7 AMFM-FRD-REQ-024167/A-AM/FM/HD Tuner - Standalone AHU (TcSE ROIN-285721-1)

Global AHU

7.1 General Requirements

7.1.1 HDR-SR-REQ-024053/A-Initial Display Data shown when selecting an HD Preset or Direct Tuning an HD channel (TcSE ROIN-128157-1)

Whenever the user selects a Preset with an HD channel stored in it or Direct Tunes to an HD channel, the MFD shall only display the frequency for 2 seconds before displaying the rest or the display data that the AHU sends over. This is done so that the user does not see the RBDS data flash on the display before the HD data is available.

7.1.2 AMFM-SR-REQ-024054/A-Selecting an AM/FM Preset when AMFM Tuner is active (TcSE ROIN-129208-2)

If an AM/FM preset is selected and the selected preset resides in the currently tuned band or if the preset is selected from a browsed list, the AMFM Client shall send out the SetCurrTUBand.Rq method and the SetCurrentPreset2.Rq method. The SetCurrentPreset2.Rq method shall be sent no earlier then T_BandPreset_Min ~~5ms~~ after the SetCurrTUBand.Rq method is sent and no later than T_BandPreset_Max~~10ms~~.

If AM/FM is the active source the AMFM Slave shall compare the SetCurrTUBand.Rq method to the currently tuned band and if they are the same go to the requested preset. If the requested band is different, then the AMFM Slave needs to transition to the new band and preset that was requested.

7.1.3 AMFM-SR-REQ-024055/A-Selecting an AM/FM Preset when AMFM Tuner is not the current source (TcSE ROIN-129213-3)

If an AM/FM preset is selected and AM/FM is not the active source the AMFM Slave shall send an audio source request and transition to the new AM/FM band and preset that was requested once the SetCurrentPreset2.Rq method is received.

If the SetCurrentPreset2.Rq method is not received within T_BandPreset_Max ~~10ms~~ of the SetCurrTUBand.Rq method then the AHU shall transition to the new band with the last selected preset playing.
.

7.1.4 AMFMv2-FUR-REQ-165531/A-AM FM Tuning Ranges - BOA 3.1 for Sync Gen3

The AM/FM Tuning Ranges has to be implemented as described in the following requirement: AMFMv2-HR-REQ-165529-AM FM Tuning Ranges

7.1.4.1 AMFMv2-HR-REQ-165529/A-AM FM Tuning Ranges

AHU shall be designed to support all tuning ranges in all regions regardless of which region the AHU is sourced to be sold in. Validation of all tuning ranges for all regions in this chart is an expectation of the supplier.

Band	Europe + Middle East (GCC)~~Europe + GCC~~	Asia + Australia + South Pacific + Africa ~~ROW~~	~~Japan~~Japan~~Japan~~
AM	MW: 531–1620 kHz step 9kHz auto seek step 1kHz man. seek ~~LW: 153–279 kHz step 9kHz auto seek step 1kHz man. seek~~	MW: 522–1710 kHz step 9kHz auto seek step 1kHz man. seek	522–1629 kHz step 9kHz auto seek step ~~1kHz~~ 9kHz man. seek -

Band	Europe + Middle East (GCC)Europe + GCC	Asia + Australia + South Pacific + Africa ROW	JapanJapan
FM	87.5–108 MHz step 50kHz auto seek step 50kHz man. seek	87.5–108 MHz step 50kHz auto seek step 50kHz man. seek	76.0–90.0MHz step 100 kHz
De-emphasis	50 µS	50 µS	50 µS
High-cut / Frequency response curve FM Stereo separation	AMFM-HR-REQ-026371/B-FM High Cut Control-2 AMFM-HR-REQ-026369/B-FM Frequency Response-2 AMFM-HR-REQ-050394/A-FM Stereo Separation-2EU High-cut / Frequency response curve (FAS-AHU-AMFM-GREQ-304401-FM Frequency Response – EU, FAS-AHU-AMFM-GREQ-304402-FM High Cut Control - EU)	AMFM-HR-REQ-026371/B-FM High Cut Control-2 AMFM-HR-REQ-026369/B-FM Frequency Response-2 AMFM-HR-REQ-050394/A-FM Stereo Separation-2EU High-cut / Frequency response curve (FAS-AHU-AMFM-GREQ-304401-FM Frequency Response – EU, FAS-AHU-AMFM-GREQ-304402-FM High Cut Control - EU)	AMFM-HR-REQ-026371/B-FM High Cut Control-2 AMFM-HR-REQ-026369/B-FM Frequency Response-2 AMFM-HR-REQ-050394/A-FM Stereo Separation-2EU High-cut / Frequency response curve (FAS-AHU-AMFM-GREQ-304401-FM Frequency Response – EU, FAS-AHU-AMFM-GREQ-304402-FM High Cut Control - EU)
Frequency response curve	AMFM-HR-REQ-026369-FM Frequency Response-2	AMFM-HR-REQ-026369-FM Frequency Response-2	AMFM-HR-REQ-026369-FM Frequency Response-2
FM Stereo separation	AMFM-HR-REQ-050394-FM Stereo Separation-2	AMFM-HR-REQ-050394-FM Stereo Separation-2	AMFM-HR-REQ-050394-FM Stereo Separation-2
Reference value for FM media level matching	60% Mono Modulation, 10mV RF, 1kHz Tone	60% Mono Modulation, 10mV RF, 1kHz Tone	60% Mono Modulation, 10mV RF, 1kHz Tone
Reference value for AM media level matching	70% Mono Modulation, 10mV RF, 1kHz Tone	70% Mono Modulation, 10mV RF, 1kHz Tone	70% Mono Modulation, 10mV RF, 1kHz Tone
Data system	RDS	RDS	None
Antenna Connections	Single + 2 Singledual Program dependent	Single + dual Program dependent2 Single	Single + dual Program dependent2 Single
Low Band Operation	LW Receiver	----	----
AM Input Match	Passive & Active Dummy	Passive & Active Dummy	Passive & Active Dummy
RDS AF Switching Initial Default State	On	Off	N/A
RDS Traffic Switching Initial Default State	Off	Off	N/A
FM Dynamic Audio Behavior	Based on EU Market Drive	Based on APA or EU Market Drive	Based on APA Settings Drive
AM Dynamic Search Sensitivity Default Value (High Mode)	45 +/- 3dB below Standard RF Output	45 +/- 3dB below Standard RF Output	45 +/- 3dB below Standard RF Output

Band	Europe + Middle East (GCC)~~Europe + GCC~~	Asia + Australia + South Pacific + Africa ~~ROW~~	Japan~~Japan~~
AM Dynamic Search Sensitivity Default Value (Low Mode)	n/a	n/a	n/a
FM Search Sensitivity Default Value	20dBuV +/- 3dB	20dBuV +/- 3dB	20dBuV +/- 3dB

Band	North America + Caribbean	South America
AM	530–1710 kHz step 10kHz auto seek step 10kHz man. seek	530–1710 kHz step 10kHz auto seek step 10kHz man. seek
FM	87.9–107.9MHz step 200kHz *(stations always on an odd freq)*	87.5–107.9 MHz step 100kHz auto seek step 100kHz man. seek
De-emphasis	75 µS	75 µS
High-cut	AMFM-HR-REQ-026370-FM High Cut Control-1	AMFM-HR-REQ-026370-FM High Cut Control-1
Frequency response curve	AMFM-HR-REQ-026368-FM Frequency Response-1	AMFM-HR-REQ-026368-FM Frequency Response-1
FM Stereo separation	AMFM-HR-REQ-026376-FM Stereo Separation-1	AMFM-HR-REQ-026376-FM Stereo Separation-1
Reference value for FM media level matching	85% Mono Modulation, 10mV RF, 1kHz Tone	85% Mono Modulation, 10mV RF, 1kHz Tone
Reference value for AM media level matching	76% Mono Modulation, 10mV RF, 1kHz Tone	76% Mono Modulation, 10mV RF, 1kHz Tone
Data system	RBDS	RDS
Antenna Connections	Single + dual Program dependent	Single + dual Program dependent
Low Band Operation	Reject out of band interference	Reject out of band interference
AM Input Match	Passive & Active Dummy	Passive & Active Dummy
RDS AF Switching Initial Default State	N/A	Off
RDS Traffic Switching Initial Default State	N/A	Off
FM Dynamic Audio Behavior	Based on NA Market Drive	Based on SA or NA Market Drive
AM Dynamic Search Sensitivity Default Value (High Mode)	45 +/- 3dB below Standard RF Output	54 +/- 3dB below Standard RF Output

Band	North America + Caribbean	South America
AM Dynamic Search Sensitivity Default Value (Low Mode)	14dB +/- 3dB above High Mode target value	48dB +/- 2.5dB below Standard RF Output
FM Search Sensitivity Default Value	35dBuV +/- 3dB	20dBuV +/- 3dB

NOTE: The 'HD Radio Hardware Option' Column in the following table is to be interpreted as "If the AHU is being built with HD Radio hardware, the column states whether or not the HD Radio hardware is to be ENABLED or DISABLED at the suppliers end of line."

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
AFGHANISTAN	WSPBG	AF	Disabled	Asia + Australia + South Pacific + Africa
ALGERIA	WSABB	AG	Disabled	Asia + Australia + South Pacific + Africa
ALL MALAYSIA	WSP03	MY	Disabled	Asia + Australia + South Pacific + Africa
AMERICAN SAMOA	WATAF	AQ	Enabled	Asia + Australia + South Pacific + Africa
ANGOLA	WSAA7	AO	Disabled	Asia + Australia + South Pacific + Africa
AUSTRALIA	WAPAB	AS	Disabled	Asia + Australia + South Pacific + Africa
AY ANTARCTICA		AY	Disabled	Asia + Australia + South Pacific + Africa
AZERBAIJAN	WSPBK	AJ	Disabled	Asia + Australia + South Pacific + Africa
BANGLADESH	WSPAB	BG	Disabled	Asia + Australia + South Pacific + Africa
BENIN	WSACJ	BN	Disabled	Asia + Australia + South Pacific + Africa
BHUTAN	WSPBQ	BT	Disabled	Asia + Australia + South Pacific + Africa
BOTSWANNA	WSABC	BC	Disabled	Asia + Australia + South Pacific + Africa
BRITISH INDIAN OCEAN	WAPAF	IO	Disabled	Asia + Australia + South Pacific + Africa
BRUNEI	WSPAC	BX	Disabled	Asia + Australia + South Pacific + Africa
BS BASSAS DA INDIA		BS	Disabled	Asia + Australia + South Pacific + Africa
BURKINA FASO	WSADB	UV	Disabled	Asia + Australia + South Pacific + Africa
BURUNDI	WSADA	BY	Disabled	Asia + Australia + South Pacific + Africa
BV BOUVET ISLAND		BV	Disabled	Asia + Australia + South Pacific + Africa
CAMBODIA	WSPCA	CB	Disabled	Asia + Australia + South Pacific + Africa
CAPE VERDE ISLANDS	WSAAD	CV	Disabled	Asia + Australia + South Pacific + Africa
CENTRAL AFRICA REPUBLIC	WSADL	CT	Disabled	Asia + Australia + South Pacific + Africa
CHAD	WSADM	CD	Disabled	Asia + Australia + South Pacific + Africa
CHINA	WSPAD	CH	Disabled	Asia + Australia + South Pacific + Africa
CK COCOS ISLANDS		CK	Disabled	Asia + Australia + South Pacific + Africa
COMOROS	WSABD	CN	Disabled	Asia + Australia + South Pacific + Africa
CONGO, DEMOCRATIC REPUBLIC OF	WSAAZ	CG	Disabled	Asia + Australia + South Pacific + Africa
CONGO, REPUBLIC OF	WSADH	CF	Disabled	Asia + Australia + South Pacific + Africa
COOK ISLANDS	WSPCB	CW	Disabled	Asia + Australia + South Pacific + Africa
CR CORAL SEA ISLAND		CR	Disabled	Asia + Australia + South Pacific + Africa
DJIBOUTI	WSADC	DJ	Disabled	Asia + Australia + South Pacific + Africa
DQ JARVIS ISLAND		DQ	Disabled	Asia + Australia + South Pacific + Africa
EAST TIMOR	WSADY	PT	Disabled	Asia + Australia + South Pacific + Africa
EQUATORIAL GUINEA	WSADN	EK	Disabled	Asia + Australia + South Pacific + Africa
ERITREA	WSADP	ER	Disabled	Asia + Australia + South Pacific + Africa
ETHIOPIA	WSAAF	ET	Disabled	Asia + Australia + South Pacific + Africa
EU EUROPA ISLAND		EU	Disabled	Asia + Australia + South Pacific + Africa
FIJI	WSPAG	FJ	Disabled	Asia + Australia + South Pacific + Africa
FQ BAKER ISLAND		FQ	Disabled	Asia + Australia + South Pacific + Africa
FRENCH SOUTH. ANTARCTIC LANDS	WSABH	FS	Disabled	Asia + Australia + South Pacific + Africa
GABON	WSACE	GB	Disabled	Asia + Australia + South Pacific + Africa
GAMBIA	WSADD	GA	Disabled	Asia + Australia + South Pacific + Africa
GEORGIA	WSPBF	GG	Disabled	Asia + Australia + South Pacific + Africa
GHANA	WSACA	GH	Disabled	Asia + Australia + South Pacific + Africa
GO GLORIOSO ISLAND		GO	Disabled	Asia + Australia + South Pacific + Africa
GUAM-U.S. TERR. (USE WATAB)	WANAF	GQ	Enabled	Asia + Australia + South Pacific + Africa
GUINEA REPUBLIC	WSAAG	GV	Disabled	Asia + Australia + South Pacific + Africa

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
GUINEA-BISSAU	WSADQ	PU	Disabled	Asia + Australia + South Pacific + Africa
HONG KONG	WSPAH	HK	Disabled	Asia + Australia + South Pacific + Africa
INDIA	WSPAI	IN	Disabled	Asia + Australia + South Pacific + Africa
INDONESIA	WSPAJ	ID	Disabled	Asia + Australia + South Pacific + Africa
IRAN	WSADJ	IR	Disabled	Asia + Australia + South Pacific + Africa
ISRAEL	WSPAK	IS	Disabled	Asia + Australia + South Pacific + Africa
IVORY COAST	WSAAH	IV	Disabled	Asia + Australia + South Pacific + Africa
JQ JOHNSON ATOLL	_	JQ	Disabled	Asia + Australia + South Pacific + Africa
KAZAKHSTAN	WSPBH	KZ	Disabled	Asia + Australia + South Pacific + Africa
KENYA	WSAAI	KE	Disabled	Asia + Australia + South Pacific + Africa
KIRIBATI	WSPCR	KR	Disabled	Asia + Australia + South Pacific + Africa
KQ KINGMAN REEF	_	KQ	Disabled	Asia + Australia + South Pacific + Africa
KT CHRISTMAS ISLAND	_	KT	Disabled	Asia + Australia + South Pacific + Africa
KYRGYZSTAN	WSPBP	KG	Disabled	Asia + Australia + South Pacific + Africa
LAOS	WSPCC	LA	Disabled	Asia + Australia + South Pacific + Africa
LESOTHO	WSABF	LT	Disabled	Asia + Australia + South Pacific + Africa
LIBERIA	WSACB	LI	Disabled	Asia + Australia + South Pacific + Africa
LIBYA	WSACF	LY	Disabled	Asia + Australia + South Pacific + Africa
LQ PALMYRA ATOLL	_	LQ	Disabled	Asia + Australia + South Pacific + Africa
MACAU	WSPBT	MC	Disabled	Asia + Australia + South Pacific + Africa
MADAGASCAR	WSACC	MA	Disabled	Asia + Australia + South Pacific + Africa
MALAWI	WSAAK	MI	Disabled	Asia + Australia + South Pacific + Africa
MALDIVE ISLANDS	WSPBS	MV	Disabled	Asia + Australia + South Pacific + Africa
MALI	WSADR	ML	Disabled	Asia + Australia + South Pacific + Africa
MARSHALL ISLANDS	WSPCD	RM	Disabled	Asia + Australia + South Pacific + Africa
MAURITANIA	WSADS	MR	Disabled	Asia + Australia + South Pacific + Africa
MAYOTTE	WSABE	MF	Disabled	Asia + Australia + South Pacific + Africa
MICRONESIA	WAPAG	FM	Disabled	Asia + Australia + South Pacific + Africa
MONGOLIA	WSPA8	MG	Disabled	Asia + Australia + South Pacific + Africa
MOROCCO	WSABA	MO	Disabled	Asia + Australia + South Pacific + Africa
MOZAMBIQUE	WSAAN	MZ	Disabled	Asia + Australia + South Pacific + Africa
MQ MIDWAY ISLAND	_	MQ	Disabled	Asia + Australia + South Pacific + Africa
MYANMAR	WSPA9	BM	Disabled	Asia + Australia + South Pacific + Africa
NAMIBIA	WSADT	WA	Disabled	Asia + Australia + South Pacific + Africa
NAURU	WSPAM	NR	Disabled	Asia + Australia + South Pacific + Africa
NE NIUE	_	NE	Disabled	Asia + Australia + South Pacific + Africa
NEPAL	WSPBR	NP	Disabled	Asia + Australia + South Pacific + Africa
NEW CALEDONIA	WSPAN	NC	Disabled	Asia + Australia + South Pacific + Africa
NEW ZEALAND	WAPAC	NZ	Disabled	Asia + Australia + South Pacific + Africa
NIGER	WSADU	NG	Disabled	Asia + Australia + South Pacific + Africa
NIGERIA	WSAAP	NI	Disabled	Asia + Australia + South Pacific + Africa
NORFOLK ISLANDS	WSPCE	NF	Disabled	Asia + Australia + South Pacific + Africa
NORTH KOREA	WSPCH	KN	Disabled	Asia + Australia + South Pacific + Africa
NORTHERN MARIANA ISLANDS	WATAC	CQ	Disabled	Asia + Australia + South Pacific + Africa
PAKISTAN	WSPAP	PK	Disabled	Asia + Australia + South Pacific + Africa
PALAU	WAPAH	PS	Disabled	Asia + Australia + South Pacific + Africa
PAPUA	WSPAQ	PP	Disabled	Asia + Australia + South Pacific + Africa
PC PITCAIRN ISLAND	_	PC	Disabled	Asia + Australia + South Pacific + Africa

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
PF PARACEL ISLAND		PF	Disabled	Asia + Australia + South Pacific + Africa
PHILIPPINES	WSPAR	RP	Enabled	Asia + Australia + South Pacific + Africa
REUNION	WSAAR	RE	Disabled	Asia + Australia + South Pacific + Africa
RWANDA	WSADE	RW	Disabled	Asia + Australia + South Pacific + Africa
SAMOA	WSPCG	WS	Enabled	Asia + Australia + South Pacific + Africa
SAO TOME & PRINCIPE	WSADF	TP	Disabled	Asia + Australia + South Pacific + Africa
SENEGAL	WSAAS	SG	Disabled	Asia + Australia + South Pacific + Africa
SEYCHELLES	WSPAT	SE	Disabled	Asia + Australia + South Pacific + Africa
SIERRA LEONE	WSADG	SL	Disabled	Asia + Australia + South Pacific + Africa
SINGAPORE	WSPAU	SN	Disabled	Asia + Australia + South Pacific + Africa
SOLOMON ISLANDS	WSPAV	BP	Disabled	Asia + Australia + South Pacific + Africa
SOMALIA	WSACD	SO	Disabled	Asia + Australia + South Pacific + Africa
SOUTH AFRICA	WSAAT	SF	Disabled	Asia + Australia + South Pacific + Africa
SOUTH KOREA	WSPAW	KS	Disabled	Asia + Australia + South Pacific + Africa
SRI LANKA	WSPAX	CE	Disabled	Asia + Australia + South Pacific + Africa
ST. HELENA	WSACK	SH	Disabled	Asia + Australia + South Pacific + Africa
SUDAN	WSAAU	SU	Disabled	Asia + Australia + South Pacific + Africa
SWAZILAND	WSABG	WS	Disabled	Asia + Australia + South Pacific + Africa
SYRIA	WSAA9	SY	Disabled	Asia + Australia + South Pacific + Africa
TAHITI	WSIAP	FP	Disabled	Asia + Australia + South Pacific + Africa
TAIWAN	WAPAD	TW	Disabled	Asia + Australia + South Pacific + Africa
TAJIKISTAN	WSPBM	TI	Disabled	Asia + Australia + South Pacific + Africa
TANZANIA	WSAAV	TZ	Disabled	Asia + Australia + South Pacific + Africa
TE TROMELIN ISLAND		TE	Disabled	Asia + Australia + South Pacific + Africa
THAILAND	WSPAY	TH	Disabled	Asia + Australia + South Pacific + Africa
TOGO	WSADK	TO	Disabled	Asia + Australia + South Pacific + Africa
TOKELAU	WAPAL	TL	Disabled	Asia + Australia + South Pacific + Africa
TONGA	WSPAZ	TN	Disabled	Asia + Australia + South Pacific + Africa
TUNISIA	WSAAW	TS	Disabled	Asia + Australia + South Pacific + Africa
TURKMENISTAN	WSPBL	TX	Disabled	Asia + Australia + South Pacific + Africa
TUVALU	WAPAJ	TV	Disabled	Asia + Australia + South Pacific + Africa
UGANDA	WSAAX	UG	Disabled	Asia + Australia + South Pacific + Africa
UZBEKISTAN	WSPBJ	UZ	Disabled	Asia + Australia + South Pacific + Africa
VANUATU	WAPAE	NH	Disabled	Asia + Australia + South Pacific + Africa
VIETNAM	WSPA5	VM	Disabled	Asia + Australia + South Pacific + Africa
WALLIS & FUTUNA	WAPAK	WF	Disabled	Asia + Australia + South Pacific + Africa
WESTERN SAHARA	WSADX	WI	Disabled	Asia + Australia + South Pacific + Africa
WQ WAKE ISLAND		WQ	Disabled	Asia + Australia + South Pacific + Africa
ZAMBIA	WSAA1	ZA	Disabled	Asia + Australia + South Pacific + Africa
ZIMBABWE	WSAA2	ZI	Disabled	Asia + Australia + South Pacific + Africa
ALBANIA	WSEAY	AL	Disabled	Europe + Middle East (GCC)
ANDORRA	WSEAB	AN	Disabled	Europe + Middle East (GCC)
ARMENIA	WSPA7	AM	Disabled	Europe + Middle East (GCC)
AUSTRIA	WAEAX	AU	Disabled	Europe + Middle East (GCC)
BAHRAIN	WSAAA	BA	Disabled	Europe + Middle East (GCC)
BELARUS	WSPA6	BO	Disabled	Europe + Middle East (GCC)
BELGIUM	WAEBX	BE	Disabled	Europe + Middle East (GCC)
BOSNIA	WSEAX	BK	Disabled	Europe + Middle East (GCC)

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
BULGARIA	WSEAP	BU	Disabled	Europe + Middle East (GCC)
CROATIA	WSEAS	HR	Disabled	Europe + Middle East (GCC)
CYPRUS	WSPAE	CY	Disabled	Europe + Middle East (GCC)
CZECH REPUBLIC	WSEAT	EZ	Disabled	Europe + Middle East (GCC)
DENMARK	WAEDK	DA	Disabled	Europe + Middle East (GCC)
EGYPT	WSAAE	EG	Disabled	Europe + Middle East (GCC)
ESTONIA	WSPBA	EN	Disabled	Europe + Middle East (GCC)
FAEROE ISLANDS	WSEAE	FO	Disabled	Europe + Middle East (GCC)
FINLAND	WAESF	FI	Disabled	Europe + Middle East (GCC)
FRANCE	WAEFX	FR	Disabled	Europe + Middle East (GCC)
GERMANY	WAEDX	GM	Disabled	Europe + Middle East (GCC)
GIBRALTAR	WSEAF	GI	Disabled	Europe + Middle East (GCC)
GK GUERNSEY	_	GK	Disabled	Europe + Middle East (GCC)
GREECE	WSEAG	GR	Disabled	Europe + Middle East (GCC)
GREENLAND	WAENG	GL	Disabled	Europe + Middle East (GCC)
HUNGARY	WSEAH	HU	Disabled	Europe + Middle East (GCC)
ICELAND	WSEAI	IC	Disabled	Europe + Middle East (GCC)
IM MAN, ISLE OF	_	IM	Disabled	Europe + Middle East (GCC)
IRELAND	WAEIR	EI	Disabled	Europe + Middle East (GCC)
ITALY	WAEIX	IT	Disabled	Europe + Middle East (GCC)
IZ IRAQ	_	IZ	Disabled	Europe + Middle East (GCC)
JE JERSEY	_	JE	Disabled	Europe + Middle East (GCC)
JN JAN MAYEN	_	JN	Disabled	Europe + Middle East (GCC)
JORDAN	WSAA3	JO	Disabled	Europe + Middle East (GCC)
KUWAIT	WSAAJ	KU	Disabled	Europe + Middle East (GCC)
LATVIA	WSPBB	LG	Disabled	Europe + Middle East (GCC)
LEBANON	WSAA8	LE	Disabled	Europe + Middle East (GCC)
LITHUANIA	WSPBC	LH	Disabled	Europe + Middle East (GCC)
LS LEICHTENSTEIN	_	LS	Disabled	Europe + Middle East (GCC)
LUXEMBOURG	WSEAJ	LU	Disabled	Europe + Middle East (GCC)
MACEDONIA	WSEAW	MK	Disabled	Europe + Middle East (GCC)
MALTA	WSEAK	MT	Disabled	Europe + Middle East (GCC)
MAURITIUS	WSAAL	MP	Disabled	Europe + Middle East (GCC)
MD MALDOVA	_	MD	Disabled	Europe + Middle East (GCC)
MONACO	WAEIZ	MN	Disabled	Europe + Middle East (GCC)
MONTENEGRO	WSEMA	MW	Disabled	Europe + Middle East (GCC)
NETHERLANDS	WAENL	NL	Disabled	Europe + Middle East (GCC)
NORWAY	WAENX	NO	Disabled	Europe + Middle East (GCC)
OMAN	WSAA5	MU	Disabled	Europe + Middle East (GCC)
POLAND	WSEAL	PL	Disabled	Europe + Middle East (GCC)
PORTUGAL	WAEPX	PO	Disabled	Europe + Middle East (GCC)
QATAR	WSAAQ	QA	Disabled	Europe + Middle East (GCC)
ROMANIA	WSEAM	RO	Disabled	Europe + Middle East (GCC)
RUSSIA	WSPA2	RS	Disabled	Europe + Middle East (GCC)
SAN MARINO	WAEI2	SM	Disabled	Europe + Middle East (GCC)
SAUDI ARABIA	WSAA4	SA	Disabled	Europe + Middle East (GCC)
SERBIA-MONTENEGRO	WSEAZ	SR	Disabled	Europe + Middle East (GCC)
SLOVAKIA	WSEAU	LO	Disabled	Europe + Middle East (GCC)

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
SLOVENIA	WSEAR	SI	Disabled	Europe + Middle East (GCC)
SPAIN	WAEEX	SP	Disabled	Europe + Middle East (GCC)
SV SVALBARD	_	SV	Disabled	Europe + Middle East (GCC)
SWEDEN	WAESX	SW	Disabled	Europe + Middle East (GCC)
SWITZERLAND	WAECH	SZ	Disabled	Europe + Middle East (GCC)
TURKEY	WSPA1	TU	Disabled	Europe + Middle East (GCC)
UK UNITED KINGDOM	_	UK	Disabled	Europe + Middle East (GCC)
UKRAINE	WSPBE	UP	Disabled	Europe + Middle East (GCC)
UNITED ARAB EMIRATES	WSAAY	TC	Disabled	Europe + Middle East (GCC)
VATICAN CITY	WAEIY	VT	Disabled	Europe + Middle East (GCC)
WEST BANK	WSAD1	WE	Disabled	Europe + Middle East (GCC)
YEMEN	WSAA6	YM	Disabled	Europe + Middle East (GCC)
JAPAN	WSPAL	JA	Disabled	Japan
ANGUILLA	WSIAY	AT	Disabled	North America + Caribbean
ANTIGUA & BARBUDA	WSIAA	AC	Disabled	North America + Caribbean
ARUBA	WSSAB	AA	Disabled	North America + Caribbean
BAHAMAS	WSIAB	BF	Disabled	North America + Caribbean
BARBADOS	WSIAC	BB	Disabled	North America + Caribbean
BELIZE	WSCAB	BH	Disabled	North America + Caribbean
BERMUDA	WSIAD	BD	Disabled	North America + Caribbean
BQ NAVASSA ISLAND	_	BQ	Disabled	North America + Caribbean
BRITISH VIRGIN ISLANDS	WSIAS	VI	Disabled	North America + Caribbean
CANADA	WANAC	CA	Enabled	North America + Caribbean
CAYMAN ISLAND	WSIAT	CJ	Disabled	North America + Caribbean
COSTA RICA	WSCAC	CS	Disabled	North America + Caribbean
CUBA	WSICA	CU	Disabled	North America + Caribbean
DOMINICA	WSIAE	DO	Disabled	North America + Caribbean
DOMINICAN REPUBLIC	WSIAF	DR	Enabled	North America + Caribbean
ECUADOR	WSSAH	EC	Disabled	North America + Caribbean
EL SALVADOR	WSCAD	ES	Disabled	North America + Caribbean
GRENADA	WSIAG	GJ	Disabled	North America + Caribbean
GSA (typically treat as US)	_	BLANKBLANK	Disabled	North America + Caribbean
GUADELUPE	WSIAH	GP	Disabled	North America + Caribbean
GUATEMALA	WSCAE	GT	Disabled	North America + Caribbean
HAITI	WSIAI	HA	Disabled	North America + Caribbean
HONDURAS	WSCAF	HO	Disabled	North America + Caribbean
IP CLIPPERTON ISLAND	_	IP	Disabled	North America + Caribbean
JAMAICA	WSIAJ	JM	Enabled	North America + Caribbean
MARTINIQUE	WSIAK	MB	Disabled	North America + Caribbean
MEXICO	WANAD	MX	Enabled	North America + Caribbean
Military (treat as US)	_	2BLANK	Disabled	North America + Caribbean
Military (treat as US)	_	3BLANK	Disabled	North America + Caribbean
Military (treat as US)	_	7 BLANK	Disabled	North America + Caribbean
MONSERRAT	WSIAU	MH	Disabled	North America + Caribbean
NETHERLANDS ANTILLES	WSIA1	NT	Disabled	North America + Caribbean
NICARAGUA	WSCAG	NU	Disabled	North America + Caribbean
PANAMA	WSCAH	PM	Enabled	North America + Caribbean
PUERTO RICO (USE WATAE)	WANAJ	RQ	Enabled	North America + Caribbean

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
ST. KITTS & NEVIS	WSIAL	SC	Disabled	North America + Caribbean
ST. LUCIA	WSIAM	ST	Disabled	North America + Caribbean
ST. VINCENT & THE GRENADINES	WSIAN	VC	Disabled	North America + Caribbean
TRINIDAD & TOBAGO	WSIAR	TD	Enabled	North America + Caribbean
TURKS & CAICOS ISLANDS	WSICB	TK	Disabled	North America + Caribbean
UM US MINOR OUTLYING ISLANDS		UM	Disabled	North America + Caribbean
United States of America		US	Enabled	North America + Caribbean
US VIRGIN ISLANDS	WATAD	VQ	Enabled	North America + Caribbean
ARGENTINA	WASAB	AR	Disabled	South America
BOLIVIA	WSSAC	BL	Disabled	South America
BRAZIL	WASAC	BR	Disabled	South America
CHILE	WSSAE	CI	Disabled	South America
COLOMBIA	WSSAF	CO	Disabled	South America
FALKLAND ISLANDS	WSSAI	FK	Disabled	South America
FRENCH GUIANA	WSSAJ	FG	Disabled	South America
GUYANA	WSSAK	GY	Disabled	South America
PARAGUAY	WSSAL	PA	Disabled	South America
PERU	WSSAM	PE	Disabled	South America
SURINAM	WSSAN	NS	Disabled	South America
URUGUAY	WSSAP	UY	Disabled	South America
VENEZUELA	WASAD	VE	Disabled	South America

~~The tuner/tuners will be programmable EOL (End of Line) at the B&A plant and through the applicable diagnostic tool at the dealers to align the tuner performance to intended market.~~

7.1.5 AMFM-FUR-REQ-139792/A-AM FM Tuning Ranges - BOA 4.0

The AM/FM Tuning Ranges has to be implemented as described in the following requirement: AMFM-HR-REQ-103642-AM FM Tuning Ranges

7.1.5.1 AMFM-HR-REQ-103642/C-AM FM Tuning Ranges

The AHU shall be designed and support software configuration of all tuning range parameters for all intended target markets, regardless of which region the AHU is sourced to be sold in. Validation of all tuning ranges for all regions in this chart is required.

Band	Europe + Middle East (GCC)	Asia + Australia + South Pacific + Africa	Japan
AM	MW: 531–1620 kHz step 9kHz auto seek step 1kHz man. seek	MW: 522–1710 kHz step 9kHz auto seek step 1kHz man. seek	522–1629 kHz step 9kHz auto seek step 9kHz man. seek
FM	87.5–108 MHz step 50kHz auto seek step 50kHz man. seek	87.5–108 MHz step 50kHz auto seek step 50kHz man. seek	76.0–90.0MHz step 100 kHz

Band	Europe + Middle East (GCC)	Asia + Australia + South Pacific + Africa	Japan
De-emphasis	50 µS	50 µS	50 µS
High-cut	AMFM-HR-REQ-026371-FM High Cut Control-2	AMFM-HR-REQ-026371-FM High Cut Control-2	AMFM-HR-REQ-026371-FM High Cut Control-2
Frequency response curve	AMFM-HR-REQ-026369-FM Frequency Response-2	AMFM-HR-REQ-026369-FM Frequency Response-2	AMFM-HR-REQ-026369-FM Frequency Response-2
FM Stereo separation	AMFM-HR-REQ-050394-FM Stereo Separation-2	AMFM-HR-REQ-050394-FM Stereo Separation-2	AMFM-HR-REQ-050394-FM Stereo Separation-2
Reference value for FM media level matching	60% Mono Modulation, 10mV RF, 1kHz Tone	60% Mono Modulation, 10mV RF, 1kHz Tone	60% Mono Modulation, 10mV RF, 1kHz Tone
Reference value for AM media level matching	70% Mono Modulation, 10mV RF, 1kHz Tone	70% Mono Modulation, 10mV RF, 1kHz Tone	70% Mono Modulation, 10mV RF, 1kHz Tone
Data system	RDS	RDS	None
Antenna Connections	Single + dual Program dependent	Single + dual Program dependent	Single + dual Program dependent
AM Input Match	Passive & Active Dummy	Passive & Active Dummy	Passive & Active Dummy
RDS AF Switching Initial Default State	~~Enabled~~On	~~Disabled~~Off	N/A
RDS Traffic Switching Initial Default State	~~Enabled~~Off	~~Enabled~~Off	N/A
FM Multipath Behavior	Based on EU Market Drive	Based on EU Market Drive	Based on EU Settings
AM Dynamic Search Sensitivity Default Value (High Mode)	45 +/- 3dB below Standard RF Output	45 +/- 3dB below Standard RF Output	45 +/- 3dB below Standard RF Output
AM Dynamic Search Sensitivity Default Value (Low Mode)	n/a	n/a	n/a
FM Search Sensitivity Default Value	24dBuV +/- 3dB	24dBuV +/- 3dB	24dBuV +/- 3dB

Band	North America + Caribbean	South America	Brazil
AM	530–1710 kHz step 10kHz auto seek step 10kHz man. seek	530–1710 kHz step 10kHz auto seek step 10kHz man. seek	530–1710 kHz step 10kHz auto seek step 10kHz man. seek
FM	87.9–107.9MHz step 200kHz	87.5–~~108~~ 107.9 MHz step 100kHz auto seek	75.9–107.9 MHz step 200kHz

Band	North America + Caribbean	South America	Brazil
	(stations always on an odd freq)	step 100kHz man. seek	(stations always on an odd freq)
De-emphasis	75 µS	75 µS	75 µ S
High-cut	AMFM-HR-REQ-026370-FM High Cut Control-1	AMFM-HR-REQ-026370-FM High Cut Control-1	AMFM-HR-REQ-026370-FM High Cut Control-1
Frequency response curve	AMFM-HR-REQ-026368-FM Frequency Response-1	AMFM-HR-REQ-026368-FM Frequency Response-1	AMFM-HR-REQ-026368-FM Frequency Response-1
FM Stereo separation	AMFM-HR-REQ-026376-FM Stereo Separation-1	AMFM-HR-REQ-026376-FM Stereo Separation-1	AMFM-HR-REQ-026376-FM Stereo Separation-1
Reference value for FM media level matching	85% Mono Modulation, 10mV RF, 1kHz Tone	85% Mono Modulation, 10mV RF, 1kHz Tone	85% Mono Modulation, 10mV RF, 1kHz Tone
Reference value for AM media level matching	76% Mono Modulation, 10mV RF, 1kHz Tone	76% Mono Modulation, 10mV RF, 1kHz Tone	76% Mono Modulation, 10mV RF, 1kHz Tone
Data system	RBDS	RDS	RDS
Antenna Connections	Single + dual Program dependent	Single + dual Program dependent	Single + dual Program dependent
Low Band Operation	Reject out of band interference	Reject out of band interference	Reject out of band interference
AM Input Match	Passive & Active Dummy	Passive & Active Dummy	Passive & Active Dummy
RDS AF Switching Initial Default State	N/A	~~Disabled~~Off	Off
RDS Traffic Switching Initial Default State	N/A	~~Disabled~~Off	Off
FM Multipath Behavior	Based on NA Market Drive	Based on SA or NA Market Drive	Based on SA or NA Market Drive
AM Dynamic Search Sensitivity Default Value (High Mode)	45 +/- 3dB below Standard RF Output	54 +/- 3dB below Standard RF Output	54 +/- 3dB below Standard RF Output
AM Dynamic Search Sensitivity Default Value (Low Mode)	14dB +/- 3dB above High Mode target value	48dB +/- 2.5dB below Standard RF Output	48dB +/- 2.5dB below Standard RF Output
FM Search Sensitivity Default Value	35dBuV +/- 3dB	20dBuV +/- 3dB	20dBuV +/- 3dB

NOTE: The 'HD Radio Hardware Option' Column in the following table is to be interpreted as "If the AHU is being built with HD Radio hardware, the column states whether or not the HD Radio hardware is to be ENABLED or DISABLED at the suppliers end of line."

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
AFGHANISTAN	WSPBG	AF	Disabled	Asia + Australia + South Pacific + Africa

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
ALGERIA	WSABB	AG	Disabled	Asia + Australia + South Pacific + Africa
ALL MALAYSIA	WSP03	MY	Disabled	Asia + Australia + South Pacific + Africa
AMERICAN SAMOA	WATAF	AQ	Enabled	Asia + Australia + South Pacific + Africa
ANGOLA	WSAA7	AO	Disabled	Asia + Australia + South Pacific + Africa
AUSTRALIA	WAPAB	AS	Disabled	Asia + Australia + South Pacific + Africa
AY ANTARCTICA		AY	Disabled	Asia + Australia + South Pacific + Africa
AZERBAIJAN	WSPBK	AJ	Disabled	Asia + Australia + South Pacific + Africa
BANGLADESH	WSPAB	BG	Disabled	Asia + Australia + South Pacific + Africa
BENIN	WSACJ	BN	Disabled	Asia + Australia + South Pacific + Africa
BHUTAN	WSPBQ	BT	Disabled	Asia + Australia + South Pacific + Africa
BOTSWANNA	WSABC	BC	Disabled	Asia + Australia + South Pacific + Africa
BRITISH INDIAN OCEAN	WAPAF	IO	Disabled	Asia + Australia + South Pacific + Africa
BRUNEI	WSPAC	BX	Disabled	Asia + Australia + South Pacific + Africa
BS BASSAS DA INDIA		BS	Disabled	Asia + Australia + South Pacific + Africa
BURKINA FASO	WSADB	UV	Disabled	Asia + Australia + South Pacific + Africa
BURUNDI	WSADA	BY	Disabled	Asia + Australia + South Pacific + Africa
BV BOUVET ISLAND		BV	Disabled	Asia + Australia + South Pacific + Africa
CAMBODIA	WSPCA	CB	Disabled	Asia + Australia + South Pacific + Africa
CAPE VERDE ISLANDS	WSAAD	CV	Disabled	Asia + Australia + South Pacific + Africa
CENTRAL AFRICA REPUBLIC	WSADL	CT	Disabled	Asia + Australia + South Pacific + Africa
CHAD	WSADM	CD	Disabled	Asia + Australia + South Pacific + Africa
CHINA	WSPAD	CH	Disabled	Asia + Australia + South Pacific + Africa
CK COCOS ISLANDS		CK	Disabled	Asia + Australia + South Pacific + Africa
COMOROS	WSABD	CN	Disabled	Asia + Australia + South Pacific + Africa
CONGO, DEMOCRATIC REPUBLIC OF	WSAAZ	CG	Disabled	Asia + Australia + South Pacific + Africa
CONGO, REPUBLIC OF	WSADH	CF	Disabled	Asia + Australia + South Pacific + Africa
COOK ISLANDS	WSPCB	CW	Disabled	Asia + Australia + South Pacific + Africa
CR CORAL SEA ISLAND		CR	Disabled	Asia + Australia + South Pacific + Africa
DJIBOUTI	WSADC	DJ	Disabled	Asia + Australia + South Pacific + Africa
DQ JARVIS ISLAND		DQ	Disabled	Asia + Australia + South Pacific + Africa
EAST TIMOR	WSADY	PT	Disabled	Asia + Australia + South Pacific + Africa
EQUATORIAL GUINEA	WSADN	EK	Disabled	Asia + Australia + South Pacific + Africa
ERITREA	WSADP	ER	Disabled	Asia + Australia + South Pacific + Africa
ETHIOPIA	WSAAF	ET	Disabled	Asia + Australia + South Pacific + Africa
EU EUROPA ISLAND		EU	Disabled	Asia + Australia + South Pacific + Africa
FIJI	WSPAG	FJ	Disabled	Asia + Australia + South Pacific + Africa
FQ BAKER ISLAND		FQ	Disabled	Asia + Australia + South Pacific + Africa
FRENCH SOUTH. ANTARCTIC LANDS	WSABH	FS	Disabled	Asia + Australia + South Pacific + Africa

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
GABON	WSACE	GB	Disabled	Asia + Australia + South Pacific + Africa
GAMBIA	WSADD	GA	Disabled	Asia + Australia + South Pacific + Africa
GEORGIA	WSPBF	GG	Disabled	Asia + Australia + South Pacific + Africa
GHANA	WSACA	GH	Disabled	Asia + Australia + South Pacific + Africa
GO GLORIOSO ISLAND		GO	Disabled	Asia + Australia + South Pacific + Africa
GUAM-U.S. TERR. (USE WATAB)	WANAF	GQ	Enabled	Asia + Australia + South Pacific + Africa
GUINEA REPUBLIC	WSAAG	GV	Disabled	Asia + Australia + South Pacific + Africa
GUINEA-BISSAU	WSADQ	PU	Disabled	Asia + Australia + South Pacific + Africa
HONG KONG	WSPAH	HK	Disabled	Asia + Australia + South Pacific + Africa
INDIA	WSPAI	IN	Disabled	Asia + Australia + South Pacific + Africa
INDONESIA	WSPAJ	ID	Disabled	Asia + Australia + South Pacific + Africa
IRAN	WSADJ	IR	Disabled	Asia + Australia + South Pacific + Africa
ISRAEL	WSPAK	IS	Disabled	Asia + Australia + South Pacific + Africa
IVORY COAST	WSAAH	IV	Disabled	Asia + Australia + South Pacific + Africa
JQ JOHNSON ATOLL		JQ	Disabled	Asia + Australia + South Pacific + Africa
KAZAKHSTAN	WSPBH	KZ	Disabled	Asia + Australia + South Pacific + Africa
KENYA	WSAAI	KE	Disabled	Asia + Australia + South Pacific + Africa
KIRIBATI	WSPCR	KR	Disabled	Asia + Australia + South Pacific + Africa
KQ KINGMAN REEF		KQ	Disabled	Asia + Australia + South Pacific + Africa
KT CHRISTMAS ISLAND		KT	Disabled	Asia + Australia + South Pacific + Africa
KYRGYZSTAN	WSPBP	KG	Disabled	Asia + Australia + South Pacific + Africa
LAOS	WSPCC	LA	Disabled	Asia + Australia + South Pacific + Africa
LESOTHO	WSABF	LT	Disabled	Asia + Australia + South Pacific + Africa
LIBERIA	WSACB	LI	Disabled	Asia + Australia + South Pacific + Africa
LIBYA	WSACF	LY	Disabled	Asia + Australia + South Pacific + Africa
LQ PALMYRA ATOLL		LQ	Disabled	Asia + Australia + South Pacific + Africa
MACAU	WSPBT	MC	Disabled	Asia + Australia + South Pacific + Africa
MADAGASCAR	WSACC	MA	Disabled	Asia + Australia + South Pacific + Africa
MALAWI	WSAAK	MI	Disabled	Asia + Australia + South Pacific + Africa
MALDIVE ISLANDS	WSPBS	MV	Disabled	Asia + Australia + South Pacific + Africa
MALI	WSADR	ML	Disabled	Asia + Australia + South Pacific + Africa
MARSHALL ISLANDS	WSPCD	RM	Disabled	Asia + Australia + South Pacific + Africa
MAURITANIA	WSADS	MR	Disabled	Asia + Australia + South Pacific + Africa
MAYOTTE	WSABE	MF	Disabled	Asia + Australia + South Pacific + Africa
MICRONESIA	WAPAG	FM	Disabled	Asia + Australia + South Pacific + Africa
MONGOLIA	WSPA8	MG	Disabled	Asia + Australia + South Pacific + Africa

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
MOROCCO	WSABA	MO	Disabled	Asia + Australia + South Pacific + Africa
MOZAMBIQUE	WSAAN	MZ	Disabled	Asia + Australia + South Pacific + Africa
MQ MIDWAY ISLAND		MQ	Disabled	Asia + Australia + South Pacific + Africa
MYANMAR	WSPA9	BM	Disabled	Asia + Australia + South Pacific + Africa
NAMIBIA	WSADT	WA	Disabled	Asia + Australia + South Pacific + Africa
NAURU	WSPAM	NR	Disabled	Asia + Australia + South Pacific + Africa
NE NIUE		NE	Disabled	Asia + Australia + South Pacific + Africa
NEPAL	WSPBR	NP	Disabled	Asia + Australia + South Pacific + Africa
NEW CALEDONIA	WSPAN	NC	Disabled	Asia + Australia + South Pacific + Africa
NEW ZEALAND	WAPAC	NZ	Disabled	Asia + Australia + South Pacific + Africa
NIGER	WSADU	NG	Disabled	Asia + Australia + South Pacific + Africa
NIGERIA	WSAAP	NI	Disabled	Asia + Australia + South Pacific + Africa
NORFOLK ISLANDS	WSPCE	NF	Disabled	Asia + Australia + South Pacific + Africa
NORTH KOREA	WSPCH	KN	Disabled	Asia + Australia + South Pacific + Africa
NORTHERN MARIANA ISLANDS	WATAC	CQ	Disabled	Asia + Australia + South Pacific + Africa
PAKISTAN	WSPAP	PK	Disabled	Asia + Australia + South Pacific + Africa
PALAU	WAPAH	PS	Disabled	Asia + Australia + South Pacific + Africa
PAPUA	WSPAQ	PP	Disabled	Asia + Australia + South Pacific + Africa
PC PITCAIRN ISLAND		PC	Disabled	Asia + Australia + South Pacific + Africa
PF PARACEL ISLAND		PF	Disabled	Asia + Australia + South Pacific + Africa
PHILIPPINES	WSPAR	RP	Enabled	Asia + Australia + South Pacific + Africa
REUNION	WSAAR	RE	Disabled	Asia + Australia + South Pacific + Africa
RWANDA	WSADE	RW	Disabled	Asia + Australia + South Pacific + Africa
SAMOA	WSPCG	WS	Disabled	Asia + Australia + South Pacific + Africa
SAO TOME & PRINCIPE	WSADF	TP	Disabled	Asia + Australia + South Pacific + Africa
SENEGAL	WSAAS	SG	Disabled	Asia + Australia + South Pacific + Africa
SEYCHELLES	WSPAT	SE	Disabled	Asia + Australia + South Pacific + Africa
SIERRA LEONE	WSADG	SL	Disabled	Asia + Australia + South Pacific + Africa
SINGAPORE	WSPAU	SN	Disabled	Asia + Australia + South Pacific + Africa
SOLOMON ISLANDS	WSPAV	BP	Disabled	Asia + Australia + South Pacific + Africa
SOMALIA	WSACD	SO	Disabled	Asia + Australia + South Pacific + Africa
SOUTH AFRICA	WSAAT	SF	Disabled	Asia + Australia + South Pacific + Africa
SOUTH KOREA	WSPAW	KS	Disabled	Asia + Australia + South Pacific + Africa
SRI LANKA	WSPAX	CE	Disabled	Asia + Australia + South Pacific + Africa
ST. HELENA	WSACK	SH	Disabled	Asia + Australia + South Pacific + Africa
SUDAN	WSAAU	SU	Disabled	Asia + Australia + South Pacific + Africa
SWAZILAND	WSABG	WS	Disabled	Asia + Australia + South Pacific + Africa

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
SYRIA	WSAA9	SY	Disabled	Asia + Australia + South Pacific + Africa
TAHITI	WSIAP	FP	Disabled	Asia + Australia + South Pacific + Africa
TAIWAN	WAPAD	TW	Disabled	Asia + Australia + South Pacific + Africa
TAJIKISTAN	WSPBM	TI	Disabled	Asia + Australia + South Pacific + Africa
TANZANIA	WSAAV	TZ	Disabled	Asia + Australia + South Pacific + Africa
TE TROMELIN ISLAND		TE	Disabled	Asia + Australia + South Pacific + Africa
THAILAND	WSPAY	TH	Disabled	Asia + Australia + South Pacific + Africa
TOGO	WSADK	TO	Disabled	Asia + Australia + South Pacific + Africa
TOKELAU	WAPAL	TL	Disabled	Asia + Australia + South Pacific + Africa
TONGA	WSPAZ	TN	Disabled	Asia + Australia + South Pacific + Africa
TUNISIA	WSAAW	TS	Disabled	Asia + Australia + South Pacific + Africa
TURKMENISTAN	WSPBL	TX	Disabled	Asia + Australia + South Pacific + Africa
TUVALU	WAPAJ	TV	Disabled	Asia + Australia + South Pacific + Africa
UGANDA	WSAAX	UG	Disabled	Asia + Australia + South Pacific + Africa
UZBEKISTAN	WSPBJ	UZ	Disabled	Asia + Australia + South Pacific + Africa
VANUATU	WAPAE	NH	Disabled	Asia + Australia + South Pacific + Africa
VIETNAM	WSPA5	VM	Disabled	Asia + Australia + South Pacific + Africa
WALLIS & FUTUNA	WAPAK	WF	Disabled	Asia + Australia + South Pacific + Africa
WESTERN SAHARA	WSADX	WI	Disabled	Asia + Australia + South Pacific + Africa
WQ WAKE ISLAND		WQ	Disabled	Asia + Australia + South Pacific + Africa
ZAMBIA	WSAA1	ZA	Disabled	Asia + Australia + South Pacific + Africa
ZIMBABWE	WSAA2	ZI	Disabled	Asia + Australia + South Pacific + Africa
ALBANIA	WSEAY	AL	Disabled	Europe + Middle East (GCC)
ANDORRA	WSEAB	AN	Disabled	Europe + Middle East (GCC)
ARMENIA	WSPA7	AM	Disabled	Europe + Middle East (GCC)
AUSTRIA	WAEAX	AU	Disabled	Europe + Middle East (GCC)
BAHRAIN	WSAAA	BA	Disabled	Europe + Middle East (GCC)
BELARUS	WSPA6	BO	Disabled	Europe + Middle East (GCC)
BELGIUM	WAEBX	BE	Disabled	Europe + Middle East (GCC)
BOSNIA	WSEAX	BK	Disabled	Europe + Middle East (GCC)
BULGARIA	WSEAP	BU	Disabled	Europe + Middle East (GCC)
CROATIA	WSEAS	HR	Disabled	Europe + Middle East (GCC)
CYPRUS	WSPAE	CY	Disabled	Europe + Middle East (GCC)
CZECH REPUBLIC	WSEAT	EZ	Disabled	Europe + Middle East (GCC)
DENMARK	WAEDK	DA	Disabled	Europe + Middle East (GCC)
EGYPT	WSAAE	EG	Disabled	Europe + Middle East (GCC)
ESTONIA	WSPBA	EN	Disabled	Europe + Middle East (GCC)
FAEROE ISLANDS	WSEAE	FO	Disabled	Europe + Middle East (GCC)
FINLAND	WAESF	FI	Disabled	Europe + Middle East (GCC)
FRANCE	WAEFX	FR	Disabled	Europe + Middle East (GCC)
GERMANY	WAEDX	GM	Disabled	Europe + Middle East (GCC)
GIBRALTAR	WSEAF	GI	Disabled	Europe + Middle East (GCC)
GK GUERNSEY		GK	Disabled	Europe + Middle East (GCC)
GREECE	WSEA	GR	Disabled	Europe + Middle East (GCC)

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
	G			
GREENLAND	WAENG	GL	Disabled	Europe + Middle East (GCC)
HUNGARY	WSEAH	HU	Disabled	Europe + Middle East (GCC)
ICELAND	WSEAI	IC	Disabled	Europe + Middle East (GCC)
IM MAN, ISLE OF		IM	Disabled	Europe + Middle East (GCC)
IRELAND	WAEIR	EI	Disabled	Europe + Middle East (GCC)
ITALY	WAEIX	IT	Disabled	Europe + Middle East (GCC)
IZ IRAQ		IZ	Disabled	Europe + Middle East (GCC)
JE JERSEY		JE	Disabled	Europe + Middle East (GCC)
JN JAN MAYEN		JN	Disabled	Europe + Middle East (GCC)
JORDAN	WSAA3	JO	Disabled	Europe + Middle East (GCC)
KUWAIT	WSAAJ	KU	Disabled	Europe + Middle East (GCC)
LATVIA	WSPBB	LG	Disabled	Europe + Middle East (GCC)
LEBANON	WSAA8	LE	Disabled	Europe + Middle East (GCC)
LITHUANIA	WSPBC	LH	Disabled	Europe + Middle East (GCC)
LS LEICHTENSTEIN		LS	Disabled	Europe + Middle East (GCC)
LUXEMBOURG	WSEAJ	LU	Disabled	Europe + Middle East (GCC)
MACEDONIA	WSEAW	MK	Disabled	Europe + Middle East (GCC)
MALTA	WSEAK	MT	Disabled	Europe + Middle East (GCC)
MAURITIUS	WSAAL	MP	Disabled	Europe + Middle East (GCC)
MD MALDOVA		MD	Disabled	Europe + Middle East (GCC)
MONACO	WAEIZ	MN	Disabled	Europe + Middle East (GCC)
MONTENEGRO	WSEMA	MW	Disabled	Europe + Middle East (GCC)
NETHERLANDS	WAENL	NL	Disabled	Europe + Middle East (GCC)
NORWAY	WAENX	NO	Disabled	Europe + Middle East (GCC)
OMAN	WSAA5	MU	Disabled	Europe + Middle East (GCC)
POLAND	WSEAL	PL	Disabled	Europe + Middle East (GCC)
PORTUGAL	WAEPX	PO	Disabled	Europe + Middle East (GCC)
QATAR	WSAAQ	QA	Disabled	Europe + Middle East (GCC)
ROMANIA	WSEAM	RO	Disabled	Europe + Middle East (GCC)
RUSSIA	WSPA2	RS	Disabled	Europe + Middle East (GCC)
SAN MARINO	WAEI2	SM	Disabled	Europe + Middle East (GCC)
SAUDI ARABIA	WSAA4	SA	Disabled	Europe + Middle East (GCC)
SERBIA-MONTENEGRO	WSEAZ	SR	Disabled	Europe + Middle East (GCC)
SLOVAKIA	WSEAU	LO	Disabled	Europe + Middle East (GCC)
SLOVENIA	WSEAR	SI	Disabled	Europe + Middle East (GCC)
SPAIN	WAEEX	SP	Disabled	Europe + Middle East (GCC)
SV SVALBARD		SV	Disabled	Europe + Middle East (GCC)
SWEDEN	WAESX	SW	Disabled	Europe + Middle East (GCC)
SWITZERLAND	WAECH	SZ	Disabled	Europe + Middle East (GCC)

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
TURKEY	WSPA1	TU	Disabled	Europe + Middle East (GCC)
UK UNITED KINGDOM		UK	Disabled	Europe + Middle East (GCC)
UKRAINE	WSPBE	UP	Disabled	Europe + Middle East (GCC)
UNITED ARAB EMIRATES	WSAAY	TC	Disabled	Europe + Middle East (GCC)
VATICAN CITY	WAEIY	VT	Disabled	Europe + Middle East (GCC)
WEST BANK	WSAD1	WE	Disabled	Europe + Middle East (GCC)
YEMEN	WSAA6	YM	Disabled	Europe + Middle East (GCC)
JAPAN	WSPAL	JA	Disabled	Japan
ANGUILLA	WSIAY	AT	Disabled	North America + Caribbean
ANTIGUA & BARBUDA	WSIAA	AC	Disabled	North America + Caribbean
ARUBA	WSSAB	AA	Disabled	North America + Caribbean
BAHAMAS	WSIAB	BF	Disabled	North America + Caribbean
BARBADOS	WSIAC	BB	Disabled	North America + Caribbean
BELIZE	WSCAB	BH	Disabled	North America + Caribbean
BERMUDA	WSIAD	BD	Disabled	North America + Caribbean
BQ NAVASSA ISLAND		BQ	Disabled	North America + Caribbean
BRITISH VIRGIN ISLANDS	WSIAS	VI	Disabled	North America + Caribbean
CANADA	WANAC	CA	Enabled	North America + Caribbean
CAYMAN ISLAND	WSIAT	CJ	Disabled	North America + Caribbean
COSTA RICA	WSCAC	CS	Disabled	North America + Caribbean
CUBA	WSICA	CU	Disabled	North America + Caribbean
DOMINICA	WSIAE	DO	Disabled	North America + Caribbean
DOMINICAN REPUBLIC	WSIAF	DR	Enabled	North America + Caribbean
ECUADOR	WSSAH	EC	Disabled	North America + Caribbean
EL SALVADOR	WSCAD	ES	Disabled	North America + Caribbean
GRENADA	WSIAG	GJ	Disabled	North America + Caribbean
GSA (typically treat as US)		BLANKBLANK	Disabled	North America + Caribbean
GUADELUPE	WSIAH	GP	Disabled	North America + Caribbean
GUATEMALA	WSCAE	GT	Disabled	North America + Caribbean
HAITI	WSIAI	HA	Disabled	North America + Caribbean
HONDURAS	WSCAF	HO	Disabled	North America + Caribbean
IP CLIPPERTON ISLAND		IP	Disabled	North America + Caribbean
JAMAICA	WSIAJ	JM	Enabled	North America + Caribbean
MARTINIQUE	WSIAK	MB	Disabled	North America + Caribbean
MEXICO	WANAD	MX	Enabled	North America + Caribbean
Military (treat as US)		2BLANK	Disabled	North America + Caribbean
Military (treat as US)		3BLANK	Disabled	North America + Caribbean
Military (treat as US)		7 BLANK	Disabled	North America + Caribbean
MONSERRAT	WSIAU	MH	Disabled	North America + Caribbean
NETHERLANDS ANTILLES	WSIA1	NT	Disabled	North America + Caribbean
NICARAGUA	WSCA	NU	Disabled	North America + Caribbean

Destination Country	WERS country code	2 letter Destination Code	HD Radio Hardware Option	Tuner Region
	G			
PANAMA	WSCAH	PM	Enabled	North America + Caribbean
PUERTO RICO (USE WATAE)	WANAJ	RQ	Enabled	North America + Caribbean
ST. KITTS & NEVIS	WSIAL	SC	Disabled	North America + Caribbean
ST. LUCIA	WSIAM	ST	Disabled	North America + Caribbean
ST. VINCENT & THE GRENADINES	WSIAN	VC	Disabled	North America + Caribbean
TRINIDAD & TOBAGO	WSIAR	TD	Enabled	North America + Caribbean
TURKS & CAICOS ISLANDS	WSICB	TK	Disabled	North America + Caribbean
UM US MINOR OUTLYING ISLANDS		UM	Disabled	North America + Caribbean
United States of America		US	Enabled	North America + Caribbean
US VIRGIN ISLANDS	WATAD	VQ	Enabled	North America + Caribbean
ARGENTINA	WASAB	AR	Disabled	South America
BOLIVIA	WSSAC	BL	Disabled	South America
BRAZIL	WASAC	BR	~~Enabled~~Disabled	~~South America~~Brazil
CHILE	WSSAE	CI	Disabled	South America
COLOMBIA	WSSAF	CO	Disabled	South America
FALKLAND ISLANDS	WSSAI	FK	Disabled	South America
FRENCH GUIANA	WSSAJ	FG	Disabled	South America
GUYANA	WSSAK	GY	Disabled	South America
PARAGUAY	WSSAL	PA	Disabled	South America
PERU	WSSAM	PE	Disabled	South America
SURINAM	WSSAN	NS	Disabled	South America
URUGUAY	WSSAP	UY	Disabled	South America
VENEZUELA	WASAD	VE	Disabled	South America

7.1.6 TU-TMR-REQ-024057/A-T_PRESET_STORE (TcSE ROIN-119072-3)

Name	Description	Units	Range	Resolution	Default
T_PRESET_STORE	Time delay before a preset is stored	sec	1-30	0.5	2

7.1.7 TU-TMR-REQ-024058/A-T_button_hold (TcSE ROIN-159172-3)

Name	Description	Units	Range	Resolution	Default
T_button_hold	Time delay before a button press and hold function is activated	sec	1-30	0.5	1.5

7.1.8 AMFM-SR-REQ-024059/A-Starting Index = 0x00 Usage for Preset List or Station List browsing (TcSE ROIN-174324-1)

If the AM/FM Slave receives a request for Preset List or Station List and the Starting Index parameter in the request is set to 0x00, then the AM/FM Slave shall respond by following the examples below.

Example 1: If the request is for a List Size of 5 and a Starting Index of 0x00 then the response would come back with two stations above the currently playing station and two stations below the currently playing station.

Example 2: If the request is for a List Size of 4 and a Starting Index of 0x00 then the response would come back with one station above and two stations below the currently playing station.

Example 3: If the request is for a List Size of 6 and a Starting Index of 0x00 then the response would come back with two stations above and three stations below the currently playing station.

7.1.9 HDR-SR-REQ-024060/A-The meaning of HD Multicast when used in the AM/FM/HD signals (TcSE ROIN-185467-1)

In the signals and messages for AM/FM/HD the use of the term Multicast is defined in the following way:

HD Multicast 1 = HD1 = MPS
HD Multicast 2 = HD2 = SPS
HD Multicast 3 = HD3 = SPS
HD Multicast 4 = HD4 = SPS
HD Multicast 5 = HD5 = SPS
HD Multicast 6 = HD6 = SPS
HD Multicast 7 = HD7 = SPS

Example:
If you are on 94.7 -1 (HD1) and it has 3 HD channels then:
NumofHDMulticastChans.St = 0x3 3 Multicast Available
CurrentHDMulticast.St = 0x1

7.1.10 AMFM-TMR-REQ-024061/A-T_BandPreset_Min (TcSE ROIN-197190-1)

Name	Description	Units	Range	Resolution	Default
T_BandPreset_Min	Minimum time after the Band request is sent to send the Preset request.	msec	60 - 90	5	75

7.1.11 AMFM-TMR-REQ-024062/A-T_BandPreset_Max (TcSE ROIN-197191-1)

Name	Description	Units	Range	Resolution	Default
T_BandPreset_Max	Maximum time after the Band request is sent to send the Preset request.	msec	90 - 150	5	100

7.1.12 HDR-TMR-REQ-024063/A-T_HD Decode (TcSE ROIN-195283-1)

Name	Description	Units	Range	Resolution	Default
T_HD Decode	Time until the digital audio stream is blended from an HD decoded station.	msec	500-1000	100	800

7.1.13 HDR-HMI-REQ-024064/A-When to use AvailableHDChannel.St vs NumofHDMulticastChans.St (TcSE ROIN-200119-1)

If the method AvailableHDChannel.St is being reported as invalid or is not received then the Client shall use the method NumofHDMulticastChans.St for HMI purposes. If both methods are valid then either one can be used based on how the HMI wants to show the HD information to the user.

7.1.14 AMFM-SR-REQ-024065/A-CurrentStationName usage (TcSE ROIN-159173-1)

For AMFM Tuner CurrentStationName.St and CurrentPSName.St shall always be sent together by the AHU to handle legacy compatibility. If the AHU is sending Unicode then CurrentStationName.St signal shall contain valid data and CurrentPSName.St signal shall be filled with EOS characters. If non Unicode text is being sent then both CurrentStationName.St and CurrentPSName.St signals shall be filled with data.

When CurrentPSName.St is contained in a sequence diagram it represents the sending of both the CurrentStationName.St and CurrentPSName.St.

7.2 HD Acquiring and Display Data Sequence Diagrams

7.2.1 HDR-SD-REQ-024066/A-HD Acquiring Process (TcSE ROIN-119537-1)

Linked Elements
HDR-SD-REQ-024067/A-HD Display Data (TcSE ROIN-119600-3)

Scenario

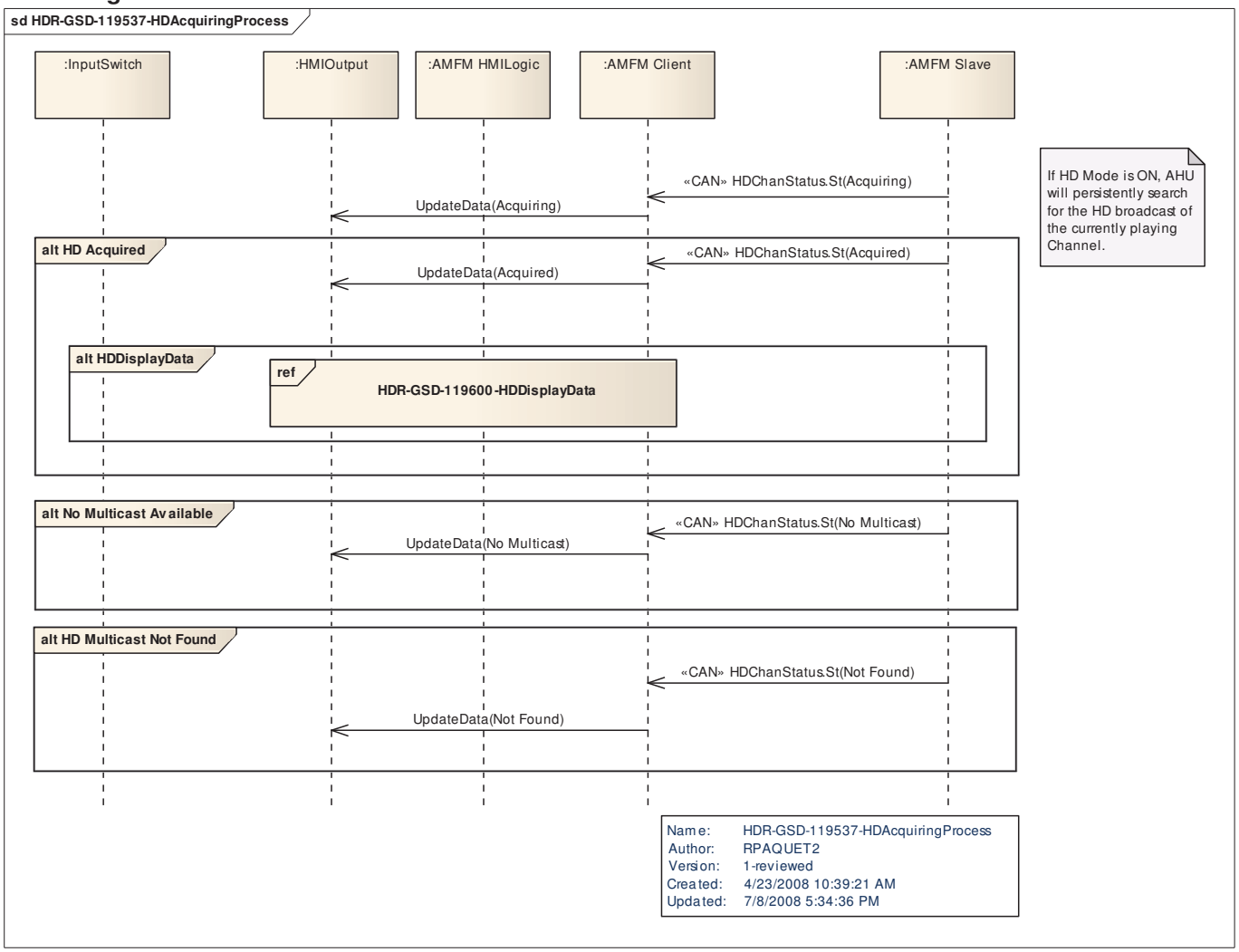
Normal Usage
The user has selected a station and the system is searching for HD broadcast information for that station.

Constraints

Pre-condition
HD radio is turned On.

Post-condition
If HD broadcast is available and found for the tuned station then the station will broadcast in Digital. See Sequence Diagram HDR-GSD-119600-HD Display Data.

Sequence Diagram



7.2.2 HDR-SD-REQ-024067/A-HD Display Data (TcSE ROIN-119600-3)

Scenario

Normal Usage

HD Acquiring Process found an HD broadcast for the tuned station.

Constraints

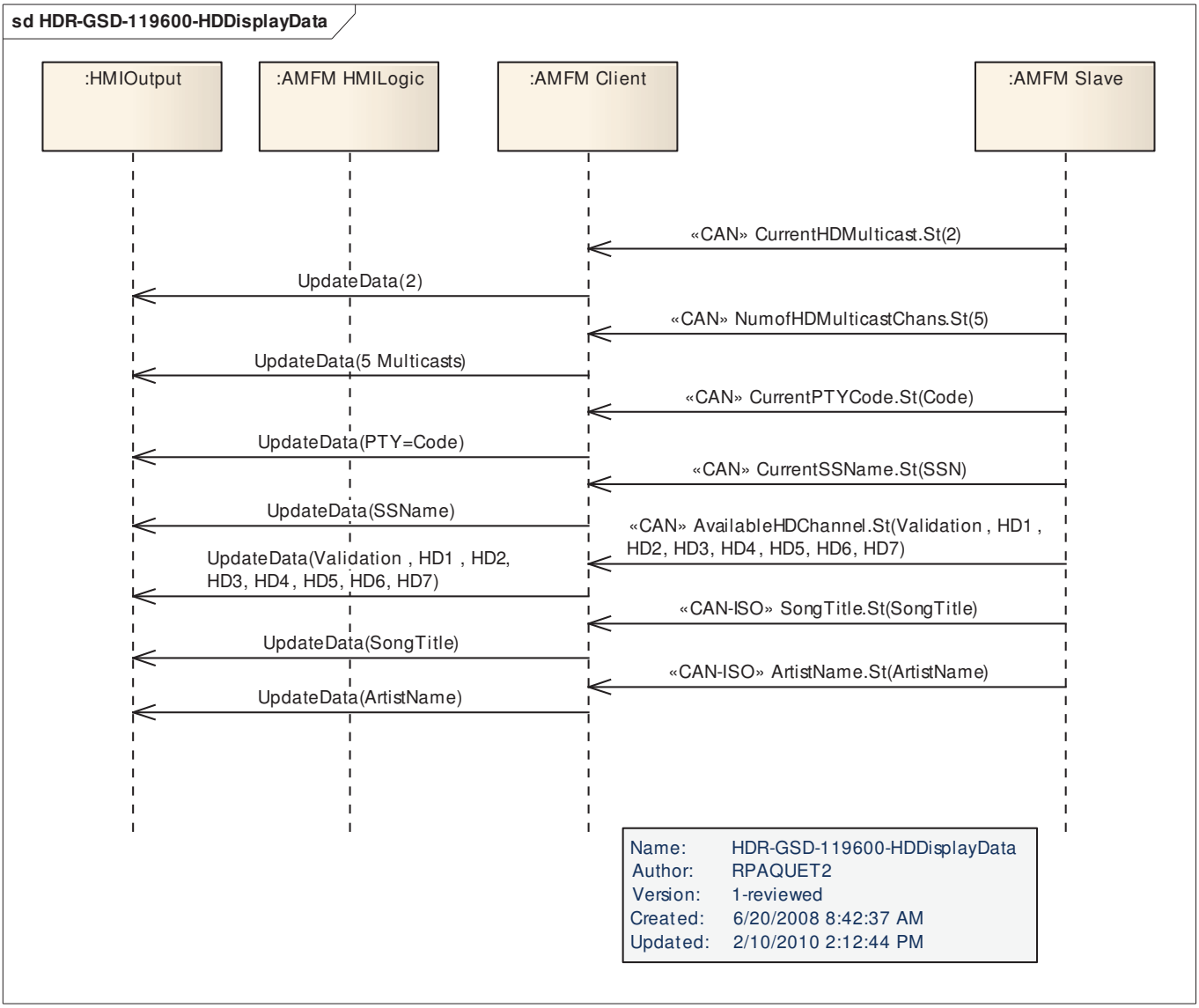
Pre-condition

Radio is searching for HD broadcast on tuned station.

Post-condition

HD Broadcast data is displayed to the user.

Sequence Diagram



7.3 AMFM-CLD-REQ-024121/A-AMFM Client (TcSE ROIN-128936-2)

Responsibility: The AMFM Client is the interface of the AMFM function. It acts with other system parts that control the AMFM or need data from it.
It also requests audio resources if they are needed.

7.3.1 Functional Requirements

7.3.1.1 AMFM-SR-REQ-024117/A-AMFM Band Preset Client Operation (TcSE ROIN-202162-1)

The Client shall send the Band (SetCurrTUBand.Rq) and Preset (SetCurrTUPreset.Rq) request in the same message frame as defined in the DAB section.

The Client shall also follow the current AMFM method of selecting a preset using the SetCurrTUBand.Rq and SetCurrPreset2.Rq and timing defined.

Example:
Message 0x1FF will be sent with SetCurrTUBand.Rq equal to some band and SetCurrTUPreset.Rq equal to some preset.

Then 75 to 100ms later the message 0x1F5 will be sent with SetCurrPreset2.Rq equal to the same value sent in SetCurrTUPreset.Rq.

7.3.1.2 AMFM-SR-REQ-048885/B-Storing Last Known Bank for Each Band (TcSE ROIN-306017-1)

The AMFM Client shall remember the last tuned bank in the AM and FM bands. If AM or FM is selected the AMFM Client shall request the last tuned bank in the band that is being requested.

Example 1: Last time user was listening to AM band they were in AM AST bank. They are currently listening to FM2 and select AM band again. The AMFM Client shall request the AM AST bank/band.

Example 2: Last time user was listening to FM band they were in FM2 bank. They are currently listening to CD and select FM band again. The AMFM Client shall request the FM2 bank/band.

Immediately following a battery connect if AM or FM is selected the AMFM Client shall request AM1 for an AM selection and FM1 for an FM selection.

7.4 AMFM-CLD-REQ-024123/B-AMFM Server (TcSE ROIN-128937-3)

Responsibility: The AMFM Tuner Server (Slave is the legacy term and will be replaced by Server in the future) is responsible for controlling the radio receiver when incoming service requests are received. The Server also transmits radio related status information to other interested parts over the Client. It will also handle traffic and PTY announcements for RDS markets.

7.4.1 Functional Requirements

7.4.1.1 AMFM-FUR-REQ-024112/B-Autocompare (TcSE ROIN-27892-1)

The tuner must compare the actual tuned station / frequency with the preset memory.
The following is the indication if there is accordance;

1. In FM mode
   - RDS station: The PI code is identical
   - Non-RDS station: The frequency is identical

2. In AM mode
   - The frequency is identical

The following paragraph only applies for RDS.

If a ~~local~~ station is stored more than one time~~, the PS shall be compared. If they are identical,~~ the lowest preset number shall be selected.

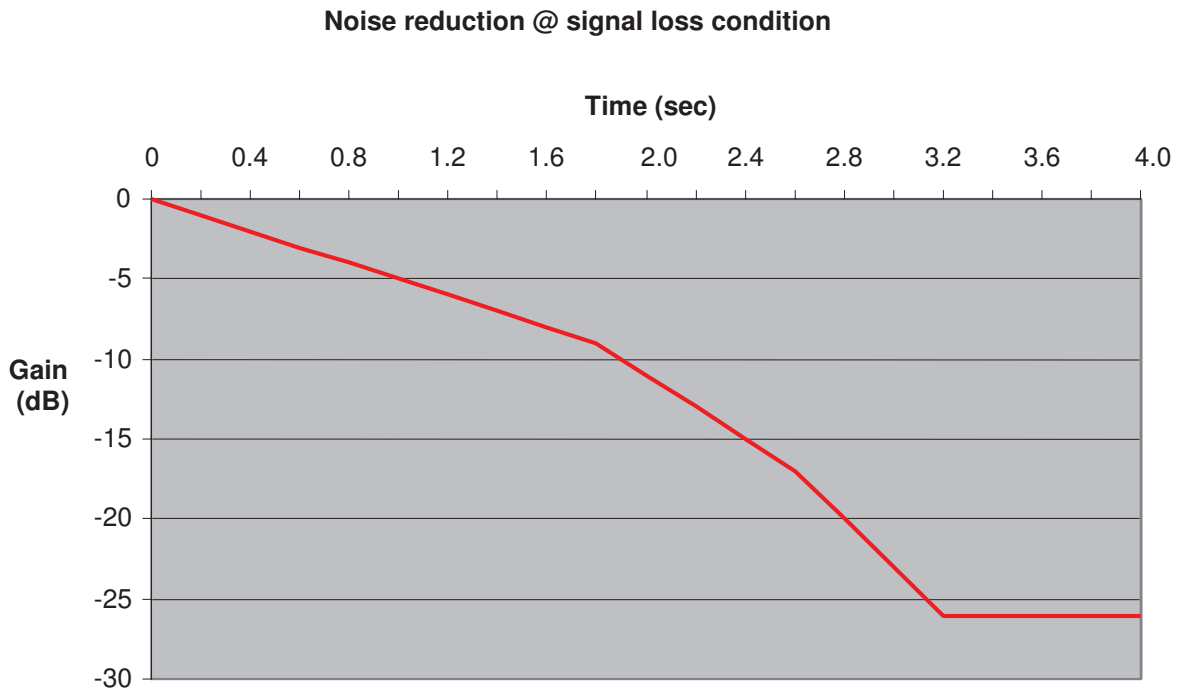
~~The same behaviour also applies to all other stations but without comparing the PS.~~
The tuner shall take the AF list out from the preset memory, but it shall be ensured that the best AF applies every time.

7.4.1.2 AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)

Noise reduction strategy for signal loss condition

The radio shall reduce the off-station noise according to the chart below in the case that the tuner enters a signal loss condition.

Fine tuning will be done during development via jury evaluation.



Data Ponts	
Time (sec)	Gain (dB)
0.0	0.0
1.7	-9.0
2.5	-17.0
3.2 -->	-26.0

7.4.1.3 AMFM-FUR-REQ-024114/A-EU - Regional Mode (TcSE ROIN-27900-2)

AHU default is to have the Regional mode ON.

Regional Mode shall be designed to meet IEC 62106 2nd Edition 07/2009: Specification of the radio data system (RDS). Reference this externally controlled specification (not owned by Ford Motor Company).

Regional Mode On
Regional switching is disabled; assume programming is different - No switching between regions.
One exception is if the AHU has done a modulation comparison and the result is that both stations have the same modulation.

Regional Mode Off
Regional switching is possible assume programming is the same - Allow AF switching.
In order to cut down on confusion, since it is unlikely that most users are unaware of how all this works, the REGIONAL MODE ON state is normally the default setting. In this case the AHU shall not appear to randomly switch to another station at various times.

Regional Mode Preset
The Regional Mode status shall be selected via HMI. It stays either on or off. The Regional mode shall not be stored on a dedicated Preset.
If the radio station was stored as a Regional Program on a Preset, the PS name needs to be updated as soon as the Regional information disappears. The AHU is allowed to change the Preset Number when the Regional information in the PI code changes.

Fine tuning shall be done during field test (jury evaluation).

7.4.1.4 HDR-FUR-REQ-024125/A-HD tuner tune steps (TcSE ROIN-27907-2)

This requirement only applies for tuning step information while the AHU is currently tuned into an HD decoded station.

Description

AM and FM Tune-Up and Tune-Down Functions with HD present

When multiple HD streams are available on the current frequency, the Tune-Up and Tune-Down functions shall allow the selection of HD streams as well as analog frequencies. When the user activates the tune up/down function the tuner shall select the next available digital multicast in the direction the user tuned. If the current HD stream is the highest numbered stream, the next tune-up shall tune to the next highest analog ~~station~~ frequency in the steps specified in the analog tuner methodology. If the current HD stream is the lowest numbered stream, the next tune-down shall tune to the next lower analog ~~station~~ frequency in the steps specified in the analog tuner methodology.

AM and FM Seek-Up and Seek Down Functions with HD present

When multiple HD streams are available on the current frequency the Seek-Up and Seek-Down functions shall allow the selection of HD streams as well as analog frequencies. When the user activates the Seek-Up or Seek-Down function the tuner shall select the next available digital multicast in the direction the user indicated. If the current HD stream is the highest numbered stream, the next Seek-Up shall seek~~tune~~ to the next highest analog frequency~~station~~ in the steps specified in the analog tuner methodology. If the current HD stream is the lowest numbered stream, the next Seek-Down shall ~~tune~~ seek to the next lower analog frequency~~station~~ in the steps specified in the analog tuner methodology.

7.4.1.5 TU-TMR-REQ-024126/A-T_AF (TcSE ROIN-119068-2)

Name	Description	Units	Range	Resolution	Default
T_AF	Time duration the HMI indicates "AF OFF"	sec	1-30	1	20

7.4.1.6 TU-TMR-REQ-024127/A-T_PI (TcSE ROIN-119069-3)

Name	Description	Units	Range	Resolution	Default
T_PI	Maximum time duration for the best AF to be from a verified PI code	sec	1-30	0.01	0.4

7.4.1.7 TU-TMR-REQ-024128/A-T_AF_JUMP (TcSE ROIN-119071-2)

Name	Description	Units	Range	Resolution	Default
T_AF_JUMP	Time delay before the tuner shall jump to another AF until after a manual tune.	sec	1-30	1	8

7.4.1.8 AMFM-SR-REQ-024116/B-AMFM Band Preset Server Operation (TcSE ROIN-201283-2)

The server must implement both versions of Band Preset requests one with a timer and one without a timer between the Band and Preset requests for AM/FM and SDARS preset functions. SetCurrTUPreset.Rq and SetCurrPreset2.Rq shall be recognized by the server.

If server receives SetCurrTUBand.Rq then they must check in the same frame for SetCurrTUPreset.Rq or SetCurrPreset2.Rq. If SetCurrTUPreset.Rq or SetCurrPreset2.Rq is set to 0x0 then the server shall go to the Band requested.

If the server receives the SetCurrPreset2.Rq then they shall go to the requested preset.

If the server receives the SetCurrTUPreset.Rq then they shall go to the requested preset.

In the diagrams where you see SetCurrPreset2.Rq this can be SetCurrTUPreset.Rq or where you see SetCurrTUPreset.Rq this can be SetCurrPreset2.Rq depending on the Client. If Client sends the preset request in the same frame as the band request then the timing requirements shall not be used.

Preset Only Requests:
If a Preset Only request is sent using either SetCurrTUPreset.Rq or SetCurrPreset2.Rq the server/slave shall go to that preset in the band indicated by the server in the Band status signal. If the band status indicates a source that is not the active source the Server/Slave shall change to the source that matches the band status and then proceed to the preset requested.

7.4.1.9 AMFM-SR-REQ-024118/A-AM Seek Stop Sensitivity Interface (TcSE ROIN-230962-2)

The AMFM Slave shall look at the following signals to determine whether it is day or night and use this information for seek stop sensitivity.

C1MCA programs use the following signal:
Mc_VehDayNightUsrSel_St

CGEA programs use the following signals:
Day_Night_Status
Parklamp_Status

For CGEA programs the AMFM Slave shall look at Day_Night_Status to determine whether it's day or night. If Day_Night_Status is Null 0x0 then the AMFM Slave shall use Parklamp_Status to make its determination. If using Parklamp_Status Off 0x0 is to be considered as Day, and On 0x1 is to be considered as Night

The AMFM Slave shall look at the Chimes Type configuration to determine whether they are on a C1MCA or CGEA program.

7.4.1.10 AMFM-FUR-REQ-051697/A-Preset Indication Update

The preset indication after a preset recall shall only be removed or corrected after 5 seconds. Value will be confirmed by jury evaluation.

7.5 AMFM-FUN-REQ-023992/A-Select AM/FM Tuner as Source (TcSE ROIN-120003-2)

7.5.1 Use Cases

7.5.1.1 AMFM-UC-REQ-023993/A-Listening to AM radio (TcSE ROIN-24962-1)

Linked Elements
AMFM-SR-REQ-024115/A-Itunes Tagging (TcSE ROIN-183961-1)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)
HDR-SR-REQ-024150/A-Itunes Tagging (TcSE ROIN-121077-5)
HDR-SR-REQ-023822/A-Listening to AM/FM Radio with HD active (TcSE ROIN-121061-1)
AMFM-FUR-REQ-023952/A-RDS Latin Mapping Table (TcSE ROIN-112612-1)
AMFM-FUR-REQ-023953/A-EU - Tunnel Detection (TcSE ROIN-27890-2)
HDR-FUR-REQ-023823/C-HD Detect Decode (TcSE ROIN-27888-9)
AMFM-FUR-REQ-024112/B-Autocompare (TcSE ROIN-27892-1)

Normal usage and on the fly decisions when actively listening to AM radio
Scenarios

Normal Usage
User is listening to AM mode.

E1-Valid HD stream is detected
Radio audio blends from analog to digital.
Go to ~~HDR-GUC-24899-1-Listening to AM radio with HD active~~HDR-UC-REQ-024130-Listening to AM radio with HD active

Constraints

Pre-condition
AHU is on.

Post-condition
User hears analog AM broadcast.
HMI persistently displays {AM frequency}

7.5.1.2 AMFM-UC-REQ-023994/A-Listening to FM radio w/o RDS/RBDS (TcSE ROIN-24968-1)

Linked Elements
AMFM-SR-REQ-024115/A-Itunes Tagging (TcSE ROIN-183961-1)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)
HDR-SR-REQ-024150/A-Itunes Tagging (TcSE ROIN-121077-5)
HDR-SR-REQ-023822/A-Listening to AM/FM Radio with HD active (TcSE ROIN-121061-1)
AMFM-FUR-REQ-023952/A-RDS Latin Mapping Table (TcSE ROIN-112612-1)
AMFM-FUR-REQ-023953/A-EU - Tunnel Detection (TcSE ROIN-27890-2)
AMFM-FUR-REQ-023954/A-EU - RDS (TcSE ROIN-27896-3)
AMFM-FUR-REQ-023955/A-RBDS (TcSE ROIN-27897-1)
HDR-FUR-REQ-023823/C-HD Detect Decode (TcSE ROIN-27888-9)
AMFM-FUR-REQ-024112/B-Autocompare (TcSE ROIN-27892-1)

Normal usage and on the fly decisions when actively listening to FM radio

Scenarios

Normal Usage
User is listening to FM mode.

E1-Valid HD stream is detected
Radio audio blends from analog to digital.
Go to ~~HDR-GUC-24905-1-Listening to FM radio with HD active~~HDR-UC-REQ-024131-Listening to FM radio with HD active

E2-RDS/RDBS data is detected-RDS/RBDS is enabled
Go to ~~AMFM-GUC-24974-1-Listening to FM radio with RBDS data~~AMFM-UC-REQ-023995-Listening to FM radio with RBDS data and ~~AMFM-GUC-24980-1-Listening to FM radio with RDS data~~AMFM-UC-REQ-023996-Listening to FM radio with RDS data

Constraints

Pre-condition
AHU is ON

Pre-condition
RDS/RBDS is not available or enabled

Post-condition
User hears analog FM broadcast.
HMI persistently displays {FM frequency}

7.5.1.3 AMFM-UC-REQ-023995/A-Listening to FM radio with RBDS data (TcSE ROIN-24974-1)

Linked Elements
AMFM-SR-REQ-024115/A-Itunes Tagging (TcSE ROIN-183961-1)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)
HDR-SR-REQ-024150/A-Itunes Tagging (TcSE ROIN-121077-5)
HDR-SR-REQ-023822/A-Listening to AM/FM Radio with HD active (TcSE ROIN-121061-1)
AMFM-FUR-REQ-023952/A-RDS Latin Mapping Table (TcSE ROIN-112612-1)
AMFM-FUR-REQ-023953/A-EU - Tunnel Detection (TcSE ROIN-27890-2)
AMFM-FUR-REQ-023955/A-RBDS (TcSE ROIN-27897-1)
HDR-FUR-REQ-023823/C-HD Detect Decode (TcSE ROIN-27888-9)
AMFM-FUR-REQ-024112/B-Autocompare (TcSE ROIN-27892-1)

Normal usage and on the fly decisions when actively listening to FM radio

Scenarios

Normal Usage
User is listening to FM mode with an active RBDS stream.

E1-Valid HD stream is detected
Radio audio blends from analog to digital.

Go to ~~HDR-GUC-24905-1-Listening to FM radio with HD active~~HDR-UC-REQ-024131-Listening to FM radio with HD active

Constraints

Pre-condition
AHU is ON
Pre-condition
RBDS is enabled.
Pre-condition
AHU is not configured in EU mode.
Pre-condition
RBDS data is available.

Post-condition
User hears analog FM broadcast.
HMI persistently displays {FM frequency, PS and RT data fields}.

7.5.1.4 AMFM-UC-REQ-023996/A-Listening to FM radio with RDS data (TcSE ROIN-24980-2)

Linked Elements
AMFM-FUR-REQ-024113/A-Station List (TcSE ROIN-27903-3)
AMFM-FUR-REQ-024114/A-EU - Regional Mode (TcSE ROIN-27900-2)
AMFM-SR-REQ-024115/A-Itunes Tagging (TcSE ROIN-183961-1)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)
HDR-SR-REQ-024150/A-Itunes Tagging (TcSE ROIN-121077-5)
HDR-SR-REQ-023822/A-Listening to AM/FM Radio with HD active (TcSE ROIN-121061-1)
AMFM-FUR-REQ-023952/A-RDS Latin Mapping Table (TcSE ROIN-112612-1)
AMFM-FUR-REQ-023953/A-EU - Tunnel Detection (TcSE ROIN-27890-2)
AMFM-FUR-REQ-023954/A-EU - RDS (TcSE ROIN-27896-3)
AMFM-FUR-REQ-023955/A-RBDS (TcSE ROIN-27897-1)
AMFM-FUR-REQ-023985/A-EU - AF Strategy (TcSE ROIN-27901-2)
AMFM-FUR-REQ-023986/A-EU - PI Strategy (TcSE ROIN-27902-1)
DAB-SD-REQ-024436/A-Display Service Name (TcSE ROIN-147156-1)
DAB-SD-REQ-024437/A-Display Stereo Flags (TcSE ROIN-147164-1)
AMFM-FUR-REQ-032073/A-EU - AF Strategy (TcSE ROIN-271456)
AMFM-FUR-REQ-092600/A-EU - AF Strategy
AMFM-FUR-REQ-092601/A-EU - PI Strategy
HDR-FUR-REQ-023823/C-HD Detect Decode (TcSE ROIN-27888-9)
AMFM-FUR-REQ-024112/B-Autocompare (TcSE ROIN-27892-1)

Normal usage and on the fly decisions when actively listening to FM radio

Scenarios

Normal Usage
User is listening to FM mode with an active RDS stream.

E1-Valid HD stream is detected
Radio audio blends from analog to digital.
Go to ~~HDR-GUC-24905-1-Listening to FM radio with HD active~~HDR-UC-REQ-024131-Listening to FM radio with HD active

Constraints

Pre-condition
AHU is ON
Pre-condition
RBDS is enabled.
Pre-condition
AHU is configured in EU mode.
Pre-condition
RBDS data is available.

Post-condition
User hears analog FM broadcast.
HMI persistently displays {FM frequency, PS and RT data fields}.

7.5.1.5 AMFM-UC-REQ-023997/A-Set Audio Source to AM (TcSE ROIN-24665-1)

Scenarios

Normal Usage
User selects <AM> via HMI.
AHU transitions to AM as active audio source and tunes to the previously tuned bank and frequency.
HMI indicates {AM Tuner} source and other displays appropriate for currently selected audio source.

E1-Battery connect Power ON
AHU powers on and transitions to AM as active audio source.
Tuner set according to AHU Defaults Requirements.
HMI indicates {AM} source and other displays appropriate for currently selected audio source.

E2-AM already the active source
User selects <AM> via HMI.
AHU maintains AM as active audio source.

Constraints

Pre-condition
AHU is ON

Post-condition
User is listening to AM radio.
HMI indicates {AM} source and other displays appropriate for currently selected audio source.

7.5.1.6 AMFM-UC-REQ-023998/A-Set Audio Source to FM - with RDS (TcSE ROIN-24677-1)

Scenarios

Normal Usage
User selects <FM> via HMI.
AHU transitions to FM tuning to the previously tuned preset bank, channel and frequency.
AHU playing the last FM preset bank, channel and frequency.
The AHU compares RDS data (PI, AF) from memory against the data from current broadcast.
HMI indicates {FM Tuner} source and other displays appropriate for currently selected audio source.

E1-frequency broadcast data mismatch, data is present
Tuning to previous frequency provides broadcast data that does not match the broadcast data of previous channel but another station with matching broadcast data is present.
The AHU changes frequency to the strongest FM station with matching broadcast data.
AHU is playing selected FM station.
HMI indicates {FM} source and other displays appropriate for currently selected audio source.

E2-Frequency broadcast data mismatch, data not present
Tuning to previous frequency provides broadcast data that does not match the broadcast data of previous channel and another station with matching broadcast data is not present.
The AHU changes frequency to the last active frequency.
AHU is playing selected FM station.
HMI indicates {FM} source and other displays appropriate for currently selected audio source.

E3-1st source change to FM after battery disconnect/connect
1st source change to FM after battery disconnect/connect:
User selects <FM> via HMI.
AHU transitions to FM as active audio source.
Tuner set according to AHU Defaults Requirements.
See also, ~~AMFM-GUC-25040-1-Select FM Preset (non-North American)~~~~AMFM-GUC-25040-1-Select FM Preset (non-North American)~~AMFM-UC-REQ-024013-Select FM Preset (non-North American)
HMI indicates {FM} source and other displays appropriate for currently selected audio source.

E4-FM already the active source
User selects <FM> via HMI.
AHU maintains FM as active audio source.

Constraints

Pre-condition
AHU is ON
Pre-condition
RDS Active
Pre-condition
AHU configured for Europe.

Post-condition
User is listening to FM radio.
HMI indicates {FM} source and other displays appropriate for currently selected audio source.

7.5.1.7 AMFM-UC-REQ-023999/A-Set Audio Source to FM - without RDS (TcSE ROIN-24683-1)

Scenarios

Normal Usage
User selects <FM> via HMI.
AHU transitions to FM tuning to the previously tuned preset bank, channel and frequency.
AHU playing the last FM preset bank, channel and frequency.
HMI indicates {FM Tuner} source and other displays appropriate for currently selected audio source.
E1-1st source change to FM after battery disconnect/connect
User selects <FM> via HMI.
AHU transitions to FM as active audio source.
Tuner set according to AHU Defaults Requirements.
See also, ~~AMFM-GUC-25028-1-Select FM Preset (North American)~~AMFM-GUC-25028-1-Select FM Preset (North ~~American)~~AMFM-UC-REQ-024015-Select FM Preset (North American)
HMI indicates {FM} source and other displays appropriate for currently selected audio source.

E2-FM already active audio source
User selects <FM> via HMI.
AHU maintains FM as active audio source.
HMI maintains displays for FM.

Constraints

Pre-condition
AHU is ON
Post-condition
User is listening to FM radio.
HMI indicates {FM} source and other displays appropriate for currently selected audio source.

7.5.2 Sequence Diagrams

7.5.2.1 AMFM-SD-REQ-023816/A-Activate AM/FM Radio (TcSE ROIN-111297-4)

Scenario

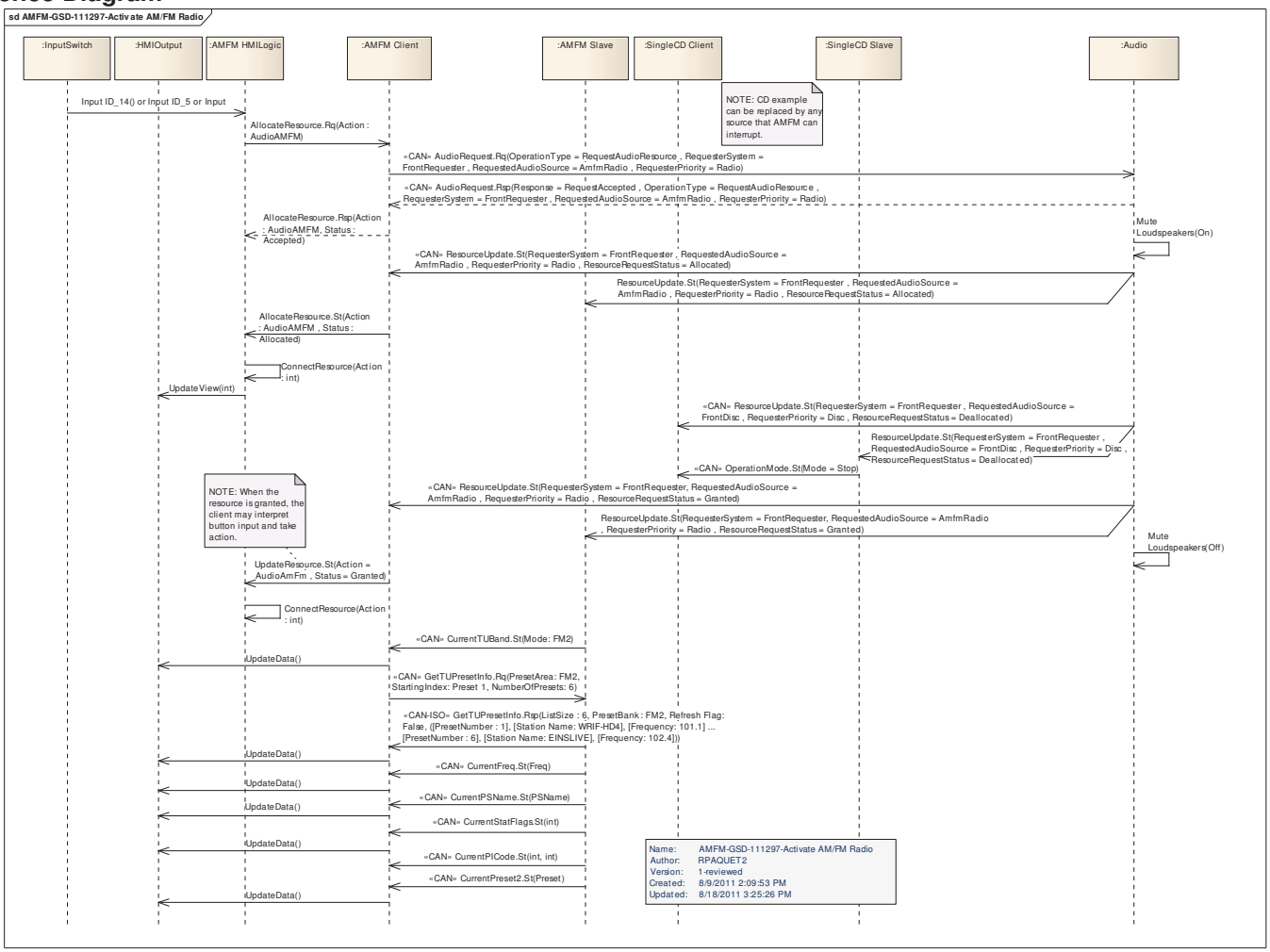
Normal Usage
User selects <AM/FM> via HMI.

Constraints

Pre-condition
Multimedia System is in ON state and in a source other than AM/FM.

Post-condition
Audio Resource Server transitions to AM/FM as active audio source and tunes to the previously tuned bank and frequency. HMI indicates {AM/FM Tuner} source and other displays appropriate for currently selected audio source.

Sequence Diagram



7.6 HDR-FUN-REQ-024129/A-Listening to AM/FM Radio with HD Active (TcSE ROIN-120238-3)

7.6.1 Use Cases

7.6.1.1 HDR-UC-REQ-024130/A-Listening to AM radio with HD active (TcSE ROIN-24899-2)

Linked Elements

AMFM-SR-REQ-024115/A-Itunes Tagging (TcSE ROIN-183961-1)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)
HDR-SR-REQ-024150/A-Itunes Tagging (TcSE ROIN-121077-5)
HDR-SR-REQ-023822/A-Listening to AM/FM Radio with HD active (TcSE ROIN-121061-1)
AMFM-FUR-REQ-023952/A-RDS Latin Mapping Table (TcSE ROIN-112612-1)
AMFM-FUR-REQ-023953/A-EU - Tunnel Detection (TcSE ROIN-27890-2)
HDR-FUR-REQ-023823/C-HD Detect Decode (TcSE ROIN-27888-9)
AMFM-FUR-REQ-024112/B-Autocompare (TcSE ROIN-27892-1)

Normal usage and on the fly decisions when actively listening to AM radio with HD

Scenarios

Normal Usage

User selects AM mode or selects a new frequency in AM with a valid HD data stream.

E1-HD data stream lost or degraded

HD data stream is lost or degrades. Radio audio blends from digital to analog.
Go to AMFM-GUC-24962-1-Listening to AM radio

Constraints

Pre-condition
AHU is ON
Pre-condition
HD function is enabled in AM.
Pre-condition
Valid HD data stream is available.
Pre-condition
AHU is not configured in EU mode.

Post-condition
User hears decoded digital AM broadcast.
HMI persistently displays {AM frequency} and {HD text} (when HD text is available).

7.6.1.2 HDR-UC-REQ-024131/A-Listening to FM radio with HD active (TcSE ROIN-24905-2)

Linked Elements
AMFM-SR-REQ-024115/A-Itunes Tagging (TcSE ROIN-183961-1)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)
HDR-SR-REQ-024150/A-Itunes Tagging (TcSE ROIN-121077-5)
HDR-SR-REQ-023822/A-Listening to AM/FM Radio with HD active (TcSE ROIN-121061-1)
AMFM-FUR-REQ-023952/A-RDS Latin Mapping Table (TcSE ROIN-112612-1)
AMFM-FUR-REQ-023953/A-EU - Tunnel Detection (TcSE ROIN-27890-2)
HDR-FUR-REQ-023823/C-HD Detect Decode (TcSE ROIN-27888-9)
AMFM-FUR-REQ-024112/B-Autocompare (TcSE ROIN-27892-1)

Normal usage and on the fly decisions when actively listening to FM radio with HD

Scenarios

Normal Usage
User selects FM mode or selects a new frequency in FM with a valid HD data stream.

E1-HD data stream lost or degraded
HD data stream is lost or degrades. Radio audio blends from digital to analog.
Go to AMFM-GUC-24968-1-Listening to FM radio w/o RDS/RBDS or AMFM-GUC-24974-1-Listening to FM radio with RBDS data or AMFM-GUC-24980-1-Listening to FM radio with RDS data

Constraints

Pre-condition
AHU is ON
Pre-condition
HD function is enabled in FM.
Pre-condition
Valid HD data stream is available.

Post-condition
User hears decoded digital FM broadcast.
HMI persistently displays {FM frequency} and {HD text} (when HD text is available).
~~{HD text remains displayed while available.}~~

7.6.2 Requirements

7.6.2.1 HDR-SR-REQ-023822/A-Listening to AM/FM Radio with HD active (TcSE ROIN-121061-1)

This function is to use the AMFM-GSD-111297-Activate AM/FM Radio Sequence Diagram found in the AM/FM Tuner Feature as the base operation for this function.

7.6.2.2 HDR-FUR-REQ-023823/C-HD Detect Decode (TcSE ROIN-27888-9)

HD Rradio functionality must meet the following externally controlled ~~Ibiquity~~ IBiquity Specifications;~~;~~

Document Title	Revision	Date	Doc. No.
HD Radio Commercial Receiver Product Requirements Guideline	A	May 8, 2003	RX_SSSS_5032
HD Radio Supplemental Program Services	A	November, 2004	RX_TN_5082
HD Radio Commercial Receiver Interface and System Functional Description	A	Feb. 19, 2003	RX_SSFD_5029

Document Title	Document Name
HD Radio™ Commercial Receiver Product Requirements Guideline	RX_SSS_5032
HD Radio™ Supplemental Program Services	RX_TN_5082
HD Radio™ Commercial Receiver Interface and System Functional Description	RX_SSFD_5029

(refer to the latest released versions as maintained by iBiquity)
~~Reference this externally controlled specification (not owned by Ford Motor Company).~~

HD ~~r~~Radio digital blending for tuning to a new station
When a station is tuned and an HD stream is available. The tuner initially plays the analog broadcast. Simultaneously, the HD tuner demodulates HD1. ~~HMI shall provide an indication such as the HD icon shall start blinking until the data stream is decoded~~HMI shall provide an indication of HD acquiring until the data stream is decoded. ~~Once HD1 has been successfully decoded, within "T_HD decode" seconds, the HD digital stream is blended from the analog to minimize artifacts.~~
The shaping and blending characteristics to be determined jointly between the supplier and the Ford D&R engineer to be audibly non-obtrusive to the user.

Weak digital signal while Listening to HD-1

If a tuned HD Radio signal strength drops below its acceptable threshold while playing, the
HD tuner shall blend to the analog signal and attempt to reacquire the HD signal. HMI shall provide the normal indication of attempting to acquire and HD stream.~~.~~

The fading and blending characteristics to be determined jointly between the supplier and the Ford D&R engineer.

Weak digital signal while listening to Streams other than HD-1

If a tuned HD Radio stream other than HD-1 drops below its acceptable signal strength threshold, the tuner shall mute and attempt to reacquire the HD signal. ~~HMI shall provide a visual indication to the user until an acceptable signal is reacquired.~~

~~If after "T_HD _multicast_reacquire" seconds, the HD tuner cannot reacquire the digital stream, the tuner shall tune to preset 1 for the current band. If Preset 1 of the current band is an HD stream and is not available, the tuner shall tune to the analog signal of preset 1.~~

~~The fading and blending characteristics to be determined jointly between the supplier and the Ford D&R engineer.~~

Manual Frequency Tune

HD tune works the same as ***analog*** tune except it shall attempt to decode an HD ***datastream*** every time a new frequency is selected. If the user does not wait for the HD data to decode and become available and selects to tune again, it cancels the HD decode attempt and tunes to the next ***analog*** frequency.

The user shall select previous or next channel manually. Available methods are:
- Step by step (individual button press message received): previous / next channel.
- Continuous action (press and hold message received): previous / next channel.

When the user was already on an HD station, it shall step up or down through the available digital multicasts in the direction the user tuned if they are available.

When the user was already on an HD station with the multicast of HD-1 or the last HD multicast selected on the current frequency and the user manually tunes up or down in the direction that would take the tuner past the available digital multicasts, the tuner shall tune to the next frequency.

Multicast Availability

Upon tuning to an HD enabled frequency, the HD tuner shall provide the number of HD channels available on the current frequency to the HMI.

Data Truncations

The following data are the only data items to be truncated. All other data will not be truncated.

Data Name	Attribute	Truncated after x characters
SIS – SSN	Short Station Name	4
PSD – Artist	Artist	64
PSD – Title	Title	64
SIS – Program Type	Station Program Type	22
PSD – Genre	Song Genre	22

When the AHU is currently decoding HD Radio data, the AHU shall not send out any RBDS data.
Following the rule priority of HD data hysteresis in FAS-AHU-HDR-GREQ-206211-3-MPS Data Field Hysteresis, if HD Radio decoding is no longer available, the AHU shall clear the HD data fields (PAD title / PAD artist / SSN) then switch back to send out RBDS data (if available and if RBDS is turned on). If the AHU is tuned to an HD multicast stream (HD2+) and the HD Radio decoding is no longer available, the AHU shall clear the HD data fields (PAD title / PAD artist / SSN) and shall not send any more RBDS or HD radio data for that multicast stream until either the HD radio re-acquires the HD radio multicast stream or the user selects a new station that has data available. PTY is one exception to the rule. When HD is active, the AHU shall send out the RBDS PTY codes and not HD PTY codes for MPS stations and the AHU shall send out the HD PTY codes for SPS stations. If HD is not active, all PTY codes are send out as the RBDS PTY codes.

Determining status of the "HDChanStatus" signal

Follow these scenarios to determine when to assert one of the appropriate signal messages that the system will use to display the HD status to the customer.

1. If HD is On and the AHU determines that the selected station has no HD available, then set signal to "No Multicast".

2. If HD is On and the AHU determines that the selected station has HD content then set signal to Acquiring while the AHU is gathering the HD data from that point until the AHU has completed acquiring ~~all HD~~either HD1 (MPS) or HD2+ (SPS) data on that station.

3. Once the AHU is done gathering the HD Data, set the signal to "Acquired".

4. If HD is Off, set signal to "No Multicast". Additionally, in this state, no other information shall be sent by the AHU over CAN to state what multicast channels are available or which one is actively being tuned to.

5. AHU is not configured for HD (No HD Integrated) set signal to "Invalid".

6. When the user tries to direct tune to a multicast of 2+ or selects a preset that has a multicast of 2+ stored in it and the AHU does not find the user desired multicast although the station has HD but not that multicast number, the signal should be set as "Not Found"

7. When the user tries to direct tune to a multicast of 2+ or selects a preset that has a multicast of 2+ stored in it and the AHU does not find the multicast and the station has no HD, the signal should be set as "Not Found"

7.6.2.3 HDR-SR-REQ-023824/A-HD Information Handling (TcSE ROIN-222548-1)

The AM/FM/HD Client shall display HD data until the Server clears the data regardless of the HDChanStatus_St signal. The data that will be cleared by the Server is CurrentSSName_St, SongTitle_St, and ArtistName_St and this is handled by sending either nulls for a signal or by sending only an end of string character for the data sent in a TP method.

7.7 AMFM-FUN-REQ-024019/A-Tuning AM/FM Radio (TcSE ROIN-120038-2)

7.7.1 Use Cases

7.7.1.1 AMFM-UC-REQ-024020/A-Frequency Tune by Button press and hold (TcSE ROIN-25082-1)

Linked Elements
AMFM-FUR-REQ-024113/A-Station List (TcSE ROIN-27903-3)
AMFM-FUR-REQ-024114/A-EU - Regional Mode (TcSE ROIN-27900-2)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)
AMFM-FUR-REQ-023828/A-Manual Tune (TcSE ROIN-27906-2)
AMFM-FUR-REQ-023954/A-EU - RDS (TcSE ROIN-27896-3)
AMFM-FUR-REQ-023985/A-EU - AF Strategy (TcSE ROIN-27901-2)
AMFM-FUR-REQ-023986/A-EU - PI Strategy (TcSE ROIN-27902-1)
AMFM-FUR-REQ-032073/A-EU - AF Strategy (TcSE ROIN-271456)
AMFM-FUR-REQ-092600/A-EU - AF Strategy
AMFM-FUR-REQ-092601/A-EU - PI Strategy
AMFM-FUR-REQ-024112/B-Autocompare (TcSE ROIN-27892-1)

Scenarios

Normal Usage

User selects <Tune Up> or <Tune Down> continuously for T_button hold
AHU continuously tunes in the direction specified by the user.
AHU stops tuning after <Tune Up> or <Tune Down> command is released via HMI.

Constraints

Pre-condition

AHU is ON

Pre-condition

AM or FM is selected as the source.

Post-condition

The AHU plays selected frequency.

7.7.1.2 AMFM-UC-REQ-024021/A-Frequency Tune by single step / press (TcSE ROIN-25076-2)

Linked Elements
AMFM-FUR-REQ-024113/A-Station List (TcSE ROIN-27903-3)
AMFM-FUR-REQ-024114/A-EU - Regional Mode (TcSE ROIN-27900-2)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)
AMFM-FUR-REQ-023828/A-Manual Tune (TcSE ROIN-27906-2)
AMFM-FUR-REQ-023954/A-EU - RDS (TcSE ROIN-27896-3)
AMFM-FUR-REQ-023985/A-EU - AF Strategy (TcSE ROIN-27901-2)
AMFM-FUR-REQ-023986/A-EU - PI Strategy (TcSE ROIN-27902-1)
AMFM-FUR-REQ-032073/A-EU - AF Strategy (TcSE ROIN-271456)
AMFM-FUR-REQ-092600/A-EU - AF Strategy
AMFM-FUR-REQ-092601/A-EU - PI Strategy
AMFM-FUR-REQ-024112/B-Autocompare (TcSE ROIN-27892-1)

Scenarios

Normal Usage

The user selects and releases <Tune Up> or <Tune Down> via HMI.
AHU tunes one step in the direction specified by the user.

Note: The HMI shall provide a first surface accessible control to operate this function (e.g. rotary, hard key, permanently accessible touch screen area, etc.)

Constraints

Pre-condition
AHU is ON
Pre-condition
AM or FM is selected as the source.

Post-condition
The AHU plays selected frequency.

7.7.2 Requirements

7.7.2.1 AMFM-FUR-REQ-023828/A-Manual Tune (TcSE ROIN-27906-2)

The AHU shall soft mute upon activation of the tune function and soft un-mute after the tune function has been completed.

AM and FM manual tune up/down:

- Tune-Up / Tune-Down – The tuner shall use the standard specified tuning steps for the applicable consumer market for each Tune-Up or Tune-Down button press.

- Tune-Up/Down Press and Hold – When the user presses and holds the tune button for more than **T_button hold** seconds, the tuner shall continuously tune up/down in the direction specified until a message is received that the button has been released. The tuner shall stop on the last tuned station before the message was received. The AHU shall report the current frequency to the HMI during the tuning process.

When tuning up, if the highest frequency in the band is reached, the tuner shall wrap around and continue at the lowest frequency in the band.

When tuning down, if the lowest frequency in the band is reached, the tuner shall wrap around and continue at the highest frequency in the band.

During the manual tuning action the audio shall be muted. Unmuting shall be smooth after tuning is complete.

FM manual tune up/down with RDS present

In addition to the requirements above, the following requirements apply when RDS is present and active.

All RDS filters, which are user selected by the HMI (e.g. TA) shall be ignored, however, RDS indications via HMI are still allowed.

After a manual tune function, the AHU must not jump to another AF until after $\mathbf{T_{\_AF\_JUMP}}$ seconds. During that time, another manual tune may be performed from the actual frequency. If an AF is found after $\mathbf{T_{\_AF\_JUMP}}$ seconds, the next manual tune shall be initiated from the ~~new~~ original tuned~~AF~~ frequency.

Autocompare function shall be considered.

7.7.3 Sequence Diagrams

7.7.3.1 AMFM-SD-REQ-023829/A-Manual Frequency Tune (TcSE ROIN-119303-2)

Scenario

Scenario
The user selects and releases <Tune Up> or <Tune Down> via HMI.
AHU tunes one step in the direction specified by the user.

Or User selects <Tune Up> or <Tune Down> continuously for T_button hold.
AHU continuously tunes in the direction specified by the user.
AHU stops tuning after <Tune Up> or <Tune Down> command is released via HMI.

Constraints

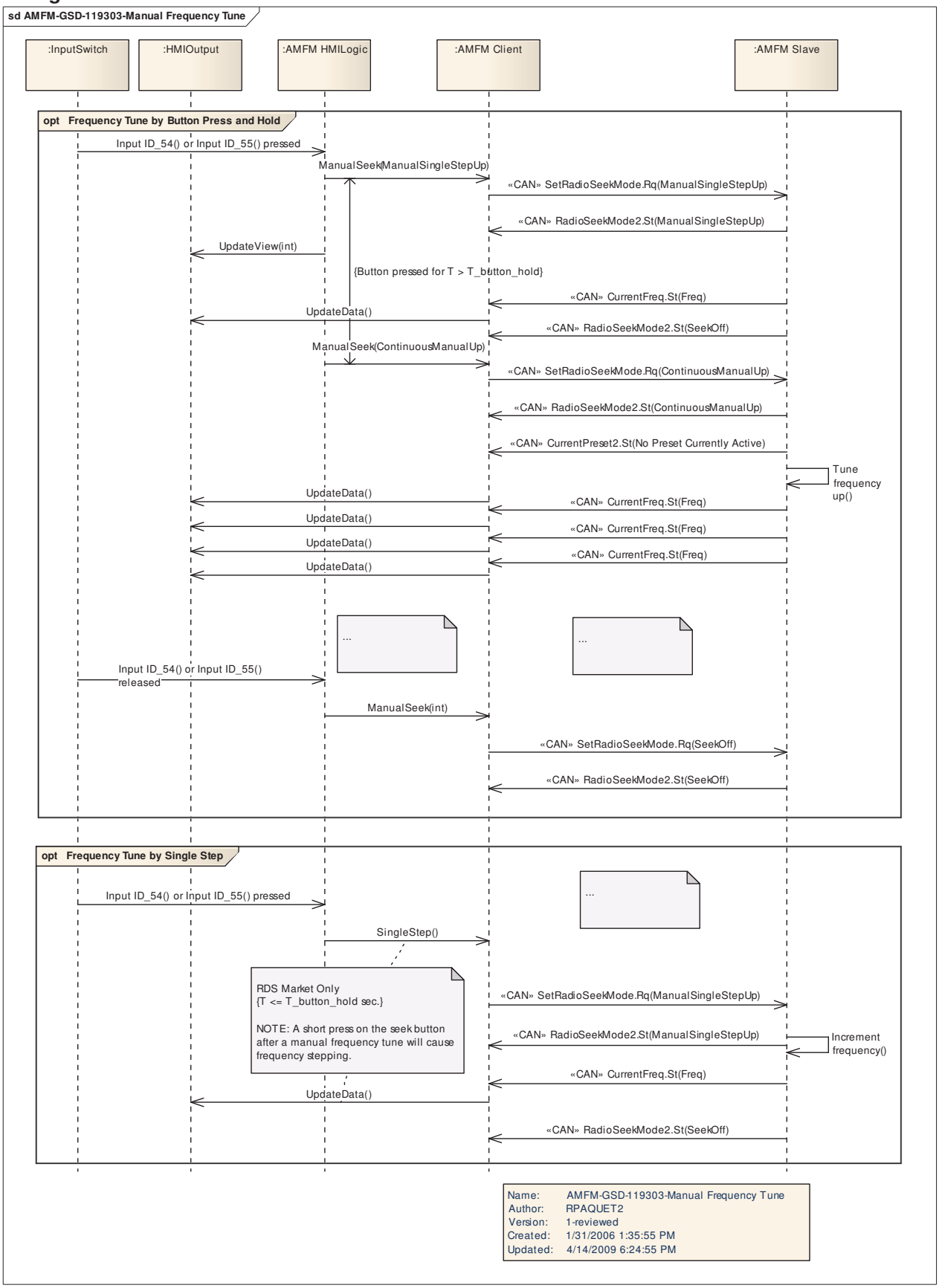
Pre-condition

User is listening to AM/FM Radio.

Post-condition

Selected frequency is now playing.

Sequence Diagram



7.8 HDR-FUN-REQ-024132/A-Manual Tuning when on an HD Multicast channel (TcSE ROIN-120263-2)

7.8.1 Use Cases

7.8.1.1 HDR-UC-REQ-024133/A-Manual Tuning when on an HD Multicast channel (TcSE ROIN-24935-3)

Linked Elements
AMFM-SR-REQ-024115/A-Itunes Tagging (TcSE ROIN-183961-1)
HDR-FUR-REQ-024125/A-HD tuner tune steps (TcSE ROIN-27907-2)
HDR-SR-REQ-024150/A-Itunes Tagging (TcSE ROIN-121077-5)
HDR-SR-REQ-023822/A-Listening to AM/FM Radio with HD active (TcSE ROIN-121061-1)
AMFM-FUR-REQ-023828/A-Manual Tune (TcSE ROIN-27906-2)
HDR-FUR-REQ-023823/C-HD Detect Decode (TcSE ROIN-27888-9)

Digital HD multicasting only available in FM.
When a user listens to a multicast of a radio station and the signal fades, the radio mutes while the tuner attempts to re-acquire the signal. ~~and the HD icon blinks. The strategy of reacquiring the multicast stream is per the Use Case titled "Unavailable Digital Signal/Loss of Digital Signal"~~

Scenarios

Normal Usage
The user selects and releases <Tune Up> or <Tune Down> via HMI.
AHU tunes one step in the direction specified by the user within the currently active set of multicast streams.

E1-Last multicast HD Stream is already tuned
AHU tunes one step in the direction specified by the user on the analog tuner.

Constraints

Pre-condition
AHU is ON
Pre-condition
FM is selected as the source.
Pre-condition
HD function is enabled in FM.
Pre-condition
Currently tuned station has digital HD multi-cast streams.

Post-condition
The AHU plays selected station.

7.9 AMFM-FUN-REQ-024000/A-Seek (TcSE ROIN-119998-4)

7.9.1 Use Cases

7.9.1.1 AMFM-UC-REQ-024001/A-Frequency Search by single step / press (TcSE ROIN-25088-3)

Linked Elements
AMFM-FUR-REQ-023845/A-Tuner Seek (TcSE ROIN-27908-8)

Scenarios

Normal Usage
The user ~~selects~~ activates <seek up> or <seek down> via HMI.
AHU seeks until the next valid station is found.

E1-No station found after completing 3 band seeks
The AHU cancels the seek and the AHU plays the last valid station.

E2-Search is cancelled before finding a new valid seek stop
The AHU plays the last active station.

Constraints

Pre-condition
AHU is ON
Pre-condition
AM or FM is the source.

Post-condition
The AHU plays selected frequency.

7.9.1.2 AMFM-UC-REQ-024002/A-Frequency Search by Button press and hold (TcSE ROIN-173673-2)

Linked Elements
AMFM-FUR-REQ-023845/A-Tuner Seek (TcSE ROIN-27908-8)

Scenarios

Normal Usage
The user ~~selects~~ activates <seek up> or <seek down> continuously for T_button_hold via HMI.
AHU continuously seeks in the direction specified by the user.
AHU stops seeking on the next valid seek stop found after the user releases the <seek up> or <seek down> via HMI.

E1-No station found after completing 3 band seeks once the user releases the seek button
The AHU cancels the seek and the AHU plays the last valid station.
E2-Search is cancelled before finding a new valid seek stop
The AHU plays the last active station.

Constraints

Pre-condition
AHU is ON
Pre-condition
AM or FM is the source.

Post-condition
The AHU plays selected frequency.

7.9.2 Requirements

7.9.2.1 AMFM-FUR-REQ-023845/A-Tuner Seek (TcSE ROIN-27908-8)

The HMI shall determine how the user of the audio system interfaces the physical AHU tuner in order to translate the seek up/down presses of the manual seek buttons or other input methods. The AHU will simply respond to the appropriate short or long press messages that match the criteria of a seek up/down press and react according to the below specification. The HMI shall handle the visual output feedback to the user.

The AHU shall soft mute upon activation of the seek function and soft un-mute after the seek function has been completed.

Switching modes or selecting seek again will cancel the seek function. After cancel seek the tuner shall jump back to the last tuned frequency.
VOLUME~~,~~ and other functions (e.g. Menu, Text messages, etc.) defined by HMI ~~MENU, SOUND, CLOCK, and TEXT messages~~ shall not cancel seek.

Auto seek

AM / FM auto seek up/down:

- Short press message – The tuner shall seek up/down the frequency band using seek stop requirements according to the direction specified by the button press message. ~~(For RDS in FM, the PI List (1-3-4-2) order methodology also applies as first priority.)~~

- Long press message – After a message is received informing the AHU that the user pressed and held the seek button function for more than **T_button_hold** seconds, the tuner shall repeatedly continue to seek up/down~~, pausing on the next valid seek/stop frequency for 250ms,~~ in the direction specified by the received message until another message is received stating that the button function was released. The tuner stops on the next valid frequency based on the seek stop according to the direction specified by the button press message. The seek speed is 2 MHz/s (for FM) or 100 kHz/s (for AM) in the same step sizes as the standard specified tuning steps. ~~(For RDS in FM, the PI List (1-3-4-2) order methodology also applies as first priority.)~~

While tuning up, if the highest frequency in the band is reached, the tuner shall wrap around and continue at the lowest frequency in the band.

While tuning down, if the lowest frequency in the band is reached, the tuner shall wrap around and continue at the highest frequency in the band.

~~During the manual tuning action the audio level decreases by at least 10dB. Unmuting shall be smooth after tuning is complete.~~

These items additionally apply when RDS is active and on the FM band;

~~If the PI code cannot be verified than the station shall be left in the non-RDS area of the PI List and the next time the auto seek is deactivated this station shall be reordered to the correct position in the RDS area. This is to prevent loop internally on the FM band. Reorganising of the List shall not occur during the auto seek function.~~

The AF function is immediately active after every stop. The stop frequency shall be temporary stored and when the next seek press activation is made by the user, the tuner shall begin from this temporary stored frequency.

All RDS filters, which are user selected by the HMI (e.g. TA) shall be ignored, however, RDS indications via HMI are still allowed.

~~Tunnel detection shall considered.~~

The reception quality (seek stop quality) shall considered.

Autocompare shall be considered.

Auto seek shall be used to update the Learn memory.

7.9.3 Sequence Diagrams

7.9.3.1 AMFM-SD-REQ-023846/A-Automatic Frequency Search (TcSE ROIN-119310-1)

Scenario

Scenario

The user selects <seek up> or <seek down> via HMI.
System seeks until the next station is found.

Constraints

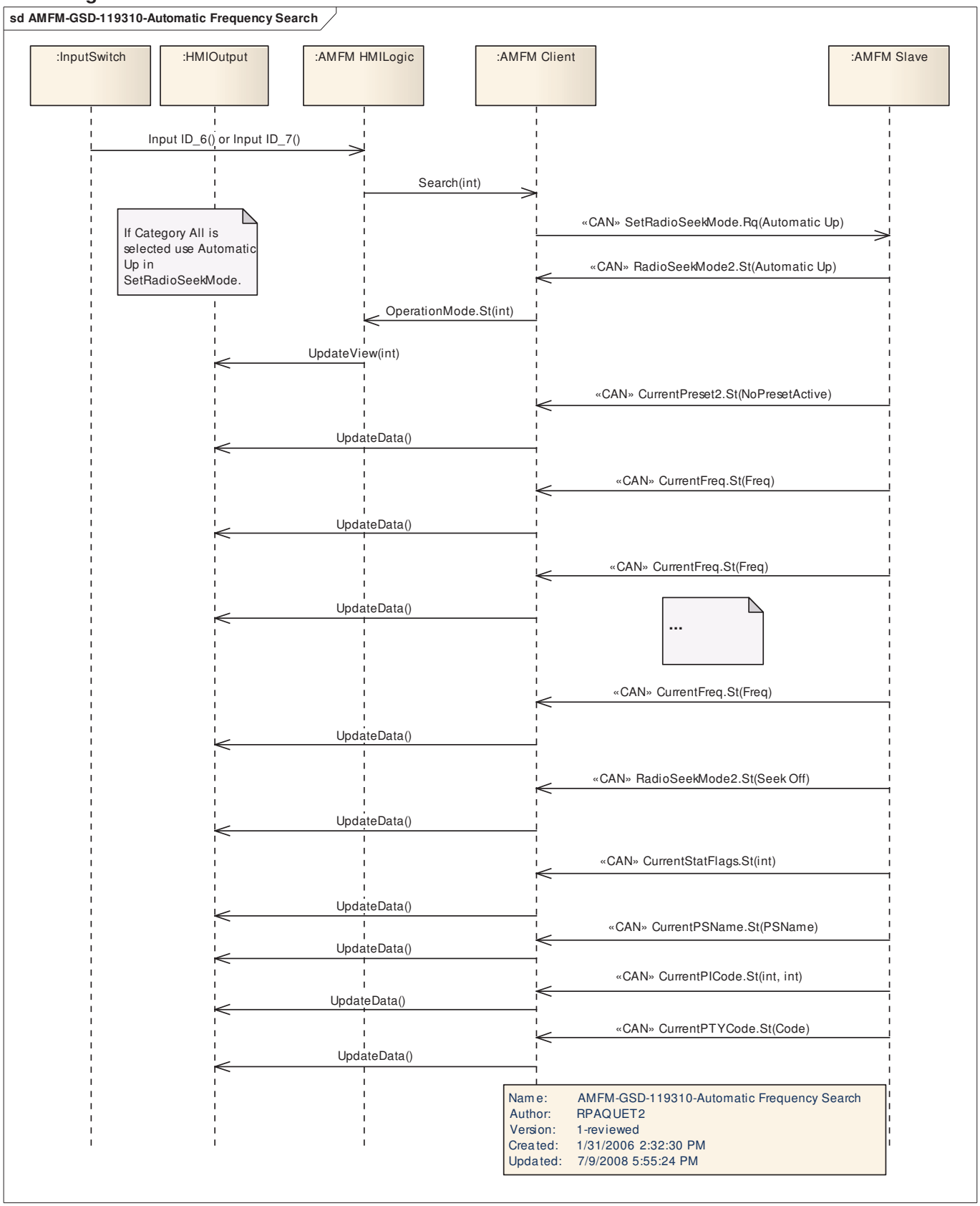
Pre-condition

AM or FM is the source.

Post-condition

The System plays the selected frequency.

Sequence Diagram



7.9.3.2 AMFM-SD-REQ-023847/A-E1-No Station found during Automatic Frequency Search (TcSE ROIN-119317-1)

Scenario

Scenario

The System cancels the seek after 3 searches through the band and no valid station is found.

Constraints

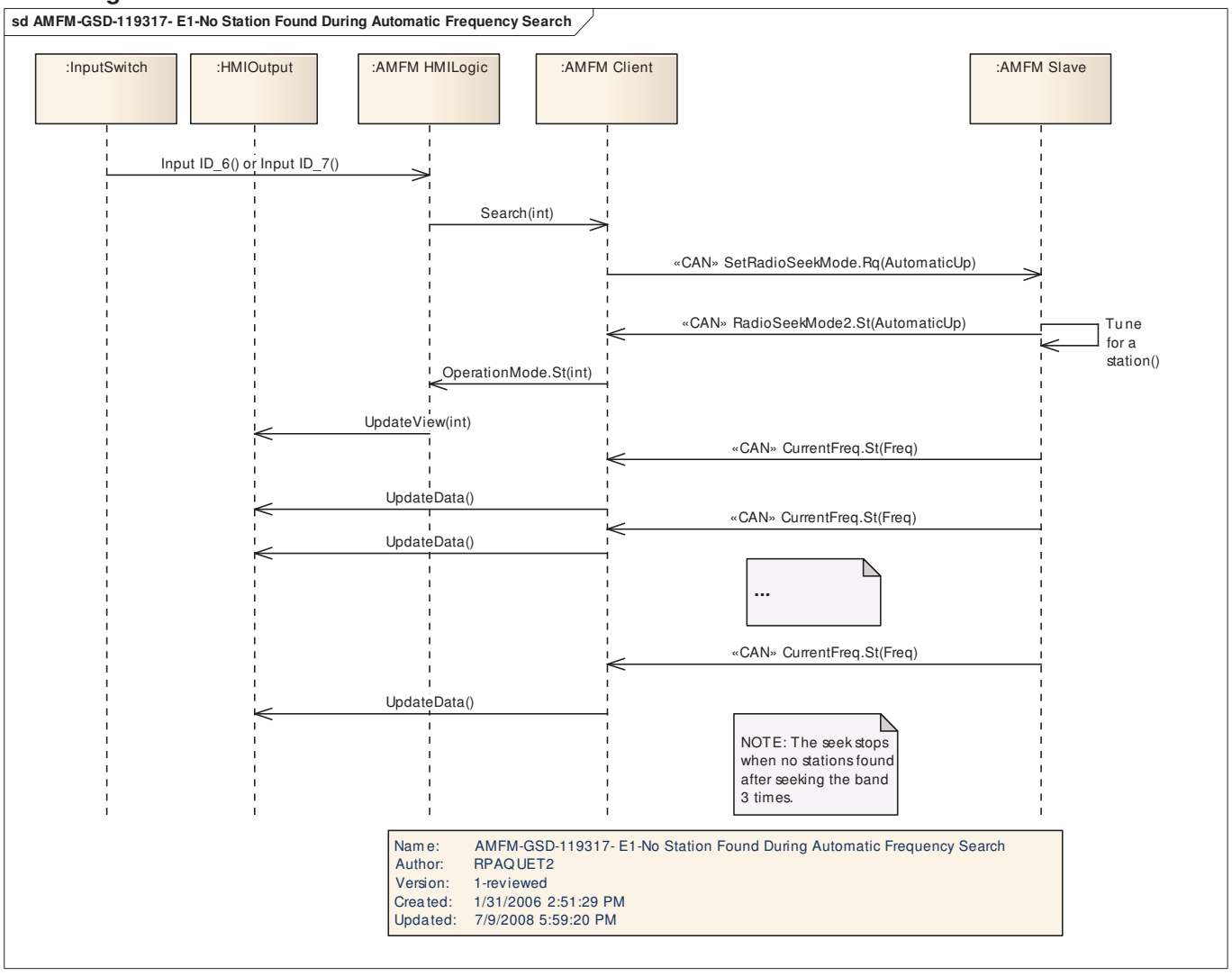
Pre-condition

The user has selected <Seek Up> or <Seek Down> to get to the next station.
See AMFM-GSD-119310-Automatic Frequency Search.

Post-condition

The System plays the last valid frequency.

Sequence Diagram



7.9.3.3 AMFM-SD-REQ-023848/A-Seek Press and Hold (TcSE ROIN-174134-1)

Scenario

Scenario

The user has pressed and held <Seek Up> or <Seek Down> for longer than the T_button_hold timer.

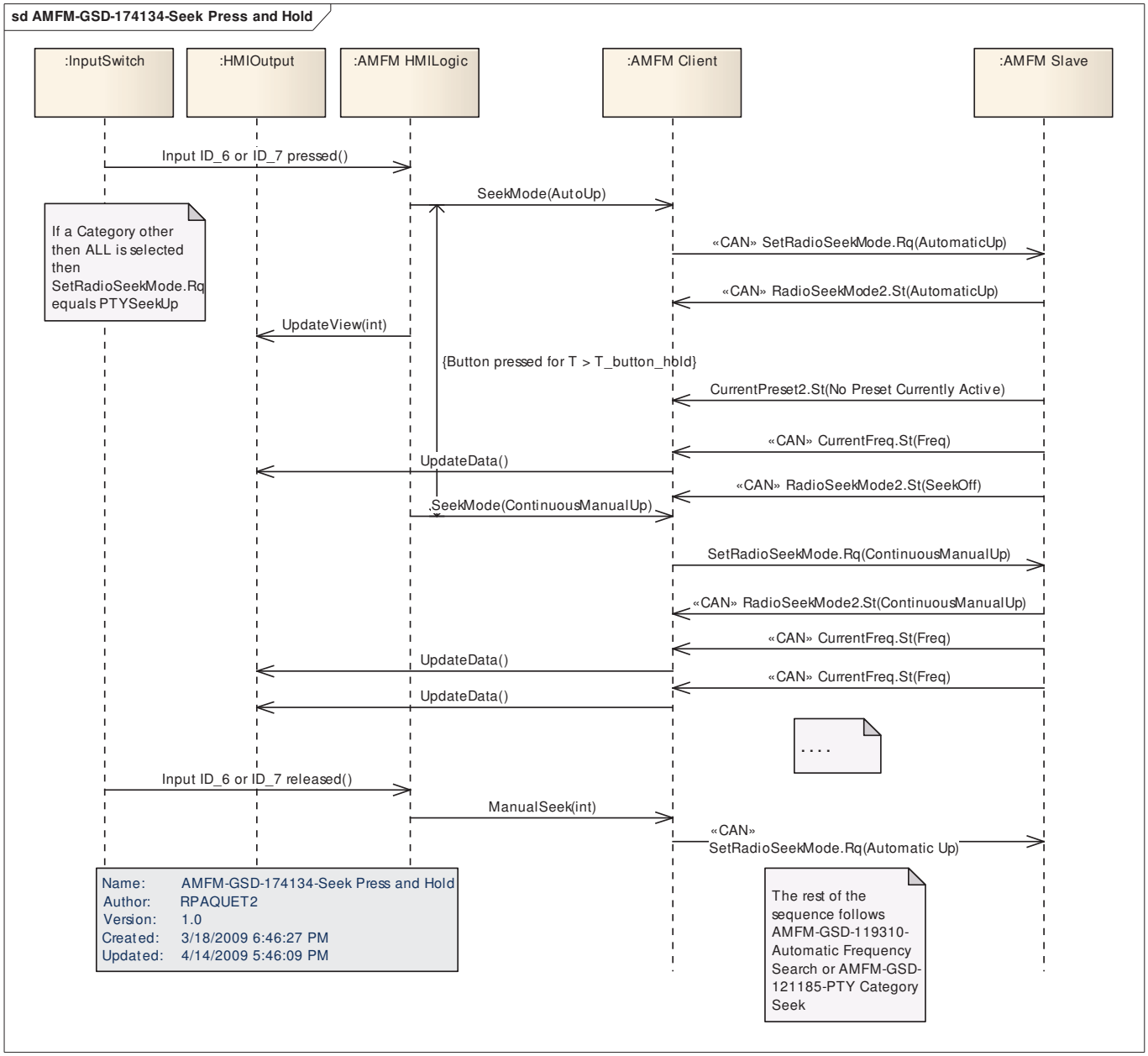
Constraints

Pre-condition

User is listening to AM or FM Radio.

Post-condition
The radio continuously seeks until the user releases the button at which point the next valid station is playing.

Sequence Diagram



7.9.3.4 AMFM-SD-REQ-023849/A-Automatic Frequency Search/PTY Search - E2 (TcSE ROIN-187189-1)

Scenario

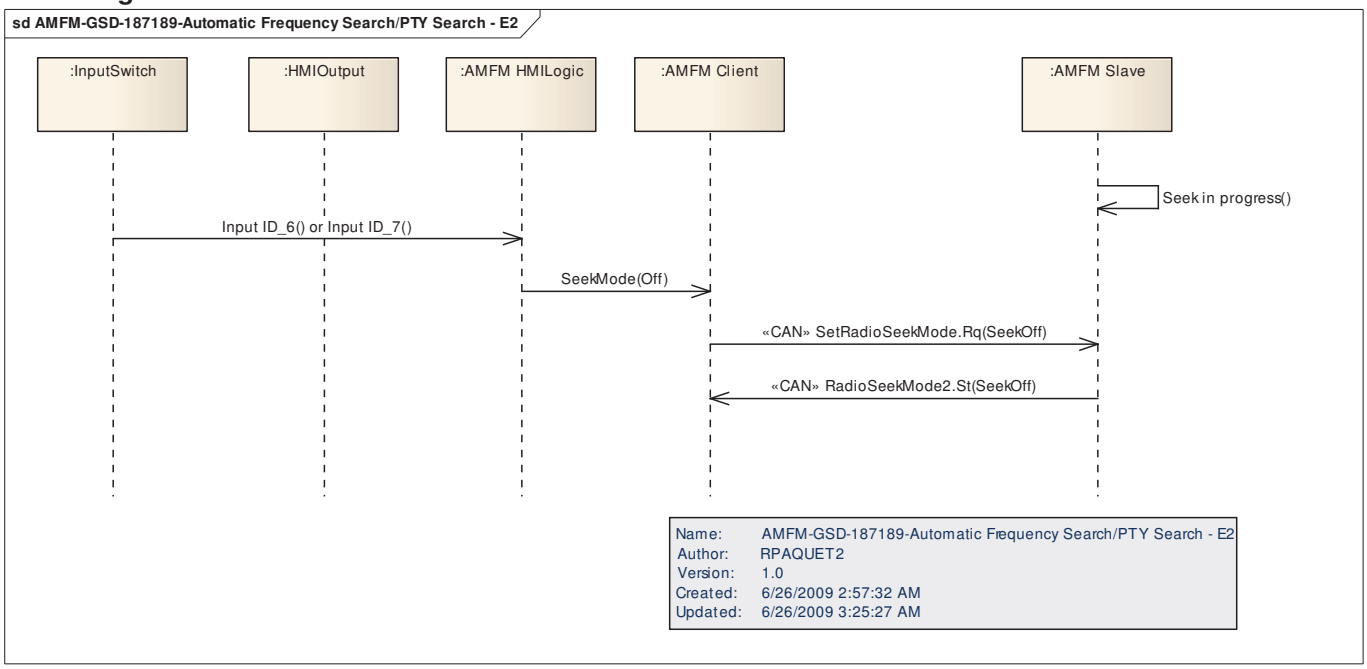
Scenario
The user has selected <Seek Up>, <Seek Down>.

Constraints

Pre-condition
Tuner is in Seek mode and has not found a valid station yet.

Post-condition
The AHU plays the last active station.

Sequence Diagram



7.10 HDR-FUN-REQ-024134/A-Frequency search when on an HD Multicast channel (TcSE ROIN-120268-2)

7.10.1 Use Cases

7.10.1.1 HDR-UC-REQ-024135/A-Frequency Search when on an HD Multicast channel (TcSE ROIN-24941-4)

Linked Elements
HDR-FUR-REQ-024125/A-HD tuner tune steps (TcSE ROIN-27907-2)
HDR-SR-REQ-023822/A-Listening to AM/FM Radio with HD active (TcSE ROIN-121061-1)
AMFM-FUR-REQ-023845/A-Tuner Seek (TcSE ROIN-27908-8)
HDR-SR-REQ-023853/A-Seek while on an HD multicast (TcSE ROIN-178509-4)
HDR-FUR-REQ-023823/C-HD Detect Decode (TcSE ROIN-27888-9)

Digital HD multicasting only available in FM.
When a user listens to a multicast of a radio station and the signal fades, the radio mutes while the tuner attempts to re-acquire the signal. ~~and the HD icon blinks. The strategy of reacquiring the multicast stream is per the Use Case titled "Unavailable Digital Signal/Loss of Digital Signal"~~

Scenarios

Normal Usage
The user selects <seek up> or <seek down> via HMI.
Seek function does not conduct a frequency seek and instead will go to previous or next digital HD multicast stream.

E1-The last multicast HD Stream is already tuned
AHU ~~tunes one step~~analog seeks in the direction specified by the user.

Constraints

Pre-condition
AHU is ON
Pre-condition
AM or FM is selected as the source.
Pre-condition
HD function is enabled in FM.

Pre-condition
HD stream available.
Pre-condition
Currently tuned station is a digital HD multi-cast stream.

Post-condition
The AHU plays selected station.

7.10.2 Requirements

7.10.2.1 HDR-SR-REQ-023853/A-Seek while on an HD multicast (TcSE ROIN-178509-4)

No Category Selected

When the Seek function is enabled while on an HD multicast "AMFM-GFUN-119998-Seek" ~~"AMFM-GSD-119303-2-Manual Frequency Tune"~~ shall be followed. ~~For Exception 1 in "HDR-GUC-24941-2-Frequency Search when on an HD Multicast channel" the system shall utilize "AMFM-GFUN-119998-3-Seek" when on the First/Last HD multicast depending on the direction of the Seek (Down/Up).~~

If the Seek press and hold function is cancelled while CurrentHDMulticast.St signal is set to 0x1 – 0x7 (Still on an HD multicast) then the AMFM Client shall send SeekOff as shown in the ~~"AMFM-GSD-119303-2-Manual Frequency Tune"~~ "AMFM-GSD-119303-Manual Frequency Tune" diagram.

If the Seek press and hold function is cancelled while CurrentHDMulticast.St signal is set to 0x0 (Not on an HD multicast) then the AMFM Client shall send AutoUp/Down.

Category Selected

When the Seek function is enabled while on an HD multicast "AMFM-GFUN-120048-PTY Category Selection and Search" ~~"AMFM-GFUN-120048-3-PTY Category Selection and Search"~~ shall be followed.

7.11 AMFM-FUN-REQ-024009/A-Store AM/FM Preset (TcSE ROIN-120018-2)

7.11.1 Use Cases

7.11.1.1 AMFM-UC-REQ-024010/A-Store AM/FM Preset (non-North American) (TcSE ROIN-25016-1)

Linked Elements
AMFM-FUR-REQ-024113/A-Station List (TcSE ROIN-27903-3)
AMFM-FUR-REQ-024114/A-EU - Regional Mode (TcSE ROIN-27900-2)
AMFM-FUR-REQ-023860/A-EU - Preset Storage (TcSE ROIN-60417-2)
AMFM-FUR-REQ-023954/A-EU - RDS (TcSE ROIN-27896-3)
AMFM-FUR-REQ-023985/A-EU - AF Strategy (TcSE ROIN-27901-2)
AMFM-FUR-REQ-023986/A-EU - PI Strategy (TcSE ROIN-27902-1)
AMFM-FUR-REQ-032073/A-EU - AF Strategy (TcSE ROIN-271456)
AMFM-FUR-REQ-092600/A-EU - AF Strategy
AMFM-FUR-REQ-092601/A-EU - PI Strategy
AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
AMFM-FUR-REQ-132994/A-EU - Preset Storage

Scenarios
Normal Usage
The user <stores> the active station onto the current preset bank in the user selected location via HMI.
The new preset replaces the previously set one.

Content of the stored station is frequency, PI, PS, AF

Constraints

Pre-condition
AHU is ON
Pre-condition
AM or FM is selected as the source.
Pre-condition
AHU is configured in EU mode.

Post-condition
The current AM or FM station is stored to the dedicated preset and continues playing current station.

7.11.1.2 AMFM-UC-REQ-024011/A-Store AM/FM Preset (North American) (TcSE ROIN-25010-2)

Linked Elements
AMFM-FUR-REQ-023860/A-EU - Preset Storage (TcSE ROIN-60417-2)
AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
AMFM-FUR-REQ-132994/A-EU - Preset Storage

Scenarios

Normal Usage
The user <stores> the active station onto the current preset bank in the user selected location via HMI.
The new preset replaces the previously set one.

Content of the stored station is the frequency.
E1-HD Stream is active during preset storage
Content of the stored station is ~~frequency.~~per ~~AMFM-GREQ-27904-2-Preset Storage~~AMFM-FUR-REQ-023859-Preset Storage.

E2-User attempts to store a direct tuned HD multicast station that does not exist
~~Content of the stored station is frequency and HD multicast stream number.~~
Only the station frequency is stored.

Constraints

Pre-condition
AHU is ON
Pre-condition
AM or FM is selected as the source.
Pre-condition
AHU is not configured in EU mode.

Post-condition
The current AM or FM station is stored to the dedicated preset and continues playing current station.

7.11.2 Requirements

7.11.2.1 AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)

Each preset shall store frequency and band.

~~Presets for RBDS enabled channels will additionally store PS~~

HD2+ enabled channels will ~~instead~~additionally store the "Short Name" and the HD multicast number.

Preset Store
When the user presses and holds a preset button for more than **T_PRESET_STORE**, the preset store function shall be activated. This function shall store the above information in the preset location corresponding to the preset button being pressed. The AHU shall mute the audio for 0.5 seconds upon receiving a valid request to store preset information to a specific preset location.

Preset Recall

When the user presses a preset button for less than **T_PRESET_STORE** the AHU shall tune to the frequency and band indicated in the selected preset.

Preset Recall with HD radio

~~If the preset was stored as an HD1 stream, w~~When the user selects ~~the~~ a non HD2+ preset from the currently available preset bank ~~and~~ the analog ~~station~~ frequency is immediately selected on the analog tuner. The HD tuner shall determine if an HD stream is available and then decode and process HD-1 if available.~~.~~

If the preset selected is an HD2+ multicast ~~stream other than HD1~~, the audio shall remain muted while the HD tuner determines if the desired HD stream is available. During the time the HD tuner is determining if an HD stream is available, the HMI shall ~~blink the HD icon~~indicate that HD is available.

If "T_HD decode" seconds pass and the selected HD multicast stream is not available, the AHU shall transmit the "HD_CHANNEL_UNAVAILABLE" message and ~~return to the previously tuned channel.~~remain muted.

7.11.2.2 AMFM-FUR-REQ-023860/A-EU - Preset Storage (TcSE ROIN-60417-2)

Each preset shall store frequency and band.
Presets for RDS enabled channels will additionally store PI, PS, frequency, and the AF table.

Preset Store

When the user presses and holds a preset button for more than **T_PRESET_STORE**, the preset store function shall be activated. This function shall store the above information in the preset location corresponding to the preset button being pressed. The AHU shall mute the audio for 0.5 seconds upon receiving a valid request to store preset information to a specific preset location.

If the PS is not available at the moment when the user stores the station, the next valid received PS shall be stored in the preset. It shall be possible to store the same station on more than 1 preset and also with different PS and PI (dynamic regional stations).

The AF memory for each preset shall store as many AF's as required to ensure proper AF switching, to get the best AF every time if the user is inside of the station reception area using the *Best AF strategy* *.
This *Best AF strategy* * is concept specific and could be different for each supplier although the resulting "Best AF" for the preset recall shall be the same.

> * *Best AF strategy* means that the tuner shall select the best possible AF for the target station. The weighting factors are field strength, multipath, adjacent channel and the RDS bit error rate information (if available). To get this information as accurate as possible, different suppliers have different methods and strategies that are owned by the supplier. Verification of the success of the AF strategy implementation shall be done cooperatively with the supplier and Ford engineering during the field test drive (jury evaluation).

Preset Recall

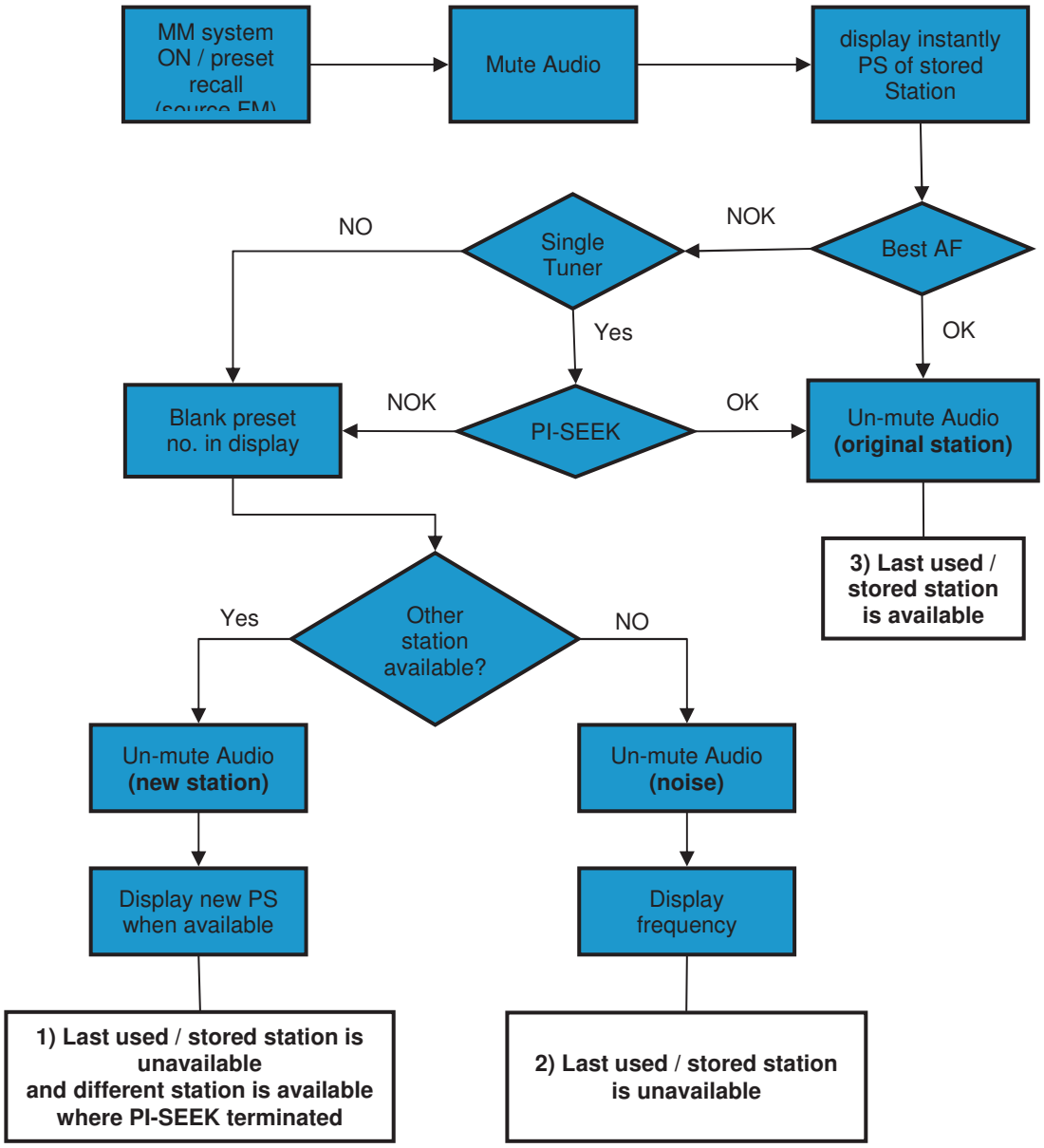
When the user presses a preset button for less than **T_PRESET_STORE** the AHU shall tune to the frequency and band indicated in the selected preset.

When selecting a Preset, the AHU shall check from the verified PI code to identify the best available AF within **T_PI** seconds.

If the stored station is not available then the AHU shall tune to the last used AF. If there is an invalid PI for this preset then the AHU shall stay tuned to the current frequency, but it shall delete the preset number and PS name. The new PS name shall be updated after the 1st confirmation (origin +1 confirmation) of the new PS name.

Regional stations and AF sorting shall be according to the industry standard "RDS-Method A and B".

"Best AF" after Power ON / Preset Recall Strategy



Notes:

- In 'garage condition', this algorithm shall result in bullet point 2' in the chart below. When the signal becomes available again, the PS code and preset numbers shall be restored.
- No AF change shall occur within **$T_{\_AF\_TURNON}$** seconds after power ON.

Fine tuning shall be done cooperatively with the supplier and Ford engineering during the field test (jury evaluation).

7.11.3 Sequence Diagrams

7.11.3.1 AMFM-SD-REQ-023861/A-Store Preset (TcSE ROIN-111303-1)

Scenario

Scenario

User presses and holds the Preset that they want to store the current station to.

Constraints

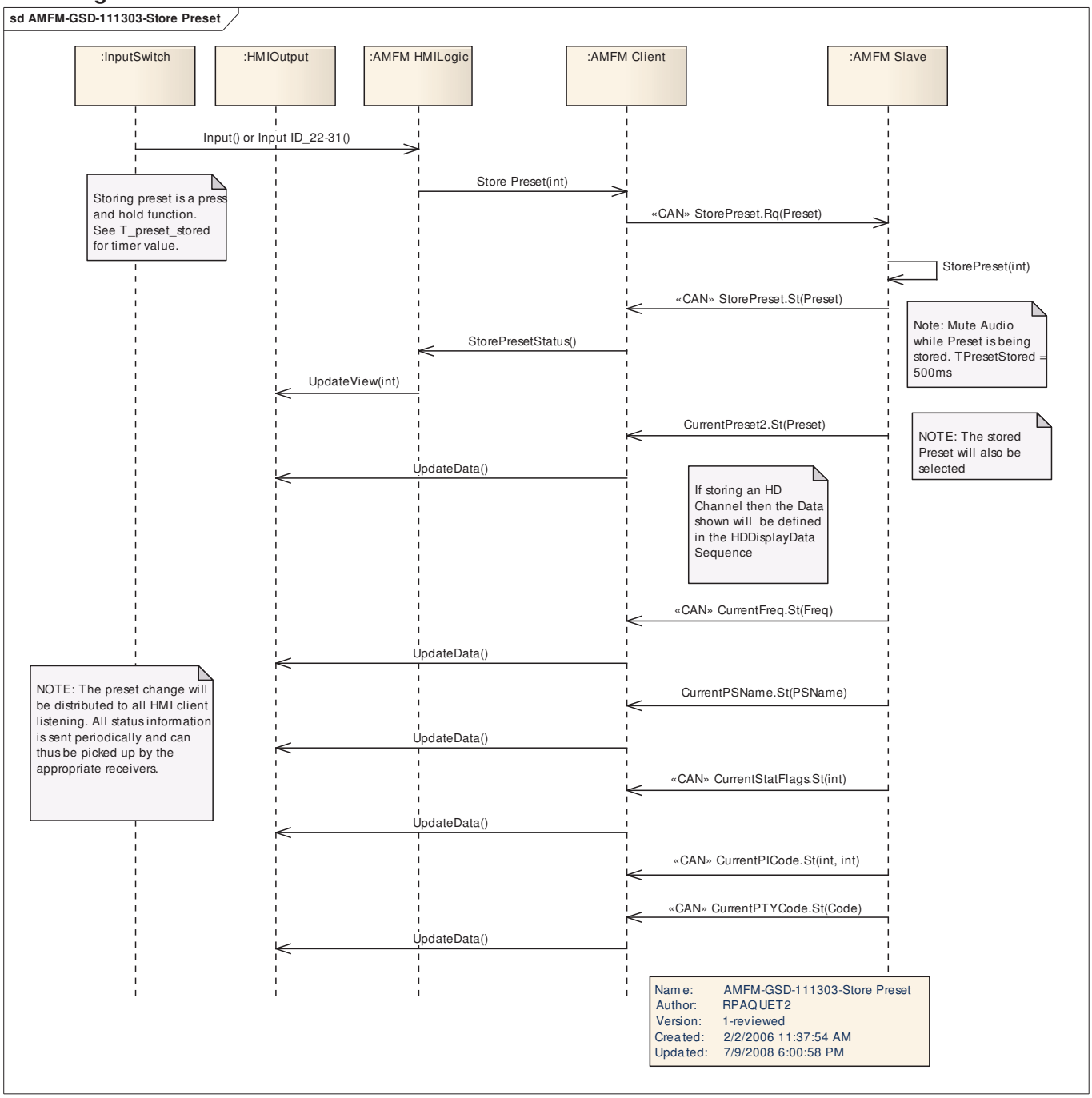
Pre-condition

The AHU is tuned to a station.

Post-condition

The AHU stored the Preset and continues to play the current station.

Sequence Diagram



7.12 HDR-FUN-REQ-024136/A-Storing a Preset with HD enabled (TcSE ROIN-120253-1)

7.12.1 Use Cases

7.12.1.1 HDR-UC-REQ-024137/A-Store AM/FM Preset with HD active (TcSE ROIN-66300-3)

Linked Elements
AMFM-SR-REQ-024115/A-Itunes Tagging (TcSE ROIN-183961-1)
HDR-FUR-REQ-024125/A-HD tuner tune steps (TcSE ROIN-27907-2)
HDR-SR-REQ-024150/A-Itunes Tagging (TcSE ROIN-121077-5)
HDR-SR-REQ-023822/A-Listening to AM/FM Radio with HD active (TcSE ROIN-121061-1)

AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
HDR-FUR-REQ-023823/C-HD Detect Decode (TcSE ROIN-27888-9)

Scenarios

Normal Usage

The user <stores> the active station onto the current preset bank in the user selected location via HMI.
The new preset replaces the previously set one.
HMI provides {audible customer feedback}.
Content of the stored station is frequency only for AM or FM HD1 stations.

Constraints

Pre-condition

AHU is ON

Pre-condition

AM or FM is selected as the source.

Pre-condition

HD function is enabled in the selected band.

Post-condition

The current AM or FM station is stored to the dedicated preset and continues playing current station.

7.12.1.2 HDR-UC-REQ-024138/A-Store FM Preset with HD stream 2+ active (TcSE ROIN-66308-2)

Linked Elements

AMFM-SR-REQ-024115/A-Itunes Tagging (TcSE ROIN-183961-1)
HDR-FUR-REQ-024125/A-HD tuner tune steps (TcSE ROIN-27907-2)
HDR-SR-REQ-024150/A-Itunes Tagging (TcSE ROIN-121077-5)
HDR-SR-REQ-023822/A-Listening to AM/FM Radio with HD active (TcSE ROIN-121061-1)
AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
HDR-FUR-REQ-023823/C-HD Detect Decode (TcSE ROIN-27888-9)

Scenarios

Normal Usage

The user <stores> the active station onto the current preset bank in the user selected location via HMI.
The new preset replaces the previously set one.
HMI provides {audible customer feedback}.
Content of the stored station is frequency and multicast stream number information.

Constraints

Pre-condition

AHU is ON

Pre-condition

FM is selected as the source.

Pre-condition

HD function is enabled in FM.

Post-condition

The current ~~AM or~~ FM station is stored to the dedicated preset and continues playing current station.

7.13 AMFM-FUN-REQ-024012/A-Select AM/FM Preset (TcSE ROIN-120023-1)

7.13.1 Use Cases

7.13.1.1 AMFM-UC-REQ-024013/B-Select FM Preset (non-North American) (TcSE ROIN-25040-1)

Linked Elements

AMFM-SR-REQ-024116/B-AMFM Band Preset Server Operation (TcSE ROIN-201283-2)
AMFM-FUR-REQ-024113/A-Station List (TcSE ROIN-27903-3)
AMFM-FUR-REQ-024114/A-EU - Regional Mode (TcSE ROIN-27900-2)
AMFM-SR-REQ-024117/A-AMFM Band Preset Client Operation (TcSE ROIN-202162-1)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)

AMFM-FUR-REQ-023860/A-EU - Preset Storage (TcSE ROIN-60417-2)
AMFM-FUR-REQ-023954/A-EU - RDS (TcSE ROIN-27896-3)
AMFM-FUR-REQ-023985/A-EU - AF Strategy (TcSE ROIN-27901-2)
AMFM-FUR-REQ-023986/A-EU - PI Strategy (TcSE ROIN-27902-1)
AMFM-SR-REQ-024054/A-Selecting an AM/FM Preset when AMFM Tuner is active (TcSE ROIN-129208-2)
AMFM-SR-REQ-024055/A-Selecting an AM/FM Preset when AMFM Tuner is not the current source (TcSE ROIN-129213-3)
AMFM-FUR-REQ-032073/A-EU - AF Strategy (TcSE ROIN-271456)
AMFM-FUR-REQ-051697/A-Preset Indication Update
AMFM-FUR-REQ-092600/A-EU - AF Strategy
AMFM-FUR-REQ-092601/A-EU - PI Strategy
AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
AMFM-SR-REQ-092583/A-AMFM Band Preset Client Operation
AMFM-SR-REQ-092586/A-AMFM Band Preset Client Operation
AMFM-FUR-REQ-132994/A-EU - Preset Storage
AMFM-FUR-REQ-024112/B-Autocompare (TcSE ROIN-27892-1)

Scenarios

Normal Usage

The user selects an available <preset> from the current preset bank via HMI.
The AHU tunes to the FM frequency and channel stored in the selected preset.
Select the station frequency according to the [Preset recall strategy].

E1-Preset data does not match broadcast data but another station w/matching broadcast data is present.

The AHU changes the frequency according to the [PI strategy].
AHU is playing selected FM station.

E2-Preset data does not match broadcast data, and another station w/matching broadcast data is not present

The AHU changes frequency to the stored frequency in the selected preset.
AHU is playing selected FM frequency.

Constraints

Pre-condition

AHU is ON

Pre-condition

FM is selected as the source.

Pre-condition

AHU is configured in EU mode.

Post-condition

AHU is playing selected FM station and frequency.

7.13.1.2 AMFM-UC-REQ-024014/B-Select AM Preset (non-North American) (TcSE ROIN-25034-1)

Linked Elements

AMFM-SR-REQ-024116/B-AMFM Band Preset Server Operation (TcSE ROIN-201283-2)
AMFM-SR-REQ-024117/A-AMFM Band Preset Client Operation (TcSE ROIN-202162-1)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)
AMFM-FUR-REQ-023860/A-EU - Preset Storage (TcSE ROIN-60417-2)
AMFM-SR-REQ-024054/A-Selecting an AM/FM Preset when AMFM Tuner is active (TcSE ROIN-129208-2)
AMFM-SR-REQ-024055/A-Selecting an AM/FM Preset when AMFM Tuner is not the current source (TcSE ROIN-129213-3)
AMFM-FUR-REQ-051697/A-Preset Indication Update
AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
AMFM-SR-REQ-092583/A-AMFM Band Preset Client Operation
AMFM-SR-REQ-092586/A-AMFM Band Preset Client Operation
AMFM-FUR-REQ-132994/A-EU - Preset Storage

Scenarios

Normal Usage

The user selects an available <preset> from the current preset bank via HMI.
The AHU tunes to the AM frequency stored in the selected preset.

Constraints

Pre-condition

AHU is ON

Pre-condition

AM is selected as the source.

Pre-condition
AHU is configured in EU mode.

Post-condition
AHU is playing selected AM frequency.

7.13.1.3 AMFM-UC-REQ-024015/B-Select FM Preset (North American) (TcSE ROIN-25028-1)

Linked Elements
AMFM-SR-REQ-024116/B-AMFM Band Preset Server Operation (TcSE ROIN-201283-2)
AMFM-FUR-REQ-024113/A-Station List (TcSE ROIN-27903-3)
AMFM-SR-REQ-024117/A-AMFM Band Preset Client Operation (TcSE ROIN-202162-1)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)
AMFM-FUR-REQ-023860/A-EU - Preset Storage (TcSE ROIN-60417-2)
AMFM-FUR-REQ-023955/A-RBDS (TcSE ROIN-27897-1)
AMFM-SR-REQ-024054/A-Selecting an AM/FM Preset when AMFM Tuner is active (TcSE ROIN-129208-2)
AMFM-SR-REQ-024055/A-Selecting an AM/FM Preset when AMFM Tuner is not the current source (TcSE ROIN-129213-3)
PERS-SR-REQ-014993/A-Selecting Radio Presets Level Personality (VEHICLE or PERS1-PERS3) (TcSE ROIN-145772-3)
AMFM-FUR-REQ-051697/A-Preset Indication Update
AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
AMFM-SR-REQ-092583/A-AMFM Band Preset Client Operation
AMFM-SR-REQ-092586/A-AMFM Band Preset Client Operation
AMFM-FUR-REQ-132994/A-EU - Preset Storage
AMFM-FUR-REQ-024112/B-Autocompare (TcSE ROIN-27892-1)

Scenarios

Normal Usage
The user selects an available <preset> from the current preset bank via HMI.
The AHU tunes to the FM frequency stored in the selected preset.

Constraints

Pre-condition
AHU is ON
Pre-condition
FM is selected as the source.
Pre-condition
AHU is not configured in EU mode.

Post-condition
AHU is playing selected FM frequency.

7.13.1.4 AMFM-UC-REQ-024016/B-Select AM Preset (North American) (TcSE ROIN-25022-1)

Linked Elements
AMFM-SR-REQ-024116/B-AMFM Band Preset Server Operation (TcSE ROIN-201283-2)
AMFM-SR-REQ-024117/A-AMFM Band Preset Client Operation (TcSE ROIN-202162-1)
AMFM-FUR-REQ-023860/A-EU - Preset Storage (TcSE ROIN-60417-2)
AMFM-SR-REQ-024054/A-Selecting an AM/FM Preset when AMFM Tuner is active (TcSE ROIN-129208-2)
AMFM-SR-REQ-024055/A-Selecting an AM/FM Preset when AMFM Tuner is not the current source (TcSE ROIN-129213-3)
PERS-SR-REQ-014993/A-Selecting Radio Presets Level Personality (VEHICLE or PERS1-PERS3) (TcSE ROIN-145772-3)
AMFM-FUR-REQ-051697/A-Preset Indication Update
AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
AMFM-SR-REQ-092583/A-AMFM Band Preset Client Operation
AMFM-SR-REQ-092586/A-AMFM Band Preset Client Operation
AMFM-FUR-REQ-132994/A-EU - Preset Storage

Scenarios

Normal Usage
The user selects an available <preset> from the current preset bank via HMI.
Frequency is selected to match the stored preset setting.

Constraints

Pre-condition
AHU is ON
Pre-condition
AM is selected as the source.

Post-condition
AHU is playing selected AM frequency.

7.13.2 Sequence Diagrams

7.13.2.1 AMFM-SD-REQ-023870/A-Select Preset (TcSE ROIN-111315-4)

Scenario

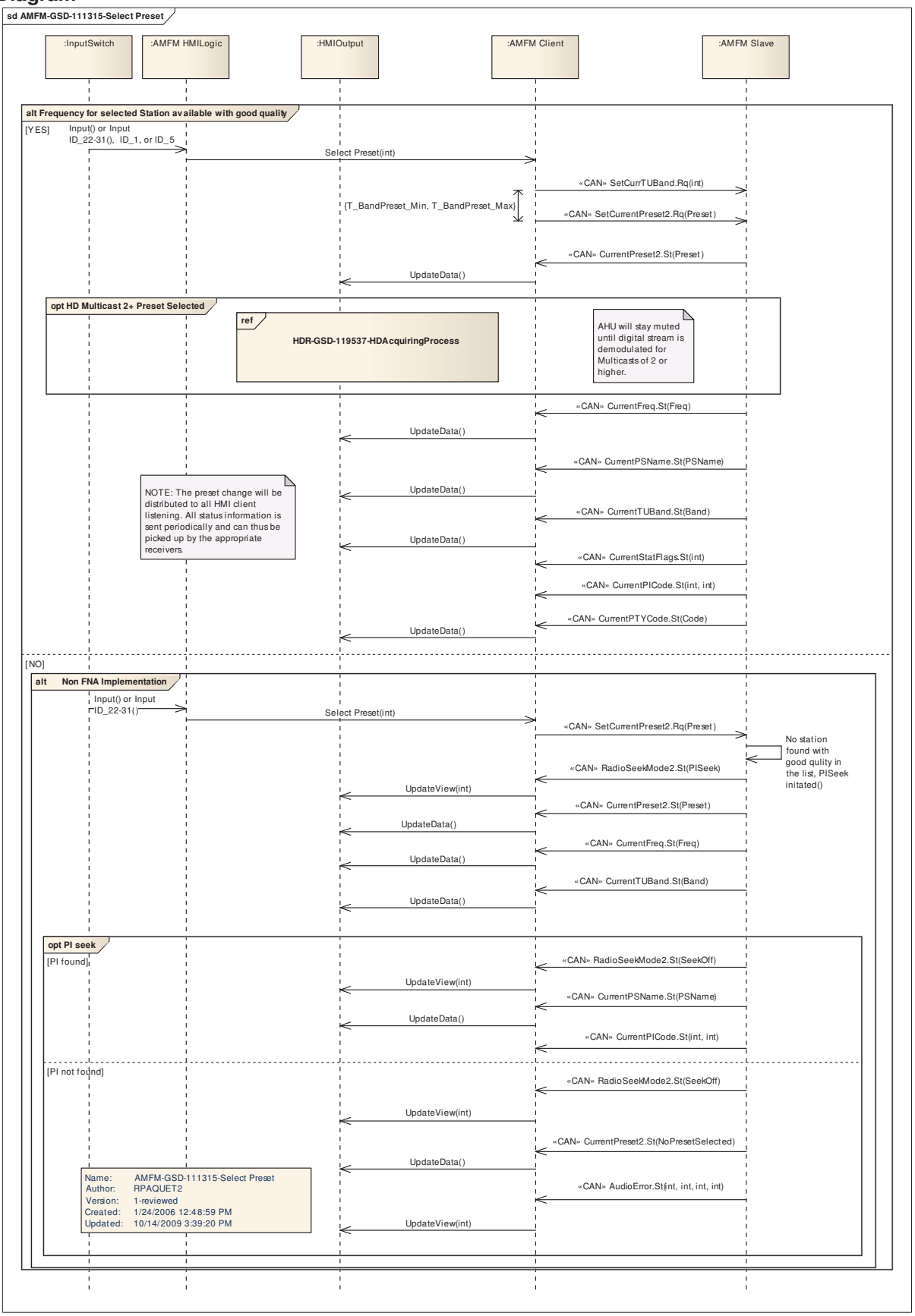
Scenario
The User selects a <Preset> via HMI.

Constraints

Pre-condition
The User is listening to the AM/FM Radio.

Post-condition
Selected Preset is playing.

Sequence Diagram



7.14 AMFMv2-FUN-REQ-024071/A-Select AM/FM Preset (TcSE ROIN-203233-2)

7.14.1 Use Cases

7.14.1.1 AMFM-UC-REQ-024013/B-Select FM Preset (non-North American) (TcSE ROIN-25040-1)

Linked Elements
AMFM-SR-REQ-024116/B-AMFM Band Preset Server Operation (TcSE ROIN-201283-2)
AMFM-FUR-REQ-024113/A-Station List (TcSE ROIN-27903-3)
AMFM-FUR-REQ-024114/A-EU - Regional Mode (TcSE ROIN-27900-2)
AMFM-SR-REQ-024117/A-AMFM Band Preset Client Operation (TcSE ROIN-202162-1)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)
AMFM-FUR-REQ-023860/A-EU - Preset Storage (TcSE ROIN-60417-2)
AMFM-FUR-REQ-023954/A-EU - RDS (TcSE ROIN-27896-3)
AMFM-FUR-REQ-023985/A-EU - AF Strategy (TcSE ROIN-27901-2)
AMFM-FUR-REQ-023986/A-EU - PI Strategy (TcSE ROIN-27902-1)
AMFM-SR-REQ-024054/A-Selecting an AM/FM Preset when AMFM Tuner is active (TcSE ROIN-129208-2)
AMFM-SR-REQ-024055/A-Selecting an AM/FM Preset when AMFM Tuner is not the current source (TcSE ROIN-129213-3)
AMFM-FUR-REQ-032073/A-EU - AF Strategy (TcSE ROIN-271456)
AMFM-FUR-REQ-051697/A-Preset Indication Update
AMFM-FUR-REQ-092600/A-EU - AF Strategy
AMFM-FUR-REQ-092601/A-EU - PI Strategy
AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
AMFM-SR-REQ-092583/A-AMFM Band Preset Client Operation
AMFM-SR-REQ-092586/A-AMFM Band Preset Client Operation
AMFM-FUR-REQ-132994/A-EU - Preset Storage
AMFM-FUR-REQ-024112/B-Autocompare (TcSE ROIN-27892-1)

Scenarios

Normal Usage
The user selects an available <preset> from the current preset bank via HMI.
The AHU tunes to the FM frequency and channel stored in the selected preset.
Select the station frequency according to the [Preset recall strategy].

E1-Preset data does not match broadcast data but another station w/matching broadcast data is present.
The AHU changes the frequency according to the [PI strategy].
AHU is playing selected FM station.
E2-Preset data does not match broadcast data, and another station w/matching broadcast data is not present
The AHU changes frequency to the stored frequency in the selected preset.
AHU is playing selected FM frequency.

Constraints

Pre-condition
AHU is ON
Pre-condition
FM is selected as the source.
Pre-condition
AHU is configured in EU mode.

Post-condition
AHU is playing selected FM station and frequency.

7.14.1.2 AMFM-UC-REQ-024014/B-Select AM Preset (non-North American) (TcSE ROIN-25034-1)

Linked Elements
AMFM-SR-REQ-024116/B-AMFM Band Preset Server Operation (TcSE ROIN-201283-2)
AMFM-SR-REQ-024117/A-AMFM Band Preset Client Operation (TcSE ROIN-202162-1)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)
AMFM-FUR-REQ-023860/A-EU - Preset Storage (TcSE ROIN-60417-2)
AMFM-SR-REQ-024054/A-Selecting an AM/FM Preset when AMFM Tuner is active (TcSE ROIN-129208-2)
AMFM-SR-REQ-024055/A-Selecting an AM/FM Preset when AMFM Tuner is not the current source (TcSE ROIN-129213-3)
AMFM-FUR-REQ-051697/A-Preset Indication Update
AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
AMFM-SR-REQ-092583/A-AMFM Band Preset Client Operation

AMFM-SR-REQ-092586/A-AMFM Band Preset Client Operation
AMFM-FUR-REQ-132994/A-EU - Preset Storage

Scenarios

Normal Usage

The user selects an available <preset> from the current preset bank via HMI.
The AHU tunes to the AM frequency stored in the selected preset.

Constraints

Pre-condition

AHU is ON

Pre-condition

AM is selected as the source.

Pre-condition

AHU is configured in EU mode.

Post-condition

AHU is playing selected AM frequency.

7.14.1.3 AMFM-UC-REQ-024015/B-Select FM Preset (North American) (TcSE ROIN-25028-1)

Linked Elements

AMFM-SR-REQ-024116/B-AMFM Band Preset Server Operation (TcSE ROIN-201283-2)
AMFM-FUR-REQ-024113/A-Station List (TcSE ROIN-27903-3)
AMFM-SR-REQ-024117/A-AMFM Band Preset Client Operation (TcSE ROIN-202162-1)
AMFM-FUR-REQ-024124/A-Mute for no signal (TcSE ROIN-27893-1)
AMFM-FUR-REQ-023860/A-EU - Preset Storage (TcSE ROIN-60417-2)
AMFM-FUR-REQ-023955/A-RBDS (TcSE ROIN-27897-1)
AMFM-SR-REQ-024054/A-Selecting an AM/FM Preset when AMFM Tuner is active (TcSE ROIN-129208-2)
AMFM-SR-REQ-024055/A-Selecting an AM/FM Preset when AMFM Tuner is not the current source (TcSE ROIN-129213-3)
PERS-SR-REQ-014993/A-Selecting Radio Presets Level Personality (VEHICLE or PERS1-PERS3) (TcSE ROIN-145772-3)
AMFM-FUR-REQ-051697/A-Preset Indication Update
AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
AMFM-SR-REQ-092583/A-AMFM Band Preset Client Operation
AMFM-SR-REQ-092586/A-AMFM Band Preset Client Operation
AMFM-FUR-REQ-132994/A-EU - Preset Storage
AMFM-FUR-REQ-024112/B-Autocompare (TcSE ROIN-27892-1)

Scenarios

Normal Usage

The user selects an available <preset> from the current preset bank via HMI.
The AHU tunes to the FM frequency stored in the selected preset.

Constraints

Pre-condition

AHU is ON

Pre-condition

FM is selected as the source.

Pre-condition

AHU is not configured in EU mode.

Post-condition

AHU is playing selected FM frequency.

7.14.1.4 AMFM-UC-REQ-024016/B-Select AM Preset (North American) (TcSE ROIN-25022-1)

Linked Elements

AMFM-SR-REQ-024116/B-AMFM Band Preset Server Operation (TcSE ROIN-201283-2)
AMFM-SR-REQ-024117/A-AMFM Band Preset Client Operation (TcSE ROIN-202162-1)
AMFM-FUR-REQ-023860/A-EU - Preset Storage (TcSE ROIN-60417-2)
AMFM-SR-REQ-024054/A-Selecting an AM/FM Preset when AMFM Tuner is active (TcSE ROIN-129208-2)
AMFM-SR-REQ-024055/A-Selecting an AM/FM Preset when AMFM Tuner is not the current source (TcSE ROIN-129213-3)
PERS-SR-REQ-014993/A-Selecting Radio Presets Level Personality (VEHICLE or PERS1-PERS3) (TcSE ROIN-145772-3)
AMFM-FUR-REQ-051697/A-Preset Indication Update
AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
AMFM-SR-REQ-092583/A-AMFM Band Preset Client Operation

AMFM-SR-REQ-092586/A-AMFM Band Preset Client Operation
AMFM-FUR-REQ-132994/A-EU - Preset Storage

Scenarios

Normal Usage

The user selects an available <preset> from the current preset bank via HMI.
Frequency is selected to match the stored preset setting.

Constraints

Pre-condition

AHU is ON

Pre-condition

AM is selected as the source.

Post-condition

AHU is playing selected AM frequency.

7.14.2 Sequence Diagrams

7.14.2.1 AMFM-SD-REQ-023872/A-Select Preset (TcSE ROIN-203236-1)

Scenario

Scenario

The User selects a <Preset> via HMI.

Constraints

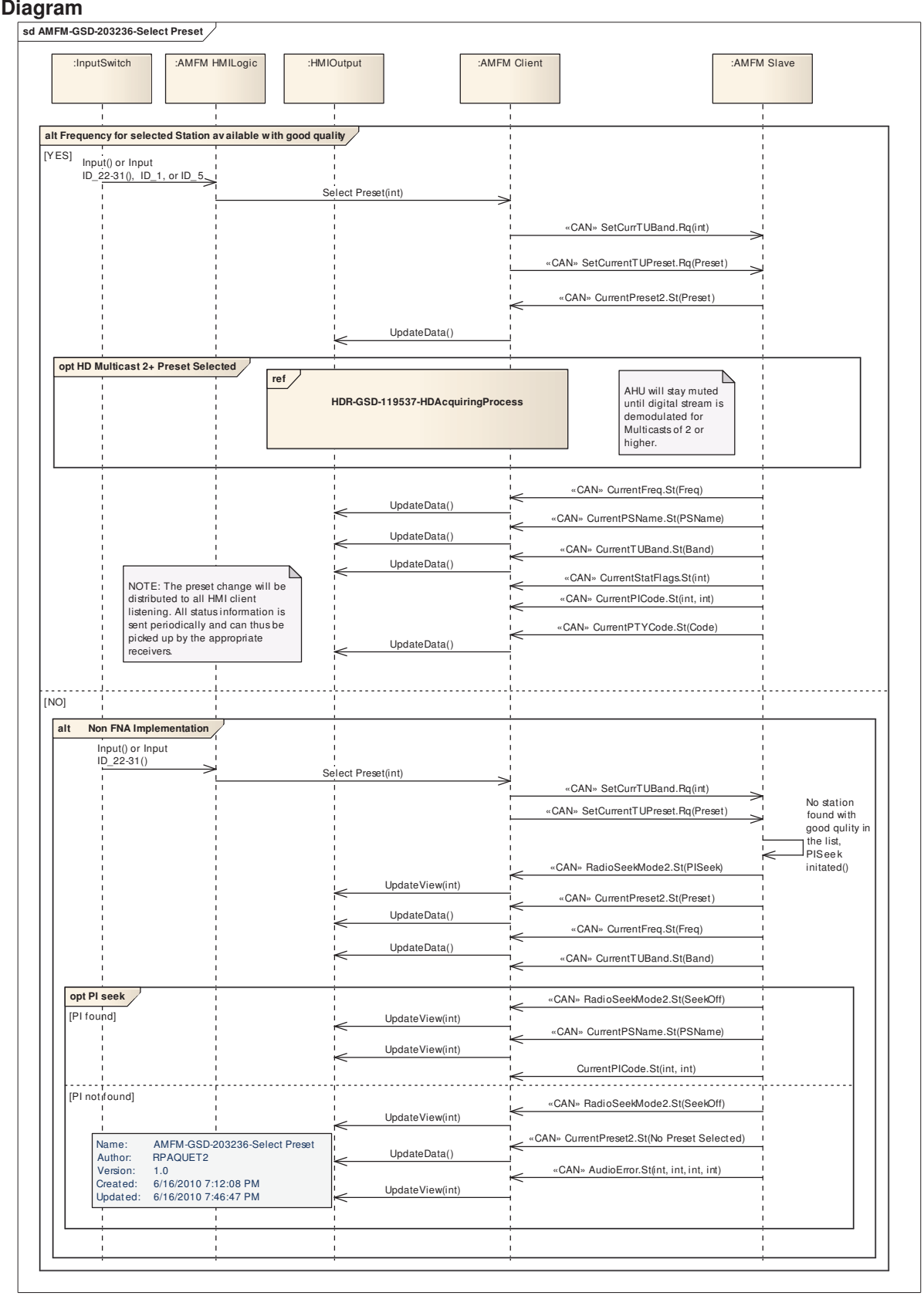
Pre-condition

The User is listening to the AM/FM Radio.

Post-condition

Selected Preset is playing.

Sequence Diagram



7.14.2.2 TU-SD-REQ-023873/A-Select Preset (Preset Only Request) (TcSE ROIN-268396-2)

Scenario

Scenario

Preset is selected.

Constraints

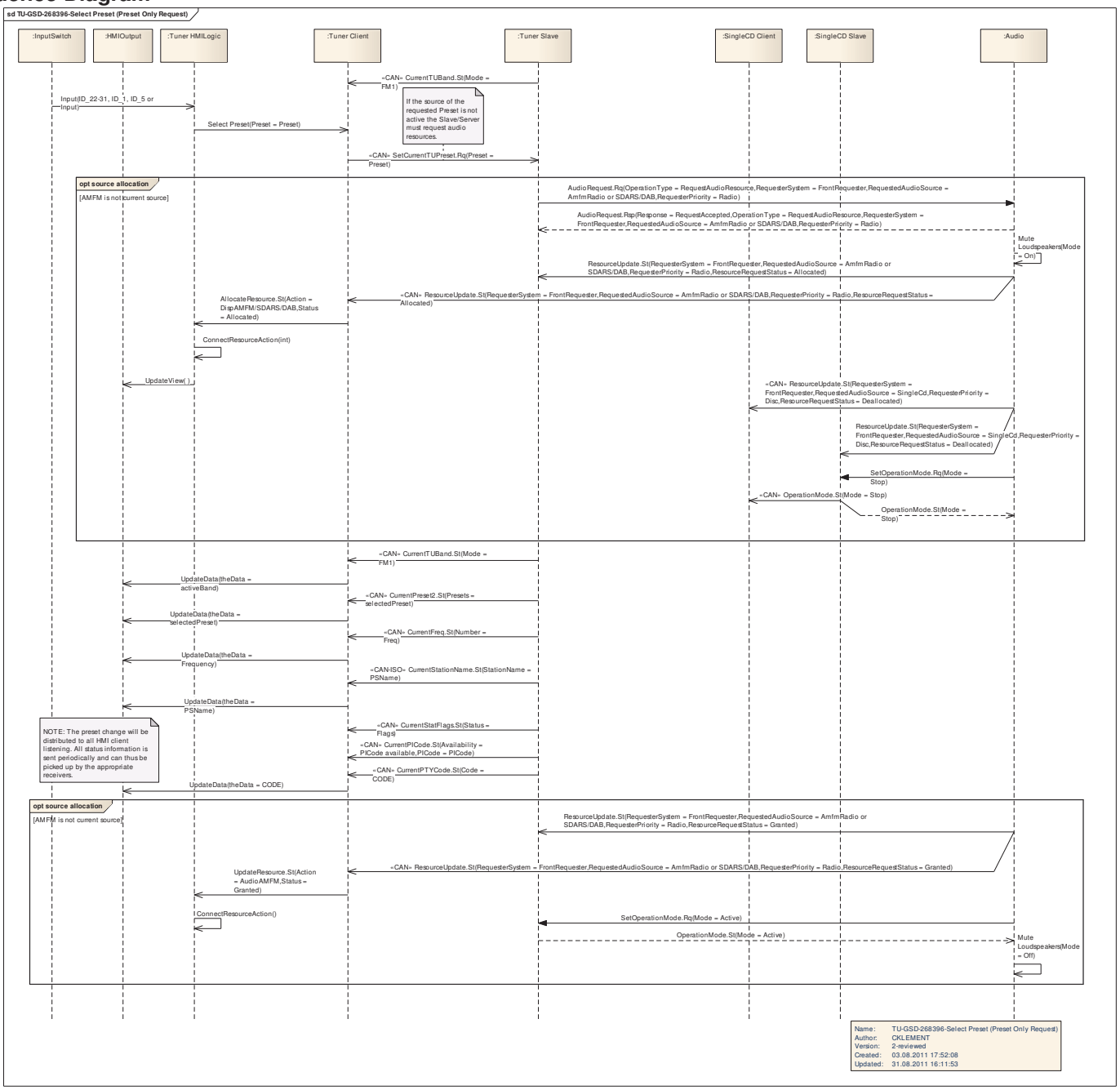
Pre-condition

The User is listening to any Source which could be interrupted by Radio, browsing a Tuner Preset list.

Post-condition

· The User is listening to Radio
· Selected Preset is active
· Band which is stated in CurrentTUBand_St / CurrentRadioBand_St is active again

Sequence Diagram



7.15 HDR-FUN-REQ-024139/A-Selecting a Preset in AM/FM with HD enabled (TcSE ROIN-120248-1)

7.15.1 Use Cases

7.15.1.1 HDR-UC-REQ-024140/A-Select AM or FM Preset with HD enabled (TcSE ROIN-24923-2)

Linked Elements
AMFM-SR-REQ-024115/A-Itunes Tagging (TcSE ROIN-183961-1)
HDR-SR-REQ-024150/A-Itunes Tagging (TcSE ROIN-121077-5)
HDR-SR-REQ-023822/A-Listening to AM/FM Radio with HD active (TcSE ROIN-121061-1)
AMFM-FUR-REQ-023860/A-EU - Preset Storage (TcSE ROIN-60417-2)
AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
AMFM-FUR-REQ-132994/A-EU - Preset Storage
HDR-FUR-REQ-023823/C-HD Detect Decode (TcSE ROIN-27888-9)

Scenarios

Normal Usage
The user selects an available <preset> via HMI.
Frequency is selected to match the stored preset setting.

E1-AHU determines that HD data stream is unavailable
AHU is playing selected analog frequency.

E2-Preset had Stream 2+ as the stored preset
Go to HDR-GUC-24929-1-Select FM Preset with HD stream 2+ stored.

Constraints

Pre-condition
AHU is ON

Pre-condition
AM or FM is selected as the source.

Pre-condition
HD function is enabled on requested band.

Post-condition
AHU is playing selected analog frequency.
A valid HD data stream is detected.
Radio audio blends from analog to digital.

7.15.1.2 HDR-UC-REQ-024141/A-Select FM Preset with HD stream 2+ stored (TcSE ROIN-24929-3)

Linked Elements
AMFM-SR-REQ-024115/A-Itunes Tagging (TcSE ROIN-183961-1)
HDR-SR-REQ-024150/A-Itunes Tagging (TcSE ROIN-121077-5)
HDR-SR-REQ-023822/A-Listening to AM/FM Radio with HD active (TcSE ROIN-121061-1)
AMFM-FUR-REQ-023860/A-EU - Preset Storage (TcSE ROIN-60417-2)
AMFM-FUR-REQ-023859/B-Preset Storage (TcSE ROIN-27904-4)
AMFM-FUR-REQ-132994/A-EU - Preset Storage
HDR-FUR-REQ-023823/C-HD Detect Decode (TcSE ROIN-27888-9)

Scenarios

Normal Usage
The user selects an available <preset> via HMI.
Preset has an HD 2+ stream stored in it.
~~Frequency~~ Station is selected to match the stored preset setting.

E1-AHU determines that HD data stream is unavailable
AHU remains muted until it sees a valid digital signal.
HMI indicates {HD PROGRAM NOT AVAILABLE}

E2-AHU determines that HD status is OFF when an HD preset request is made
AHU shall set the HD status to ON over the CAN bus and enable HD decoding.

AHU shall play the selected HD preset station based on the entry condition of HDR-GUC-24929-Select FM Preset with HD stream 2+ stored with HD enabled.

Constraints

Pre-condition
AHU is ON
Pre-condition
FM is selected as the source.
Pre-condition
HD function is enabled in FM.

Post-condition
AHU is muted until digital stream is demodulated.

7.16 AMFM-FUN-REQ-024017/A-Select Preset Bank (TcSE ROIN-120028-1)

7.16.1 Use Cases

7.16.1.1 AMFM-UC-REQ-024018/A-Select Preset Bank (TcSE ROIN-25046-2)

Linked Elements
AMFM-SR-REQ-024054/A-Selecting an AM/FM Preset when AMFM Tuner is active (TcSE ROIN-129208-2)
AMFM-SR-REQ-024055/A-Selecting an AM/FM Preset when AMFM Tuner is not the current source (TcSE ROIN-129213-3)

Scenarios

Normal Usage
The user selects a new <preset banks> via HMI.

E1-HD was turned off and the previous station in the selected bank is an HD2+
HD will remain off and the tuner will play the previous selected frequency and not the HD2+ multicast.

Constraints

Pre-condition
AHU is ON
Pre-condition
AM or FM is selected as the source.

Post-condition
Preset bank user selects is active.
Tuner will play the previous selected station on the selected bank.

7.16.2 Sequence Diagrams

7.16.2.1 AMFM-SD-REQ-023884/A-Select Frequency Band and Preset Bank (TcSE ROIN-111321-4)

Scenario

Scenario
Select Frequency Band and Preset Bank.

E1-HD was turned off and the previous station in the selected bank is an HD2+
HD will remain off and the tuner will play the previous selected frequency and not the HD2+ multicast.

Constraints

Pre-condition
The User is listening to any source.

Pre-condition
Multimedia System is On.