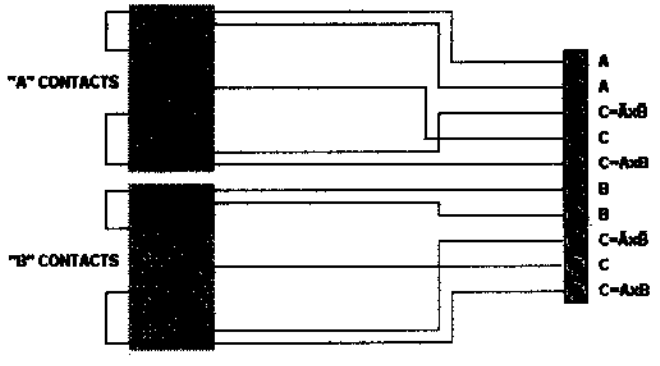
The green LED to the left of the POWER switch indicates that the APSS-1B is operating.

REAR-PANEL CONTACT CLOSURES:

3 sets of contact closures on the rear panel indicate whether the signal levels at Ports "A" and "B" are equal to, or above, their respective user-set limits. See the Drawing, "APSS-1B CONTACT CLOSURES", for more details.



APSS-1B
CONNECTIONS, INDICATORS AND CONTROLS



APSS-1B
CONTACT CLOSURES

CONTACTS A-A: CLOSED WHEN SIGNAL A IS PRESENT.
CONTACTS B-B: CLOSED WHEN SIGNAL B IS PRESENT.
CONTACTS C-C: CLOSED IF SIGNALS A AND B ARE PRESENT AND TERMINALS LABELLED C=AxB ARE JUMPERED TOGETHER.
CLOSED IF SIGNALS A AND B ARE ABSENT AND TERMINALS LABELLED C=ĀxB̄ ARE JUMPERED TOGETHER.

IV) PERFORMANCE VERIFICATION AND INITIAL ADJUSTMENT:

NOTE:

The adjustment procedures in this Section are intended to verify that the level monitors and associated comparators of the APSS-1B operate within published specifications. Final settings for the THRESHOLD and HYSTERESIS adjustments may be performed only after the APSS-1B has been installed in the CATV or LAN system. See Section V, Paragraph (C), "INSTALLATION ADJUSTMENTS".

A) SET RF LEVEL THRESHOLD FOR SOURCE "A"

The following procedure sets the level at Port "A" at which the APSS-1B will switch the "C" Port feed from Port "A" to Port "B". and activate the appropriate LED's, contact closures and alarms.

1. The APSS-1B level monitors respond to the total RF power applied to their respective Ports. If a single-frequency source is being used to simulate an RF LAN or CATV system, consult the Chart. "CALCULATING THE EFFECTIVE INPUT POWER", to determine the appropriate power setting for your application before proceeding.

2. Verify the connections to the A LOOP IN and OUT connectors on the rear panel.
   - If wideband monitoring is desired, the connectors should be jumpered with the short cable provided.
   - If single-frequency monitoring is desired, verify that the appropriate bandpass filter has been connected between the IN and OUT connectors.
   - If the calculations in the Chart, "CALCULATING THE EFFECTIVE INPUT POWER", indicate that the effective power applied to Port "A" will exceed + 50 dBmV, some attenuation must be inserted in the A LOOP IN/OUT path to avoid overloading the comparator. The minimum value needed may be calculated by the single formula:

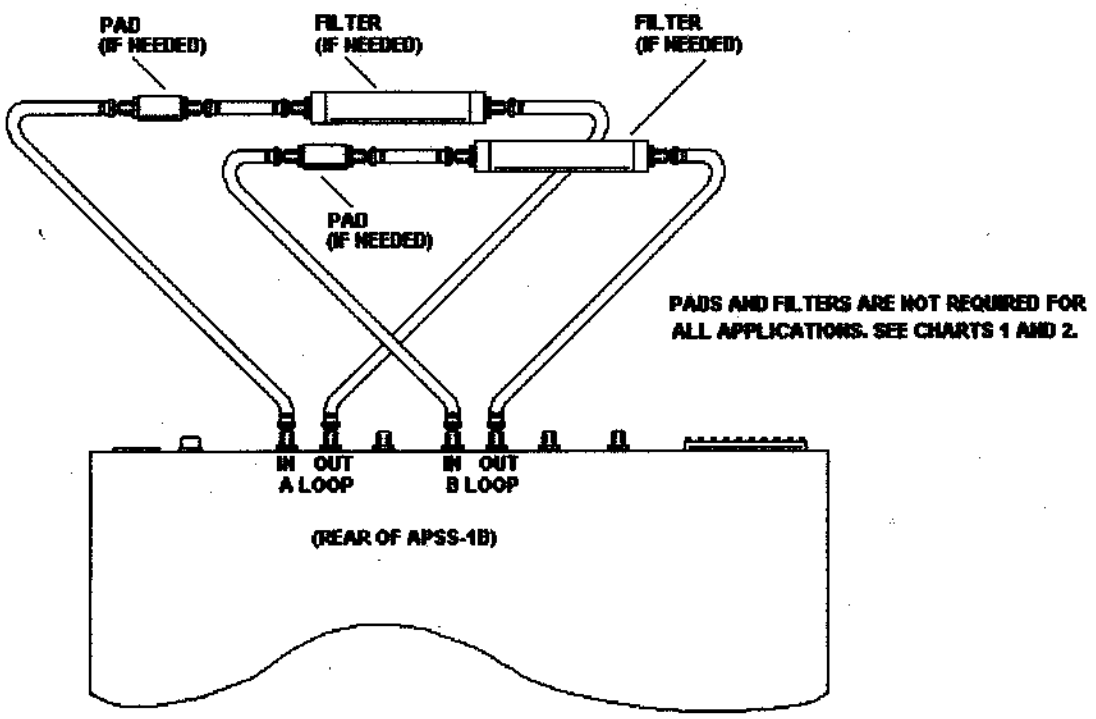
     Attenuator pad value = (Effective power) - 50

3. Terminate the "C" Port on the rear panel with a 75 ohm terminator.

4. Connect a calibrated, variable 75 ohm video modulated signal source to Port "A".

5. Set the signal to a frequency between 5 and 600 MHz. If a bandpass filter has been inserted between A LOOP IN and OUT, select a frequency that is within its passband.

6. Set the signal applied to Port "A" to the effective power at which the APSS-1B should switch to Port "B". See the Chart, "CALCULATING THE EFFECTIVE INPUT POWER", for instructions on calculating the effective power.



APSS-1B
"LOOP" CONNECTIONS

7. Select the AUTO mode of the A/B/AUTO front panel switch. The green LED should indicate that the APSS-1B is in AUTO mode. If the green A PRESENT LED, is not lit, rotate the A THRESHOLD pot on the front panel in a clockwise direction until it lights.

8. While observing the A PRESENT LED, slowly adjust the A THRESHOLD pot on the front panel in a counter-clockwise direction until the A PRESENT LED extinguishes.

9. While observing the A PRESENT LED, slowly increase the output level of the signal source until the A PRESENT LED lights again. Determine the difference between this level and the level needed to cause the A PRESENT LED to extinguish. The difference between these levels may be increased or decreased by adjusting the A HYSTERESIS pot on the front panel. Clockwise rotation increases the hysteresis, counter-clockwise rotation decreases hysteresis.

10. Setting the HYSTERESIS pot may affect the THRESHOLD setting. Repeat steps 7 through 10 as needed.

B) SET RF LEVEL THRESHOLD FOR SOURCE "B"

The following procedure sets the level at Port "B" at which the APSS-1B will switch the "C" Port feed from Port "A" to Port "B" should Port "A" fall below its set level. When the APSS-1B switches to Port "B" it will activate the appropriate LED's, contact closures and alarms.

NOTE: The APSS-1B will not switch to Port "B" unless the "B" input level is at or above the set level and the B PRESENT LED is on.

1. The APSS-1B level monitors respond to the total RF power applied to their respective Ports. If a single-frequency source is being used to simulate an RF LAN or CATV system, consult the Chart. "CALCULATING THE EFFECTIVE INPUT POWER", to determine the appropriate power setting for your application before proceeding.

2. Verify the connections to the B LOOP IN and OUT connectors on the rear panel.
   - If wideband monitoring is desired, the connectors should be jumpered with the short cable provided.
   - If single-frequency monitoring is desired, verify that the appropriate bandpass filter has been connected between the IN and OUT connectors.
   - If the calculations in the Chart, "CALCULATING THE EFFECTIVE INPUT POWER", indicate that the effective power applied to Port "B" will exceed + 50 dBmV, some attenuation must be inserted in the B LOOP IN/OUT path to avoid overloading the comparator. The minimum value needed may be calculated by the single formula:

     Attenuator pad value = (Effective power) - 50

3. Terminate the "C" Port on the rear panel with a 75 ohm terminator.

4. Connect a calibrated, variable 75 ohm video modulated signal source to Port "B".

5. Set the signal to a frequency between 5 and 600 MHz. If a bandpass filter has been inserted between B LOOP IN and OUT, select a frequency that is within its passband.

6. Set the signal applied to Port "B" to the effective power at which the APSS-1B should switch to Port "B". See the Chart, "CALCULATING THE EFFECTIVE INPUT POWER", for instructions on calculating the effective power.

7. Select the AUTO mode of the A/B/AUTO front panel switch. The green LED should indicate that the APSS-1B is in AUTO mode. If the green B PRESENT LED, is not lit, rotate the B THRESHOLD pot on the front panel in a clockwise direction until it lights.

8. While observing the B PRESENT LED, slowly adjust the B THRESHOLD pot on the front panel in a counter-clockwise direction until the B PRESENT LED extinguishes.

9. While observing the B PRESENT LED, slowly increase the output level of the signal source until the B PRESENT LED lights again. Determine the difference between this level and the level needed to cause the B PRESENT LED to extinguish. The difference between these levels may be increased or decreased by adjusting the B HYSTERESIS pot on the front panel. Clockwise rotation increases the hysteresis, counter-clockwise rotation decreases hysteresis.

10. Setting the HYSTERESIS pot may affect the THRESHOLD setting. Repeat steps 7 through 10 as needed.

C) VERIFY MANUAL OPERATION

1. Using the signal source described above, apply sufficient signal to Port "A" to light the A PRESENT LED.

2. Set the A/B/AUTO switch to the B position. The green AUTO LED should be extinguished, the A LED near the A/B/AUTO switch, should be extinguished and the B LED should be lit.

3. Remove the signal source from Port "A". The A PRESENT LED should be extinguished, and the A, B, and AUTO LED's should remain in the condition described in step 2.

4. Set the A/B/AUTO switch to the A position. The green AUTO LED should be extinguished, The A LED should be lit and the B LED should be extinguished.

V) INSTALLATION:

A) MECHANICAL INSTALLATION:

The APSS-1B is housed in a standard 1U (1.75") rack enclosure, which may be mounted in any standard rack using the usual methods. The APSS-1B is nominally 12" deep, and an additional 8" may be required for routing cables and filters (if employed). Care should be taken to provide clear access to the fuse holder and the various connections on the rear panel.

B) SUMMARY OF CABLING AND WIRING:

All connections to the APSS-1B are located on the rear panel. These include:

1) RF switch connections, consisting of:

(Port) "A"
A single type "F" female connector, accepting the primary RF signal feed.

(Port) "B"
A single type "F" female connector, accepting the secondary (back-up) RF signal feed.

(Port) "C"
A single type "F" female connector, outputting the Common terminal of the RF switch.

2) "LOOP" connections:

"A LOOP"
Two type "F" female connectors, one marked "OUT", the other marked "IN". If the "A" monitor is to respond to all frequencies present at Port "A" between 5 and 600 MHz, these connectors should be jumpered together by a short cable. If the "A" monitor is to respond only to a limited number of the signals applied to Port "A", a bandpass filter passing only these frequencies should be inserted between the "IN" and "OUT" connectors.

NOTE:

If the effective total RF input power applied to Port "A" is greater than +50 dBmV, an attenuator pad must be inserted into the "A LOOP". See Paragraph (C), "INSTALLATION ADJUSTMENTS" and the Chart, "CALCULATING EFFECTIVE INPUT RF POWER" for details.

"B LOOP"
Two type "F" female connectors, one marked "OUT", the other marked "IN". If the "B" monitor is to respond to all frequencies present at Port "B" between 5 and 600 MHz, these connectors should be jumpered together by a short cable. If the "B" monitor is to respond only to a limited number of the signals applied to Port "B", a bandpass filter passing only these frequencies should be inserted between the "IN" and "OUT" connectors.

NOTE:

If the effective total RF input power applied to Port "B" is greater than +50 dBmV, an attenuator pad must be inserted into the "A LOOP". See Paragraph (C), "INSTALLATION ADJUSTMENTS" and the Chart, "CALCULATING EFFECTIVE INPUT RF POWER" for details.

3) Contact Closure Connections:

A single "barrier strip" terminal block with ten screw-type terminals. See Chart "APSS-1B CONTACT CLOSURES" for connections. Any wiring of the appropriate gauge to carry .25 amp. meeting the local Code is usable.

4) Electrical Power:

A single 3-pin electrical receptacle accepts the power cord. Nominal operating voltage is 115 VAC, unless otherwise clearly marked on the rear of the rack enclosure.

C) INSTALLATION ADJUSTMENTS:

This procedure calibrates the APSS-1B to the RF LAN or CATV system in which it will be functioning. It assumes that all electrical connections have already been made and that both Ports are connected to the RF signals they will monitor hereafter, and that the levels of these signals have been measured and verified. If bandpass filters are to be used to reduce the monitoring bandwidth of the "A" or "B" level monitors, these filters should now be installed in their respective LOOP IN/OUT paths. See drawing "APSS-1B 'LOOP' CONNECTIONS" for installation details.

1) Before switching on the APSS-1B, consult the Chart, "CALCULATING EFFECTIVE INPUT RF POWER" to determine whether the effective power on either Port will exceed +50 dBmV. If so, it will be necessary to insert an attenuator pad in the respective LOOP IN/OUT path. The value of the pad is determined by the simple formula:

Attenuator pad value = (Effective power) - 50

See the Drawing, "APSS-1B 'LOOP' CONNECTIONS" for installation details.

2) Switch on the APSS-1B. Set the A/B/AUTO switch to AUTO. The green AUTO LED and the POWER LED should now be lit.

3) Observe the A PRESENT LED. If it is not lit, slowly turn the A THRESHOLD pot on the front panel in a clockwise direction until it lights.
4) Observe that the "A" LED near the A/B/AUTO switch is lit, indicating that the APSS-1B has set the internal RF switch to Port "A".

5) Insert a 3 dB attenuator pad between the signal source and Port "A". The A PRESENT LED should now be fully extinguished. If it is blinking, skip Step (6).

6) Rotate the A HYSTERESIS pot on the front panel in a counterclockwise direction until the A PRESENT LED begins to blink randomly. If the pot reaches its "stop" before blinking occurs, skip Step (7).

7) Rotate the A HYSTERESIS pot in a clockwise direction until the A PRESENT LED stops blinking and remains extinguished. (The HYSTERESIS adjustment sets the "noise" immunity of the APSS-1B.) The procedure just completed eliminates random switch activity caused by small, random variations in the instantaneous power of the applied signals.)

8) Observe the B PRESENT LED. If it is not lit, slowly turn the B THRESHOLD pot on the front panel in a clockwise direction until it lights.

9) Insert a 3 dB attenuator pad between the signal source and Port "B". The B PRESENT LED should now be fully extinguished. If it is blinking, skip Step (10).

10) Rotate the B HYSTERESIS pot on the front panel in a counterclockwise direction until the B PRESENT LED begins to blink randomly. If the pot reaches its "stop" before blinking occurs, skip Step (11).

11) Rotate the B HYSTERESIS pot in a clockwise direction until the B PRESENT LED stops blinking and remains extinguished. (The HYSTERESIS adjustment sets the "noise" immunity of the APSS-1B.) The procedure just completed eliminates random switch activity caused by small, random variations in the instantaneous power of the applied signals.)

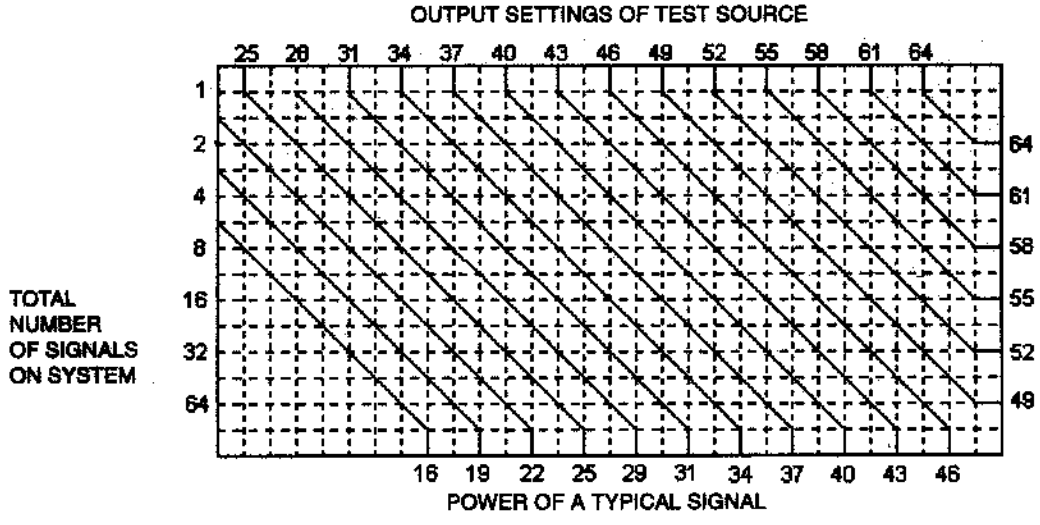
CALCULATING EFFECTIVE INPUT RF POWER:

If a single-frequency signal source is used to verify the performance of an APSS-1B, it must be set to simulate the total effective RF power of the RF LAN or CATV system into which the APSS-1B is to be installed. If the number of signals carried by the system is known, and if all of the signals have similar amplitudes, the effective power may be calculated as follows:

Effective power in dBmV = 10*log (number of signals) + (power of a typical signal in dBmV)

NOTE:

If a bandpass filter has been inserted into the monitor's LOOP IN/OUT, only the number of signals in the filter's passband should be included in the calculation.



TEST SIGNAL SOURCE SETTINGS to simulate from 1 to 64 CATV channels, each with an amplitude of 16 to 64 dBmV.

2010575003- APSS-1B FINAL

Part Number	Description	Quantity
0190197000	COND LINE CORD	1.0000 EA
0200084000	RCON F JACK-JACK SHORT	7.0000 EA
0280039000	FST CABLE TIES	29.0000 EA
0340030000	FUSE 1A FAST 5 X 20MM	2.0000 EA
0410155084	INSL 3/4 SHRINK CLR	0.4200 FT
0410155086	INSL 1 1/2 SHRINK CLR	0.2100 FT
0500016000	NU 3/8-32X3/32 HX NI	7.0000 EA
0500029000	WA 6 EXT .020 ZK	3.0000 EA
0500038000	WA 3/8 INT .022 ZK	7.0000 EA
0500258000	NU 6-32 HX SS	4.0000 EA
0500541000	WA .380 FLT .025 NI	7.0000 EA
0500677001	SC 4-40X3/16 PH BO PL	8.0000 EA
0500677002	SC 4-40X1/4 PH BO PL	5.0000 EA
0500678002	SC 6-32X1/4 PH BO PL	18.0000 EA
0500678004	SC 6-32X3/8 PH BO PL	4.0000 EA
0500679001	SC 8-32X1/4 PH BO PL	10.0000 EA
0540113000	SKT FUSE HOLDER	2.0000 EA
0590006000	TERM GND LUG #6	1.0000 EA
0690019000	DCON EAC-309	1.0000 EA
2010442033	7002B 12V 1X2 SWITCH	1.0000 EA
2050861000	P/A 20 DB COUPLER	2.0000 EA
2070788001	P/A CABLE A POST AMP	1.0000 EA
2070788002	P/A CABLE TAP "A"LOOP	1.0000 EA
2070788003	P/A CABLE "A" COUPLER IN	1.0000 EA
2070788004	P/A CABLE "B" POST AMP	1.0000 EA
2070788005	P/A CABLE "B"TAP-"B"OUT	1.0000 EA
2070788006	P/A CABLE "B"COUPLER IN	1.0000 EA
2070788010	P/A CABLE "A" IN-OUT	1.0000 EA
2070788011	P/A CABLE "B" IN-OUT	1.0000 EA
2070788013	P/A CABLE "AB"SW"-"C"	1.0000 EA
2070788014	P/A CABLE "AB"SW "B"-COUP	1.0000 EA
2070788015	P/A CABLE "AB"SW "A"-COUP	1.0000 EA
2070789001	P/A TERM BLOK HARN APSS-1	1.0000 EA
2070789003	P/A A AMP HARN APSS-1	1.0000 EA
2070789004	P/A WIRE KIT APSS-1	1.0000 EA
2070789005	P/A B AMP HARN APSS-1B	1.0000 EA
2070789006	S.A AC HARN APSS-1	1.0000 EA
2070789007	S/A WIRE KIT APSS-1B	1.0000 EA
2070790002	S/A APSS-1B MAIN PCB	1.0000 EA
2170063002	PNL-B APSS-1A TRIL	1.0000 EA
2180227002	PNL-F APSS-1B FRONT PANEL	1.0000 EA
2290206000	PLAT BOT APSS-1A	1.0000 EA
2290208000	CVR TOP, APSS-1A	1.0000 EA
2290209000	PLAT SIDE 1 U RACK 12"D	2.0000 EA

2070790002 MAIN PCB ASSEMBLY

Part Number	Description	Quantity	Ckt Ref
0120526000	CAP .1UF MON	2.0000 EA	C4,5
0120527000	CAP 10UF 16V RAD	4.0000 EA	C1,2,6,10
0120555011	CAP 27PF 50V DIS TAI	1.0000 EA	C12
0120555048	CAP 220PF 50V DIS TAI	1.0000 EA	C11
0120605001	CAP 2200UF 50V ELE	1.0000 EA	C3
0250077000	DI WO-6 600V 1.5A BR	1.0000 EA	D9
0250086000	DI 1N4446	7.0000 EA	D4,6,10,11, 12,13,14
0250206001	DI GRN LED RT ANGLE	6.0000 EA	D1,2,3,5,7,8
0330079000	HTSK APSS-1	1.0000 EA	
0440105003	PLUG 3PIN .100 GLD	1.0000 EA	J4
0440105004	PLUG 4PIN .100 GLD	1.0000 EA	J2
0440105010	PLUG 10PIN .100 GLD	1.0000 EA	J1
0440108003	PLUG 3PIN .156 M	1.0000 EA	J5
0450730000	RES 3.3K 1/4W 5%	6.0000 EA	R5,9,10,19, 20,21
0450737000	RES 4.7K 1/4W 5%	3.0000 EA	R18,24
0450751000	RES 10K 1/4W 5%	10.000 EA	R1,8,12,22, 23,27,30,31,32
0450755000	RES 12K 1/4W 5%	1.0000 EA	R33
0450762000	RES 18K 1/4W 5%	2.0000 EA	R7,13
0450793000	RES 100K 1/4W 5%	2.0000 EA	R11,34
0450821000	RES 470K 1/4W 5%	2.0000 EA	R3,17
0480335010	VRES 10K 25T 3299Z	2.0000 EA	R6,14
0480335015	VRES 1M 25T 3299Z	2.0000 EA	R2,16
0500258000	NU 6-32 HX SS	1.0000 EA	
0500675003	SC 6-32X5/16 PH ZK PL	1.0000 EA	
0570147000	SWT 2P2T SLIDE	1.0000 EA	SW2
0570357000	SW 2P2T PCMT TOGGLE	2.0000 EA	SW3,4
0570358000	SW 2P2T CEN OFF PCMT TOGL	1.0000 EA	SW1
0610143000	XFMR 115/230, 15/30V 12VA	1.0000 EA	TR1
0620053000	XSTR 2N4919	3.0000 EA	Q1,3,4
0620084000	XSTR 2N3906	1.0000 EA	Q2
0700023000	RELY RZ-12 ITT	2.0000 EA	RL1,2
0760038000	IC MC7812CT	1.0000 EA	U2
0760077000	IC CD4027	1.0000 EA	U6
0760161000	IC 14093	1.0000 EA	U3
0760208000	IC CD4081B	1.0000 EA	U4
0760211000	IC LM324N	1.0000 EA	U1
0760249000	IC CD4071BCN	1.0000 EA	U5
0780009000	SPKR PIEZO BUZZER 3-20V	1.0000 EA	
2110869000	CVR POWER SWITCH	1.0000 EA	
3080186000	PCB APSS-1A MAIN	1.0000 EA	

2070784000 S/A POST AMP APSS-1

Part Number	Description	Quantity	Ckt Ref
0120505000	CAP 1000PF 50V F/T	1.0000 EA	C58
0120603000	CAP 1PF 50V F/T	1.0000 EA	C59
0200382000	RCON BNC F FLANGE 75	1.0000 EA	
0250002000	DI 1N82AG NON/SEL	1.0000 EA	D1
0350247005	IND 5 1/2T 1/8ID	2.0000 EA	L1,2
0460085000	RES 270 1/2W 5%	1.0000 EA	R4
0460092000	RES 390 1/2W 5%	1.0000 EA	R2
0460368000	RES 100 1W 5%	1.0000 EA	R6
0480334010	VRES 10K 25T 3299Y	1.0000 EA	R10
0500551000	SC 4-40X3/16 PH ZK PL	7.0000 EA	
0760202000	IC LM358	1.0000 EA	U4
0760548000	IC MAR-3 WIDEBAND AMP	2.0000 EA	U1,2
0760549000	IC MAV-11 WIDEBAND AMP	1.0000 EA	U3
0870007001	CRES 12 5% 1206	1.0000 EA	R1
0870007010	CRES 51 5% 1206	1.0000 EA	R14
0870007024	CRES 220 5% 1206	2.0000 EA	R3,5
0870007060	CRES 10K 5% 1206	5.0000 EA	R7,9,11,12,13
0870007080	CRES 100K 5% 1206	1.0000 EA	R8
0880008016	CCAP 12PF 50V 1206	1.0000 EA	C4
0880008030	CCAP 150PF 50V 1206	1.0000 EA	C7
0880008052	CCAP .01UF 50V 1206	6.0000 EA	C1,2,3,5,6,8,11
2110742000	CVR POST AMP DSC-1000	1.0000 EA	
2130268000	ENC POST AMP DSC-1000	1.0000 EA	
3080187000	PCB POST AMP APSS-1	1.0000 EA	

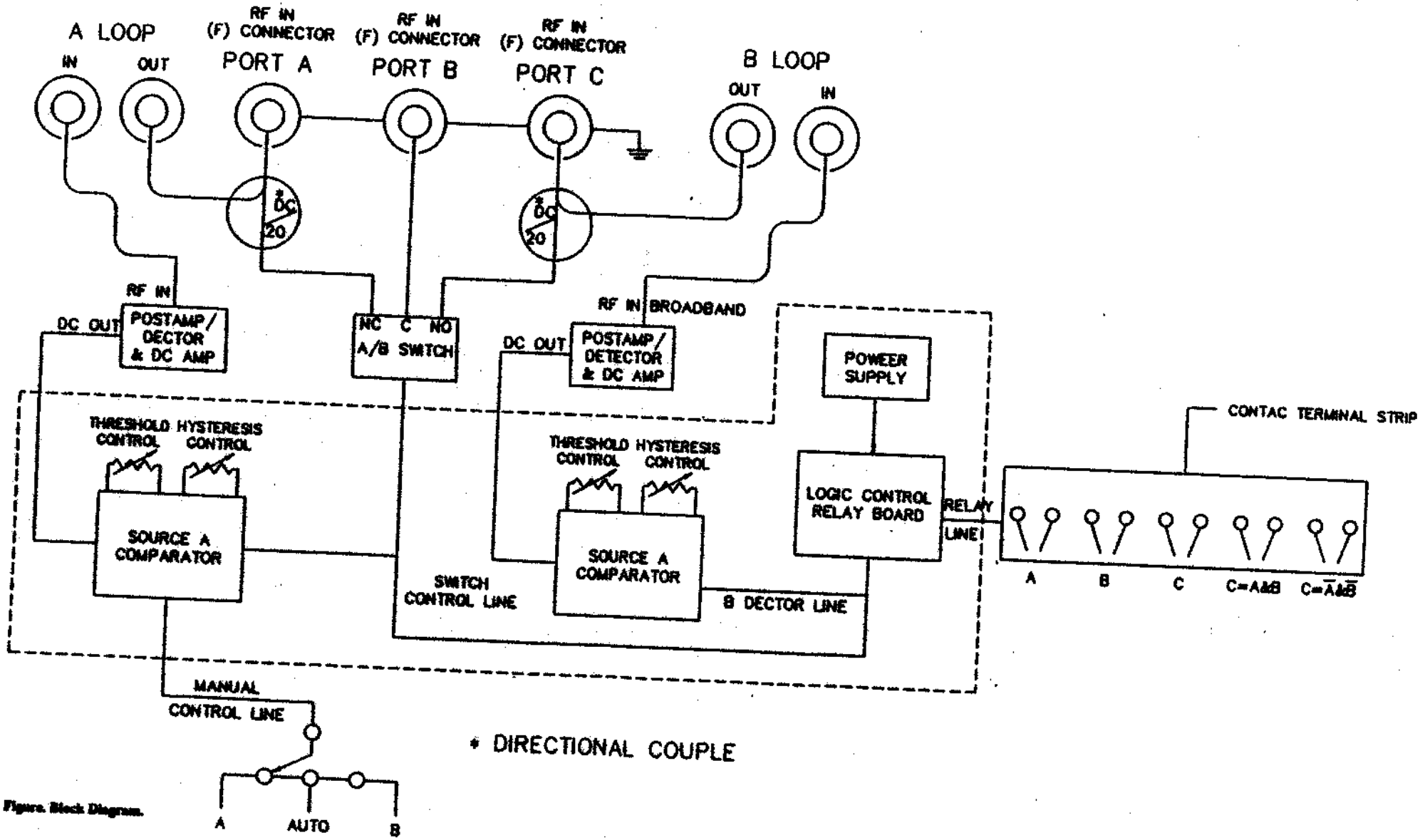


Figure. Block Diagram.