Nine
RADIO SYNDICATION

Technical Manual

August 2022

TECHNICAL OPERATIONS

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Quick Reference Intelsat 1S-19

- Ku Band

- Intelsat IS19 @ 166°E

- Transponder AN15K

- Vertical polarisation

- Main carrier downlink frequency ~ 12,554.25 MHz

- Circuit ID = FFXD001

- Modulation - QPSK 2/3

- Standard = DVB-S2

- Symbol rate - 1,548.9Ksym/sec

- Norsat PLL LNB recommended (stability +/- 25 kHz or better)

- Intermediate Frequency - 1,254.25 MHz

- NCC PID = 4151

- DVB S2 Transport Stream = 1

Important Information

This Manual covers the set up and installation of the IDC Superflex Pro and Star Pro G2 satellite receivers; and, the position of IS-19 for pointing the antenna.

The IDC MAP receiver set up and user instruction guide is in the separate document accompanying this Manual.

The system is sensitive to external interference and especially to severe variations within the mains supply. Continuity cannot be guaranteed following blackouts/brownouts. Heavy mains dips or spikes may result in connected equipment being activated, causing uncontrolled and unscheduled broadcast of material.

It is a common practice, to power remote control systems with alternative power sources having mains isolating features, such as UPS.

It is recommended that the receiver be powered from an uninterruptible power supply.

WARNING

OPERATION OF ELECTRONIC EQUIPMENT INVOLVES THE USE OF VOLTAGES AND CURRENTS WHICH MAY BE DANGEROUS TO HUMAN LIFE. OPERATING PERSONNEL SHOULD OBSERVE ALL SAFETY REGULATIONS. DO NOT CHANGE COMPONENTS OR MAKE ADJUSTMENTS INSIDE THE EQUIPMENT WITH POWER ON UNLESS PROPER PRECAUTIONS ARE OBSERVED.

Quick Set Up Guide - Star Pro G2 Audio Receiver

The IDC Receiver is shipped containing: 1 x STAR Pro G2 Audio Receiver

1 x Australian/IEC Mains Power Cord

Step 1   Test to ensure the satellite receiver is operational after shipment.

1.   Set the receiver on a work surface; do not connect it to the antenna.

2.   Plug the AC power cord into the rear panel and into the AC outlet.

3.   The STATUS LED should now be RED.

4.   After 2 minutes the:

- STATUS LED will change to GREEN

- LOCK LED will illuminate RED

- CONTROL LED will be OFF

- AUDIO 1 will be GREEN

- AUDIO 2 will be GREEN

5.   Power down the Receiver.

If any of the above steps fail, contact Nine Radio Syndication.

Step 2   Rack mount the Receiver, connect the antenna feed and power up.

1.   After 2 minutes the:

- STATUS LED will change to GREEN.

- LOCK LED will be GREEN.

- CONTROL LED will BLINK GREEN.

- AUDIO 1 will be GREEN.

- AUDIO 2 will be GREEN.

2.   Audio 1 or 2 may or may not be blinking, this is normal.

If LEDs are not GREEN refer to the Installation Guide, pages 7 to 9.

Step 3   Attach the audio and closures' connectors.

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IDC Receiver Installation Guide

Introduction

These notes describe the installation and operation of the receiving equipment, a digital audio satellite receiver from International Datacasting Corporation. The system uplinks audio in the DVB-S2 standard. It requires a Low Noise Block Downconverter, LNB, PLL type. The satellite receiver delivers two stereo audio streams and corresponding contact closures for IDs, sweeps, jingles etc.

The Main Output (Channel/Audio 1) is configured to supply live program content; the Auxiliary Output (Channel/Audio 2) is configured for News. We recommend both Channels are wired through to all on-air and production studios and your automation system.

The internal configuring of these outputs is controlled from Nine Radio Syndication, the particular mode being dependent on the program format, channel usage, stereo, mono, dual mono etc. The Receiver also provides 4 relay contact closure outputs to control station equipment for local insertion of material into program presentations.

The receivers also have the ability to replay, forward and store content via the Ethernet ports on the receiver.

Antenna Requirements

We recommend a dish size between 2m and 2.7m (location dependent). IDC satellite receivers demand input RF signals to be tightly controlled in frequency, which requires highly stable conversion within the Low Noise Block Converter (LNB) of the antenna. For reliable performance, LNB Local Oscillator stability must be better than +/- 25kHz, which is usually achieved only in LNBs based on phase-locked-loop design. Check your LNB and if required replace with a PLL type. The LNB can usually be replaced without upsetting the feed focus.

Your antenna system should be regularly checked for overall alignment, including pointing, focus and polarisation, and the condition of the lead-in cable and RF connectors. If you wish to provide split antenna feeds to the IDC receiver or other receivers, isolate the LNB power feed from one or the other receivers, using a splitter with DC-isolation.

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Receiver Preparation and Authorisation

1. Plug power into the unit. STATUS LED is green. If not, contact Nine Syndication.

2. After a minute, the LOCK LED will illuminate. If the receiver's lock light does not turn green, follow this procedure:

3. Using the keypad, press the up or down arrow until you get to Carrier A. Press the green check mark button twice.

4. If the receiver displays the message: *Password Error*, press the RED X and arrow down to Authorisation, then press the Green Check Key twice.

5. Using the keys, enter B341, then press the Green Check Key. The receiver will now display 4 asterisks. Press the Red X button.

6. Arrow down until reaching Carrier A, then press the Green Check button twice.

7. Use the up or down arrow buttons to change the value and use the left or right arrow buttons to move the cursor left or right. Change the frequency to 1254.250000 Press the green check mark button to accept the frequency.

8. Press the right arrow to enter the Rate menu. Enter the carrier symbol to 01548.900.

9. Press the right arrow to enter the Mod standard menu. Select Modulation to DVBS2.

10. Press the right arrow to enter the Parameters menu. Set the Parameters to Auto.

11. Press the right arrow to enter the next menu which will be either:

    i. NCC PID menu. Set to 4151; or

    ii. Spec Inversion menu. Set to Off.

12. Press the right arrow to enter the TS ID menu. Enter the TS ID to 1.

13. Press the right arrow to enter the 22 KHz Tone menu. Enter the 22 KHz to Off.

14. Press the right arrow to enter the Polarisation menu. Specify Horizontal.

15. Press the right arrow to enter the preferred menu. Specify Preferred as Yes.

16. Press the right arrow, the receiver will prompt to copy the settings to Carrier B. Select Yes, then press green check button to accept this option.

17. To power the antenna's LNB with the receiver:

    i. Press the red "X" button to exit the Carrier Menu and press the down button until you get to the LNB menu.

    ii. Press the green check mark button to enter the LNB Power Supply menu, use the up or down arrow buttons to enable the LNB power supply.

iii.Press the green check mark button to accept the change. If the signal is present at the coaxial cable connector on the rear panel, your receiver should lock to the DVB carrier, indicated by the green LOCK LED.

18.   Connect the antenna feed to the receiver and power-up.

When the LOCK LED is steady on GREEN, contact Nine Radio Syndication to confirm authorisation and test the receiver. If the LOCK LED flashes between RED AND GREEN or is steady on RED, check the antenna system. Authorisation will be indicated by the CH1 and CH2 Audio LED's FLASHING GREEN.
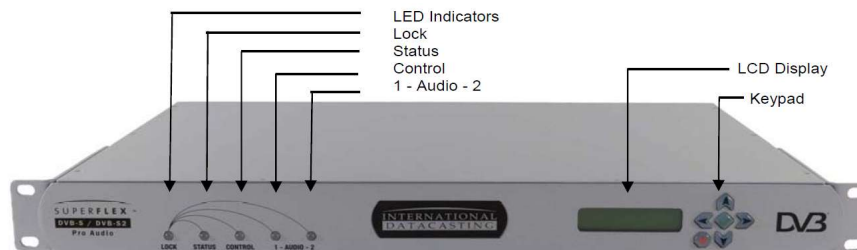
Display

Lock indicates receivers lock to incoming satellite DVB carrier on the L-Band input.

- **Off**:   no power and no lock.
- **Solid Green**:   unit is locked to the DVB carrier.
- **Solid Orange**:   unit is locked but the signal has fallen to a level at which uncorrected packets may appear. If rain fade is the cause, the receiver will recover quickly without losing lock.
- **Solid Red**:   the unit is not locked to the DVB carrier, this will be the case while it's booting, lock is not expected until the status light turns green.

Status indicates the power-up status of the receiver, including LNB DC power status to the L-Band connector. This should be green while the receiver is in operation. If the light is red, this indicates a fault in the machine, it should be returned for repair.

Control Indicates the authorization for the receiver to process control commands. Once the receiver is locked it should start flashing to indicate its receiving and decoding commands.

Audio 1 and 2 provides indication of the authorization and audio decoding activity on the audio outputs. When the receiver is locked to an audio stream these lights will flash green,

this is not an indication of the audio level as the lights will flash even when the audio is silent. Audio levels can be viewed from the menu on the LCD keypad.

When the audio stored on the receiver is a different duration to the log, the audio 1 and 2 lights will flash orange and the receiver will remain silent until a new command is received.

Receiver Display Options

First, press the Red X Button twice. Then change the display using the Left/Right Keys.

Status 1	Stream 1 Channel	Channel number for audio decoded by Audio 1	
Status 2	Stream 2 Channel	Channel number for audio decoded by Audio 2	
Status 3	CH 1 Relays 1-4	State of the pulsing relays for Audio 1	
Status 4	CH 2 Relays 1-4	State of the pulsing relays for Audio 2	
Status 5	Metadata STR 1	Serial data being sent on Audio 1	
Status 6	Metadata STR 2	Serial data being sent on Audio 2	
Status 7	CH 1 CH 2	Audio level as a graph for each Audio Channel	If frozen, recycle receiver
Status 8	Audio Backup	Should display "Disabled"	
Status 9	C/N	Carrier to Noise	Normal: 12db – 20db
Status 10	View Uncorr Biterbi	Displays the % of uncorrected errors received	Normal: <10%
Status 11	Signal Level	Displays as a % the signal level	Normal: 20% – 80%
Status 12	Sat 0 MAC Address	Displays the MAC address of the receiver card	

Receiver Menu

Stream 1-2	Relay 1-2	Meta data 1-2	Audio Meters 1-2	Audio Backup	C/N	Uncorr Errors	Signal Level	SAT 0 MAC	
Carrier A/B	Freq (MHZ)	Rate KYSM/Sec	MOD Standard	DVB S2 Parameters	Spec inversion	TS ID	NCC PID	22k Tone	Polarisation
Preferred	Copy to B								
LNB	Power Supply	Freq Reversal	AFC Range						
Ethernet Interface	IP Address	Net Mask	DHCP						
SAT Interface	IP Address	Net Mask							
Routing	Default Gateway								
NTP	Status	Forwarding ETH 0	Forwarding ETH 1						
INFO									
Authorisation	Firmware version	Live Assist	Livewire	Pro audio	Deviation				
Reboot									

1. Only items show in red allow editing

2. All other menu items are controlled by the head end

3. Before editing items shown in red you must:

Go to Authorisation

Enter the password B341

Audio output ports

Audio Channels. This is a DE-9P (male) connector used as a unidirectional (output) analogue audio data port. Pin outs are as follows:

PIN	Acronym	Reference
1	LEFT +	Audio X Left +
2	GND	Ground
3	AES +	Digital Audio Output X +
4	GND	Ground
5	RIGHT +	Audio X Right +
6	LEFT -	Audio X Left -
7	GND	Ground
8	AES -	Digital Audio Output X -
9	RIGHT -	Audio X Right -

Nominal Program Level for the IDC system is +4dBu, (+4dBm/600ohms).

Sufficient headroom is maintained by operating at this level, in order that performance not be compromised by the need to limit or otherwise process the signal before delivery.

The aim is to supply high quality program material which is as close to the original as possible. Tailoring of the audio signal to achieve a preferred 'sound' is left to the receiving station. Users will need to provide external means for level adjustment, if required. Clipping level at the receiver output is +16dBu.

For maximum flexibility, Nine Radio Syndication recommends you use stereo audio distribution amplifiers to run the outputs of your receiver(s) to your on-air studios, production studio, news room (for News Maker and monitoring) and your automation system (if applicable). This also allows you to set the output level that is required by your consoles and automation system – call Nine Radio Syndication to arrange a tone test for alignment.

AES digital output Axia Live Wire outputs are also available for integration into digital environments.

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Control Ports

Relay closures integrated into the receiver and associated with each audio stream provide an interface for remote control of user's equipment. The contacts are selectable between normally-open and normally-closed. 4 commands are available for each audio stream.

Each audio stream with its associated Commands is independent, allowing simultaneous, multiple use of single commands across the various streams. The relay closures for each audio stream are configured as follows.

Relay	Schedule Command	Schedule Event
1	1	Commercial Start Pre-feed News Start
2	2	Weather Start All News End
3	3	Sports Credit Special Event Credit
4	4	Station ID Station IDP
Other	Service	Name

For stations taking live programs that include news, the news ID should be hard timed.

Receiver Configuration

Output Connectors			
Relay	Audio	Relay	Audio
Ch 1	Ch 1	Ch 2	Ch 2
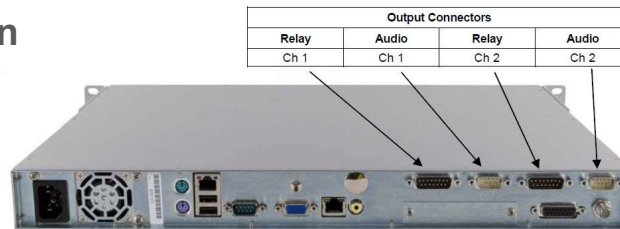
Audio Channels DE-9P connector used as unidirectional analogue audio data port. Pin outs:

PIN	Acronym	Reference
1	LEFT +	Audio X Left +
2	GND	Ground
3	AES +	Digital Audio Output X +
4	GND	Ground
5	RIGHT +	Audio X Right +
6	LEFT -	Audio X Left -
7	GND	Ground
8	AES -	Digital Audio Output X -
9	RIGHT -	Audio X Right -

Relay Channels DA-15P (male) connector used as for 4 Form C relays. Pin outs:

PIN	Acronym	Reference
1	RX (not used)	RS–232 Receive
2	Relay 1 NO	NO Form C Lock 1
3	Relay 2 NO	NO Form C Lock 2
4	Relay 3 NO	NO Form C Lock 3
5	Relay 4 NO	NO Form C Lock 4
6	GND	Ground
7	Relay 1 NC	NC Form C Lock 1
8	Relay 2 NC	NC Form C Lock 2
9	TX from receiver to PC	RS-232 Transmit
10	Relay 1 Com	Form C Common 1
11	Relay 2 Com	Form C Common 2
12	Relay 3 Com	Form C Common 3
13	Relay 4 Com	Form C Common 4
14	Relay 3 NC	NC Form C Lock 3
15	Relay 4 NC	NC Form NC Form C Lock 4

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Manual Channel Change Procedure – Authorisation required.

1. Press the (red x) button once.

2. Using the keypad, press the up or down arrow until you get to "Authorisation". Press the (green tick) button twice.

3. Using the keys, enter B341, then press the (green tick) button once. The receiver will now display 4 asterisks. Press the (red x) button once.

4. Arrow down until reaching Audio Player 1 or Audio Player 2 (depending on which channel you want to change), then press the (green tick) button twice.

5. Scroll up or down to the required channel.

6. Press the (green tick) button once.

7. The receiver is now on the selected channel. If your receiver is not authorised for the selected channel it will revert to the original channel after a few seconds.

Manual Channel Change Procedure – Authorisation not required.

1. Press (red x) button

2. Press (green tick) button

3. Display will read Audio Player 1; use the down button to select Audio Player 2

4. Press (green tick) button

5. Press up or down buttons to select required channel

6. Press (green tick) button

7. Press (red x) to go back to point 3, press (red x) again to return to main menu.

Troubleshooting Guide

Reset Equipment: As a first step power down your receiver for 30 seconds.

Loss of signal in the early morning: Ensure the dish and feed horn are clean and free from any foreign objects.

Loss of audio: Once the bit error rate exceeds a threshold, the receiver mutes. The lock will go from GREEN to ORANGE to RED as signal degrades - local interference or rain fade.

Loss of audio: If the Ch 1 and/or Ch 2 LCD volume levels are frozen in either a full or   mid-range position this means the audio card has locked up. Recycle the receiver by pressing and holding for 5 seconds the small black reset button on the rear of the receiver.

Rain fade: Heavy rain can block the signal. The fade can occur either at the uplink or the receiving site. Rain fade can have more of an effect on poorly aligned/small dishes or in systems where the signal is otherwise attenuated.

Resetting the Receivers' Frequency

For the SFX Pro Series:

Keypad, press the down arrow to Carrier A. Press the green check button twice.

If the receiver displays the message: *Password Error*, press the red X and arrow down to Authorisation, then press the green check button twice.

Enter B341, press the green check button. the receiver will display 4 asterisks. Press the red X button.

Arrow down to Carrier A, then press the green check button twice.

Change the frequency to 1254.250000. Press the green check button.

Arrow to the right through the next menu items until the receiver prompts to copy the settings to Carrier B. Select Yes, then press green check button.

For the Star Series:

Using the keypad, arrow down to Menu 2 - Input, press green check button

Arrow right to 2.1 Sat-In, press green check button

Arrow down to 2.1.3 Carrier A, press green check button

Change the frequency to 1254250, press the green check button.

Dish Alignment Checks

Check there are no spider webs around the feed horn of the LNB or spiders living within the feed horn. Because the LNB has constant power applied, spiders tend to live there during colder periods. If you lose reception in the early morning it is indicative that the feed horn of the LNB could have a problem.

Check for rust or loose fittings on the satellite antenna mount. Tighten any loose fittings being sure to check your alignment and performance afterwards.

IS-19 Transponder Spectrum (as of August 2022)

TRANSPONDER IS19-AN15K

C/F=14,302.25 / 12,554.25 MHz

(LO 12,800MHz) L-BAND U/L FREQUENCY (MHz)

1,502.25

A15K-NR
DVB-FORMAT = DVB-S2
MODULATION = QPSK
PILOTS = OFF , FRAME LENGTH=SHORT
INFORMATION RATE = 1.996Mbps
OCCUPIED BW = 1.6263MHz
SYMBOL RATE = 1.5489Mbaud
FEC = 2/3
α = 1.05

(LO 11,300MHz) L-BAND D/L FREQUENCY (MHz)

1,254.25

Es/No = 3.8dB

36MHz

14,296/12,548MHz   14,314MHz (Horz) /12,566MHz (Vert)   14,332/12,584MHz
1,248   1,284

IS-19 AN15K   IS-19 AN17K