

1. INTRODUCTION

For all aircraft on the British register, whether on a Permit to Fly or Certificate of Airworthiness, and including aeroplanes, microlights and gyroplanes, there are certain requirements that need to be met in relation to aircraft avionics that transmit radio signals. This Technical Leaflet applies to VHF radios (transceivers) and transponders. Although radio navigation devices (DME, etc) aren't directly covered by this leaflet, the maintenance advice in section 7 is still relevant.

Advice on radio interference problems is given in [TL 3.14](#)
ELT installations are dealt with in [TL 3.18](#)

2. FLIGHT RADIO-TELEPHONY OPERATOR'S LICENCE

All operators of radios in aircraft, whether of permanently installed equipment or portable 'hand-held', are required to possess a Flight Radio-Telephony Operator's Licence. Such licences are issued by the CAA on successful completion of an appropriate course. Courses are usually conducted as part of the PPL training syllabus and include some airtime as well as ground school instruction and exam.

The fundamental purpose of the licence is to allow the CAA to ensure that radio transmissions in the aviation environment are made only by competent 'qualified' individuals. For further information we suggest you contact a local flying training organisation directly, or the CAA Flight Crew Licensing Department, Tel. 01293 567171.

3. RADIO LICENCE

All owners of aircraft fitted with radio equipment must obtain a radio licence from the CAA, which must be renewed every three years for as long as the aircraft remains in service. There is a fee, which varies depending on the extent of the equipment fitted. The application form DAP1902 and details of the fees can be downloaded from the CAA website at <http://www.caa.co.uk>. This also applies to hand-held radios that are installed in aircraft.

4. EQUIPMENT APPROVAL

All radio equipment including portable equipment and transponders installed in UK aircraft must be of a type that has undergone an appropriate approval process by either EASA, the CAA or the FAA. In the case of equipment approved by the FAA, it must also be checked that the equipment meets European requirements that may not apply in the USA, e.g. for radios, 8.33Khz spacing. For the purposes of LAA aircraft, this equipment must have either a CAA approval number, an EASA ETSO approval number or an FAA TSO. Usually the equipment manufacturer or importer will have dealt with this matter. Details of avionics types that have been approved are provided on the [CAA](#), [EASA](#) and [FAA](#) websites. If in doubt about the status of new equipment, check with the supplier or contact the CAA, Tel. 01293 573134. Note that equipment obtained abroad, and even the latest products from well-established manufacturers, are sometimes found to be of a type that is not approved by CAA, EASA or FAA. Aircraft imported or found fitted with non-approved equipment will need to have that equipment removed.

Note that the CAA equipment approval numbering system for radio equipment has two sub-categories. 'LA1' equipment has no operational restrictions, but 'LA3' equipment may only be used where the carriage of the equipment is not mandatory. Under the current version of the Air Navigation Order, LAA understands this to be when flying in notified airspace or when flying at night when needing to remain in communication with ATC when a flight plan is filed. Notified airspace is listed in AIP GEN 1.5 paragraph 5, and includes flight in Controlled Airspace below FL195, Class A, B & C airspace, flight in a Radio Mandatory Zone (unless alternative procedures are being followed), and all aircraft flying IFR.

'Passive' equipment that just receive signals, such as GPS units, do not need to have an equipment approval. Where a GPS unit is connected to a transponder to provide 'ADS-B out', the

process for approval of new equipment installations can be found in form [LAA/MOD7](#) and for already-approved installations in form [LAA/MOD14](#).

Legislation has been introduced in Europe regarding the capability of voice communication radios:

- From 17 November 2013: all new radio installations must conform to the 8.33 kHz spacing standard. This applies to newly built aircraft and existing aircraft replacing their equipment. Aircraft being imported or rebuilt with an already-fitted non 8.33 kHz radio need not upgrade at this point providing it is of a type approved for use in the UK.
- From 1 January 2014: no aircraft may fly IFR in class A, B or C airspace unless equipped with an 8.33 kHz radio. No aircraft may fly VFR in class A, B or C airspace unless equipped with an 8.33 kHz radio if that airspace is operating under 8.33 kHz channel spacing.
- From 31 December 2017: all radio installations must conform to the 8.33 kHz spacing. The only exceptions being those items of equipment designed to operate only on the 25 kHz channels that have been specified in the legislation (two emergency frequencies and nine data frequencies). Back-up radios must also comply with this requirement.

UK CAA has recently issued a generic approval for 8.33 kHz hand-held radios that meet minimum requirements. The conditions of approval are given in CAA Information Notice [IN-2013/192](#). Owners buying a radio purporting to be approved to this standard should obtain written confirmation from the manufacturer that the conditions of CAA Aircraft Equipment Approval certificate LA301075 have been met. Note that these radios have an 'LA3' approval – see above note.

The installation of a transponder is a useful tool in helping other airspace users be aware of your position. Although Mode S units are mandatory in certain areas (e.g. above FL100, the London TMA, transponder mandatory zones, etc – full details in [UK AIP-GEN 1.5](#)), it is still permissible to install Mode A or C units on aircraft where transponder carriage is voluntary. Note, however, that the long-term ambition of the CAA is to phase out Mode A and C units and so they may have a limited useful life. Also, the requirements might be different when flying in other countries.

5. AVIONICS INSTALLATION APPROVAL

The installation of permanent transmitting avionics into LAA aircraft must be approved by the LAA. Note that avionics equipment designed to be portable (hand-held radio, hand-held GPS, etc) do not need installation approval.

The investigation of an avionics equipment installation involves checking that the avionics equipment is of an approved type, an inspection and ground test of the installation followed by a flight test. Applications for avionics installation approval must be made using a form [LAA/MOD7](#) which must be completed and signed up by a suitably approved LAA inspector or suitably licensed CAA avionics engineer.

Provided that the inspector is satisfied that the avionics installation meets the required design criteria and has signed the declaration on the LAA/MOD7 form and the aircraft has a valid Permit to Fly or PFRC (Permit Flight Release Certificate), a flight test is to be carried out according to schedule [LAA/FT-AVIONICS](#).

Approval is given by LAA Engineering once the installation is shown to be of an acceptable standard and a satisfactory flight test report is received. Since May 2008 this has been signified by LAA Engineering issuing an avionics installation approval certificate AD917/LAA for the aircraft which is sent to the aircraft owner.

Subsequent changes and upgrades to avionics equipment will require the same attention as above, including application on form LAA/MOD7 followed by a flight test according to flight test schedule LAA/FT-AVIONICS.

Where a Mode S transponder installation has already been approved on a form AD917/LAA and an owner subsequently wishes to connect a GPS to the transponder, an application may be made on form [LAA/MOD14](#). Approval of the connection following a satisfactory test is signified by the issue of a certificate AD917/LAA/ADS-B for that aircraft.

6. AVIONICS INSTALLATION PRACTICES

The following points are those that will need to be satisfied during installation and maintenance.

- Electrical installation must be in accordance with the **equipment manufacturer's instructions**.
- Equipment must be securely installed leaving no possibility that equipment can fall free, perhaps causing injury or **jamming controls**, especially in aerobatic aircraft.
- The existing **structural integrity** of the aircraft must not be compromised by the avionics installation: holes must not be drilled in structural components.
- The pilot must be able to operate associated switches and controls **from the 'strapped-in' position** and switches and controls should be suitably **marked and placarded**.
- Installation must not interfere with the satisfactory operation of the aircraft's controls or systems. For example, movement of control column must not be restricted and the pilot's line of sight of cockpit instruments should not be impeded.
- The quality of the pilot's **external view** should not be degraded.
- Installation must not present a hazard to the aircraft in the event of failure of the equipment; proper **electrical circuit** installation should avoid this possibility.
- Possible hazard to the occupants in the event of a **crash** should be minimised by ensuring that protruding knobs and brackets do not present in line with occupant's head, knees, etc, and that adequate soft furnishing protection is provided.
- Equipment should not unduly restrict occupant **emergency egress** from the cockpit.
- Associated **wiring and cables** must be properly 'bundled' and secured. Unsupported and spaghetti wiring is not acceptable.
- Only aviation quality wiring and terminals should be used. PVC-insulated wiring should not be used.
- The aircraft **weight schedule** must be amended and the aircraft **compass** must be checked and **swung**.
- Proper circuit protection must be incorporated.
- **Aerials** should be soundly installed with aerial cables properly routed and secured.
- A satisfactory flight test is required.
- Checks must be made that the equipment is not affected by other electrical systems (e.g. strobe lights) and also that the transmitting equipment does not adversely affect other systems.
- GR 18 (CAA [CAP747](#)) recommends that multiple radio systems are not fed by a system whereby a single failure (of fuse, switch, relay, etc) does not render all the radios unavailable. An excellent article by Bob Nuckolls describes a very sensible approach (www.aeroelectric.com/articles/avmaster.pdf).
- Where a GPS is connected to a Mode S transponder, the transponder must be set to **SIL=0** and **SDA=0**.

While there is no legally mandatory requirement to fit a **back-up press-to-transmit** button in Permit aircraft, it makes good sense to do so in case of failure of the primary PTT switch. In radio-equipped aircraft which are fitted with dual controls, separate PTT buttons should be available for the pilots in the P1 and P2 position and the intercom wiring should be arranged so that radio transmissions can be made from either headset depending on which PTT button is

depressed. Radio transmissions ('sidetone') and reception should be clearly audible in flight from both pilot positions. This is now more important than in the past because 2-seat Permit aircraft are increasingly being used for carrying out coaching flying and biennial review flights, which include a requirement to demonstrate and monitor radio calls. It is impossible to provide effective coaching unless clear communication is available between the P1 and P2 positions, as well as to and from the ground. Circumstances have also arisen in the past where the check pilot could not transmit from the P2 position and was unable to transmit a warning call when an emergency arose.

Consult your intercom manufacturer for the necessary wiring and switching circuits required to achieve the above.

Note that special additional requirements apply for the fitment of **auto-pilots** in LAA aircraft – contact LAA Engineering for information when required.

7. CONTINUED MAINTENANCE

LAA aircraft avionics installations must be inspected during the annual inspection for the Permit to Fly renewal to show that they are in good working order and remain securely installed. In particular, during flight test the quality of transmission and reception of radios should be checked. The CAA's Light Aircraft Maintenance Schedule (LAMS) requires CofA aircraft to have a radio transmission frequency tolerance check every 3 years and LAA recommend that LAA aircraft owners contact a suitably equipped avionics engineer for this check on a similar basis.

It is advisable to check the altitude encoding information transmitted by Mode C and S transponders, as received by the air traffic unit, corresponds with the aircraft's altimeter at the corresponding pressure setting, at least annually. The programmed aircraft identifier code should also be checked regularly. LAA recommends that avionics equipment, such as transponders and navigation equipment, should also be presented to a suitably equipped avionics engineer for checking and testing from time to time.

APPENDIX 1 – GROUND TESTING OF ADS-B OUT

In order to verify the ADS-B output, the transmitted data must be checked. The following method uses the PilotAware system to receive the ADS-B data and display it in a useable format. If an alternative method is used, this must be agreed with LAA Engineering prior to submitting test reports.

TEST EQUIPMENT SETUP

In order to receive the ADS-B data, a PilotAware system is required, running software version 20160307 or later. A tablet or smartphone ('computer') equipped with a GPS receiver is also required to generate receiver position data and display the received ADS-B data (the GPS data may alternatively be generated by a GPS receiver attached to the PilotAware unit). The PilotAware and computer need to be setup in accordance with the instructions provided by PilotAware (www.pilotaware.com).

Position the PilotAware and associated computer at a safe distance from the aircraft – a nearby clubhouse is ideal!

TEST PROCEDURE

Ensure that the aircraft is chocked and in a safe area with an appropriate person at the controls.

With the engine running and all electrical services switched on (e.g. strobes, lights, avionics, etc), ensure that the source GPS and transponder are on and transmitting.

Using the computer linked to the PilotAware unit, use a web browser to navigate to the PilotAware data screen (URL: 192.168.1.1). Select the 'traffic' screen, which should show a screen similar to this:

Home	Configure	Logging	Traffic	Updates	Tracks	Reboot					
Date: 2016:03:16 15:14:40											
Location: Lat:52.03928 Lng:-1.10491 Decimal Degrees											
HEX(20)	REG	SQ	DIST-KM	ALT-FT	SIG	Vers	NACp	SDA	NICa	SIL	SILs
406A3B	GMUJD	-	0.644	-393	197	2	10	0	0	0	0
C01759	C-FIVW	7303	43.272	10907	11	-	-	-	-	-	-
4CA63A	EI-DVG	4433	48.793	23257	13	-	-	-	-	-	-
4BA953	TC-JJS	3250	152.575	31407	6	-	-	-	-	-	-
4BA9CA	TC-JNJ	3222	162.812	35407	7	-	-	-	-	-	-
3C6565	D-AIKE	0634	164.293	33407	5	-	-	-	-	-	-
4CA912	EI-EPD	2051	182.874	36407	9	-	-	-	-	-	-
40690C	G-EZWK	2272	197.552	37407	4	-	-	-	-	-	-
484132	PH-BXC	6265	202.488	39407	5	-	-	-	-	-	-

- Check that the date, time and position are correct.
- Check that the aircraft being checked is listed (probably at the top) and that it shows the correct Mode S 'hex' code (which can be checked on the CAA's G-INFO database), registration and squawk code. The 'SDA' and 'SIL' fields must show '0'. Note that on later versions of PilotAware, this data is shown under the 'ADSB data' column as a series of numbers separated by commas. The 3rd and 5th numbers must both be zero.

If possible, take a screen print. On Google Chrome for tablets, this can be done by selecting 'print' from the drop-down menu and then saving as a PDF. Otherwise, a photo of the screen can be taken. Send the screen print/photo to LAA Engineering along with the completed form LAA/MOD7.

APPENDIX 2 – LIST OF POPULAR AVIONICS EQUIPMENT APPROVAL NUMBERS

The list below is not a comprehensive list of approved avionics equipment and their approval numbers. It is a list of 'popular' equipment installed by LAA members in LAA aircraft. The purpose of this list is to assist members who are experiencing difficulty in locating approval numbers on the CAA, EASA or FAA websites in order to complete their LAA/MOD 7 forms or CAA radio licence application forms.

TYPE	MAKE	MODEL	APPROVAL NO	8.33 kHz
AUDIO PANEL	GARMIN INTERNATIONAL	GMA 35	EASA.IM.210.10037276	N/A
AUDIO PANEL	GARMIN INTERNATIONAL	GMA 347	EASA.IM.210.479	N/A
CONTROLLER	TRIG AVIONICS LTD	TC20	EASA.210.1112, REV.B	N/A
CONTROLLER	TRIG AVIONICS LTD	TC90	EASA.210.10042343	N/A
DME	HONEYWELL INTERNATIONAL INC	KN-64	LA100279	N/A
DME	HONEYWELL INTERNATIONAL INC	KN-64	LA100279	N/A
ELT	ACK TECHNOLOGIES INC.	E-04	EASA.IM.210.10028407	N/A
ELT	AMERI-KING CORPORATION	AK-451-(AF)(AP)(S)	EASA.IM.210.1102	N/A
ELT	AMERI-KING CORPORATION	AK 451.017-1B	EASA.IM.210.10033545	N/A
ELT	ARTEX AIRCRAFT SUPPLIES INC	ME406	EASA.I.M.210.416	N/A
ELT	KANNAD	406 AF COMPACT	EASA.210.818, REV. A	N/A
GPS	GARMIN INTERNATIONAL	GPS100	LA301005	N/A
GPS	GARMIN INTERNATIONAL	GPS 155XL	VC01134	N/A
GPS	HONEYWELL INTERNATIONAL INC	KLN-89B	VC01071	N/A
GPS	HONEYWELL INTERNATIONAL INC	KMD 250	EASA.210.036.REV. A	N/A
GPS	II MORROW	GX 50	VC01160	N/A
GPS	SKYFORCE AVIONICS LTD	KMD 150	LA301065	N/A
GPS	SKYFORCE AVIONICS LTD	SM2000	LA301047	N/A
GPS	SKYFORCE AVIONICS LTD	SKYMAP IIIC (SM4000)	EASA.210.203 Rev. A	N/A
GPS	TRIMBLE NAVIGATION LTD	TNL-1000	LA301023	N/A
GPS	TRIMBLE NAVIGATION LTD	TNL2000	LA301004	N/A
NAV	BECKER FLUGFUNKWERK GMBH	NAV3300	EASA.210.738	N/A
TCAS	RYAN STORMSCOPE	9900BX	LA101077	N/A
TRANSPONDER	BECKER FLUGFUNKWERK GMBH	BXP6400	EASA.210.322	N/A
TRANSPONDER	BECKER FLUGFUNKWERK GMBH	BXP6401	EASA.210.322	N/A
TRANSPONDER	DYNON	SV-XPNDR-261	USE DETAILS FOR TRIG TT22	N/A
TRANSPONDER	DYNON	SV-XPNDR-262	USE DETAILS FOR TRIG TT21	N/A
TRANSPONDER	FILSER ELECTRONIC GMBH	TRT600	VC01211	N/A
TRANSPONDER	FUNKWERK AVIONICS GMBH	TRT800H	EASA.210.269	N/A
TRANSPONDER	FUNKWERK AVIONICS GMBH	TRT800	EASA.210.045	N/A
TRANSPONDER	FUNKWERK AVIONICS GMBH	TRT800A	EASA.210.268	N/A
TRANSPONDER	GARMIN INTERNATIONAL	GTX 328	EASA.IM.210.809	N/A
TRANSPONDER	GARMIN INTERNATIONAL	GTX 327	LBA.N.O.10.930-57 JTSO	N/A
TRANSPONDER	GARMIN INTERNATIONAL	GTX 330	LBA.N-O.10.930/064 JTSO	N/A
TRANSPONDER	GARMIN INTERNATIONAL	GTX 320	VC01108	N/A
TRANSPONDER	GARMIN INTERNATIONAL	GTX 320A	LBA.N-O.10.930/61 JTSO	N/A
TRANSPONDER	GARMIN INTERNATIONAL	GTX 33	EASA.IM.210.1255, REV.B	N/A
TRANSPONDER	GARMIN INTERNATIONAL	GTX 23	EASA.IM.210.1255, REV. B	N/A
TRANSPONDER	GARMIN INTERNATIONAL INC	GTX 330D	LBA.N-O.10.930/064 JTSO	N/A
TRANSPONDER	GARRECHT AVIONIC GMBH	VT-01	EASA 210.384 Rev.A	N/A
TRANSPONDER	HONEYWELL INTERNATIONAL INC	KT76A	LA100208	N/A
TRANSPONDER	HONEYWELL INTERNATIONAL INC	KT-76	LA100208	N/A

TYPE	MAKE	MODEL	APPROVAL NO	8.33 kHz
TRANSPONDER	HONEYWELL INTERNATIONAL INC	KT76C	LA101050	N/A
TRANSPONDER	HONEYWELL INTERNATIONAL INC	KT-73	EASA.210.063	N/A
TRANSPONDER	MICROAIR AVIONICS PTY LTD	T2000SFL	LA101080	N/A
TRANSPONDER	NARCO AVIONICS INC	AT-150TSO	VC00245	N/A
TRANSPONDER	NARCO AVIONICS LTD	AT-50	LA100198	N/A
TRANSPONDER	TERRA CORPORATION	TRT250	LA100346	N/A
TRANSPONDER	TRIG AVIONICS LTD	TT31	EASA.210.906 REV. A	N/A
TRANSPONDER	TRIG AVIONICS LTD	TT21 Software V1.xx	EASA.210.1056, REV.A	N/A
TRANSPONDER	TRIG AVIONICS LTD	TT22	EASA.210.1277	N/A
TRANSPONDER	TRIG AVIONICS LTD	TT21 Software V2.xx	EASA.210.10034900	N/A
TRANSPONDER	TRIG AVIONICS LTD	KT74	EASA.210.10046583	N/A
VHF COMM	AIRPLUS MAINTENANCE GmbH	KRT-2	EASA.210.10038036	Yes
VHF COMM	BECKER FLUGFUNKWERK GMBH	AR 4201	EASA.210.10038538	No
VHF COMM	BECKER FLUGFUNKWERK GMBH	AR-3201	VC00457	No
VHF COMM	BECKER FLUGFUNKWERK GMBH	AR6201	EASA.210.1249	Yes
VHF COMM	DITTEL GMBH	FSG 50	VC00358	No
VHF COMM	DITTEL gmbh, WALTER	FSG-70 SERIES	LA100331	No
VHF COMM	DITTEL,Gmbh WALTER	FSG-71M	LA100331	No
VHF COMM	DYNON	SV-COM-X83	USE DETAILS FOR TRIG TY91	Yes
VHF COMM	FUNKWERK AVIONICS GMBH	ATR-500	LBA.O.10.911/113 JTSO	No
VHF COMM	FUNKWERK AVIONICS GMBH	ATR 600	LBA.O.10.911/106 JTSO	No
VHF COMM	FUNKWERK AVIONICS GMBH	ATR833	EASA.210.193	Yes
VHF COMM	FUNKWERK AVIONICS GMBH	ATR833A	EASA.210.270	Yes
VHF COMM	GARMIN INTERNATIONAL	SL40	EASA.210.119	No
VHF COMM	GARMIN INTERNATIONAL	GTR 225A	EASA.IM.210.10043491	Yes
VHF COMM	GARMIN INTERNATIONAL	GTR 225B	EASA.IM.210.10043488	Yes
VHF COMM	HONEYWELL INTERNATIONAL INC	KY-97A	VC00439	No
VHF COMM	HONEYWELL INTERNATIONAL INC	KY-96A	VC00439	No
VHF COMM	HONEYWELL INTERNATIONAL INC	KY-92	LA100272	No
VHF COMM	HONEYWELL INTERNATIONAL INC	RT 241 SERIES	LA100211	No
VHF COMM	HONEYWELL INTERNATIONAL INC.	KY-197	VC00324	No
VHF COMM	ICOM (UK) LTD	IC-A200	LA301011	No
VHF COMM	ICOM (UK) Ltd	IC-A20	LA300341	No
VHF COMM	ICOM AMERICA INC	IC-A220T	TSO-C128a/-C169a	Yes
VHF COMM	MICROAIR AVIONICS PTY LTD	MICROAIR 760	LA301068	No
VHF COMM	NARCO AVIONICS INC	COM 120	VC00300	No
VHF COMM	NARCO AVIONICS INC	COM 800	VC00355	No
VHF COMM	NARCO AVIONICS INC	COM 810	VC00355	No
VHF COMM	TERRA CORPORATION	TX760D	LA301009	No
VHF COMM	TKM INC	MX 11	VC01085	No
VHF COMM	TRIG AVIONICS LTD	TY91	EASA.210.10042695, REV. B	Yes
VHF COMM	TRIG AVIONICS LTD	TY92	EASA.210.10042695, REV. B	Yes
VHF COMM	TRIG AVIONICS LTD	TY96	EASA.210.10058724	Yes
VHF COMM /GPS	GARMIN INTERNATIONAL	GNC 250 XL	LA101043	No
VHF COMM/NAV	GARMIN INTERNATIONAL	SL30	LBA.N-O.10.985/005 JTSO	No
VHF COMM/NAV	GARMIN INTERNATIONAL	GNC 255A	EASA.IM.210.10043506	Yes
VHF COMM/NAV	GARMIN INTERNATIONAL	GNC 255B	EASA.IM.210.10043490	Yes
VHF COMM/NAV	HONEYWELL INTERNATIONAL INC	KX-125	LA301029	No
VHF COMM/NAV	NARCO AVIONICS INC	MARK 12E	LA300345	No
VHF COMM/NAV	TERRA CORPORATION	TN-200 D	LA301013	No
VHF COMM/NAV	TERRA CORPORATION	TMA 230 D	LA301010	No

TYPE	MAKE	MODEL	APPROVAL NO	8.33 kHz
VHF COMM/NAV/GPS	GARMIN INTERNATIONAL	GNS 530W	EASA.IM.210.919	Yes
VHF COMM/NAV/GPS	GARMIN INTERNATIONAL	GTN750	EASA.IM.210.10048536.REV.A	Yes
VHF COMM/NAV/GPS	GARMIN INTERNATIONAL	GNS 430W	EASA.IM.210.920	Yes
VHF COMM/NAV/GPS	GARMIN INTERNATIONAL	GTN 650	EASA.IM.210.10037627	Yes
VHF/COMM/NAV	NARCO AVIONICS INC	MARK 12D	LA300305	No
VHF/COMM/NAV/GPS	GARMIN INTERNATIONAL	GNS 430	LA101059	Yes
VHF/COMM/NAV/GPS	HONEYWELL INTERNATIONAL INC	KX-155	LA101079	No
VHF/COMM/NAV/GPS	HONEYWELL INTERNATIONAL INC	KX 155A	LA101052	No
VHF/COMM/NAV/GPS	NARCO AVIONICS Ltd	MARK 12E/NCS-812	LA300345	No
VHF/COMM/NAV/GPS	NARCO AVIONICS LTD	ESCORT II	LA300328	No
VOR-VHF	NARCO AVIONICS INC	NAV-121 TSO	LA100260	No